Who Reaps what is Sown? A Feminist Inquiry into Climate Change Adaptation in Two Mexican *Ejidos*

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Abstract

This paper highlights the ways in which relations of power, specifically those of gender, shape knowledge production, resource distribution, decision-making and thus, adaptation to climate change. I utilize feminist standpoint theory and geographic conceptualizations of social reproduction to argue that policies and programs that seek to enhance adaptation to climate change must understand how gender affects differential access to resources and decision-making in the context of climate variability. Specifically, I argue that situated knowledge and social reproduction are useful conceptual tools for analyzing how women's daily activities and social locations shape what they know and how they respond to social and environmental stressors like drought. In making this argument, I present the results of fieldwork conducted in two rural communities in Mexico's semi-arid highlands to empirically explore the significance of gender in the production of knowledge, provisioning of resources, and the different ways that households adapt to climate change. This kind of critical engagement between feminist and adaptive capacity approaches opens up a conceptual space for reflection and encounters that move the debates closer toward addressing the challenges that climate change presents.

Introduction

The literature on adaptation to global environmental change argues that understanding the science behind the causes and consequences of climate change is inadequate for developing effective environmental policies. We must also understand the related issues of: how people adapt, the social processes of decision-making under uncertainty, and how states and society can contribute to building the capacity of households and communities to adapt (Eakin and Lemos, 2006; Lemos et al., 2007; Nightingale, 2009; Smit and Wandel, 2006; Yohe and Tol, 2002). Less clear, however, is how decision-making processes and power dynamics *within* households affect the strategies for adaptation that materialize across various networks and scales.

To address this gap, I put the adaptation literature in dialogue with feminist theories of knowledge and power to demonstrate how gender is the point around which decision-making and resource production and distribution within and outside households revolves. Here, I endeavor to demonstrate that feminist theories of knowledge production and of social reproduction are useful tools for understanding how knowledge formation and acquisition intersects with the social relations of power, specifically those of gender, directly affecting the abilities of rural households to take action in response to a changing climate. Working from the intersection of climate change adaptation scholarship and feminist theory, I argue that approaching questions of adaptive capacities through the lens of feminist standpoint and social reproduction provides greater insights into how women's material realities shape the production and exchange of knowledge and resources, within their households and within their communities as they contend with overlapping political, economic, and environmental changes. This, in turn, affects their ability to adapt to climatic variation and extremes such as El Niño-induced drought.

In making this argument, I present fieldwork conducted in two *ejidos*[2] in the central Mexican state of Guanajuato (figure 1). The *ejidos* are located in the northern part of the state, which is characterized by varied topography, high elevation and a semi-arid climate[3]. Although drought is within the norm of climate variation in a semi-arid region such as northern Guanajuato (figure 2), climate models predict that the number of droughts and erratic rainfall patterns will continue to rise, making this region less suitable for rain-fed crops (Conde et al., 1997; Magaña et al., 2000). Agriculture in both communities relies primarily on seasonal rainfall and is particularly susceptible to fluctuations in precipitation and temperature. As evidence of this, farmers in this study lost close to 100 percent of their rain-fed crops (primarily maize, beans, and squash) in 2009 due to an El Niño-induced drought. The devastating impact of this drought could be felt statewide

[2] Ejidos are agrarian communities that provide for common ownership of land while members have usufruct rights to farm on plots assigned to them.
[3] The region receives an annual average of 516mm (20 inches).

and as a result, the governor declared the state a "disaster zone" (García, 2009). Coupled with an economic crisis that had begun to take hold in 2008, the drought created a "double exposure" for families that disproportionately impacted women and those who depend on them in these *ejidos* (O'Brien and Leichenko, 2000). It is the potential increase in adverse climatic events and overall climatic uncertainty that poses new challenges to individuals' and households' capacity to adapt. This article focuses on both the drought as well as the associated effects of the economic crisis in the two communities under study.

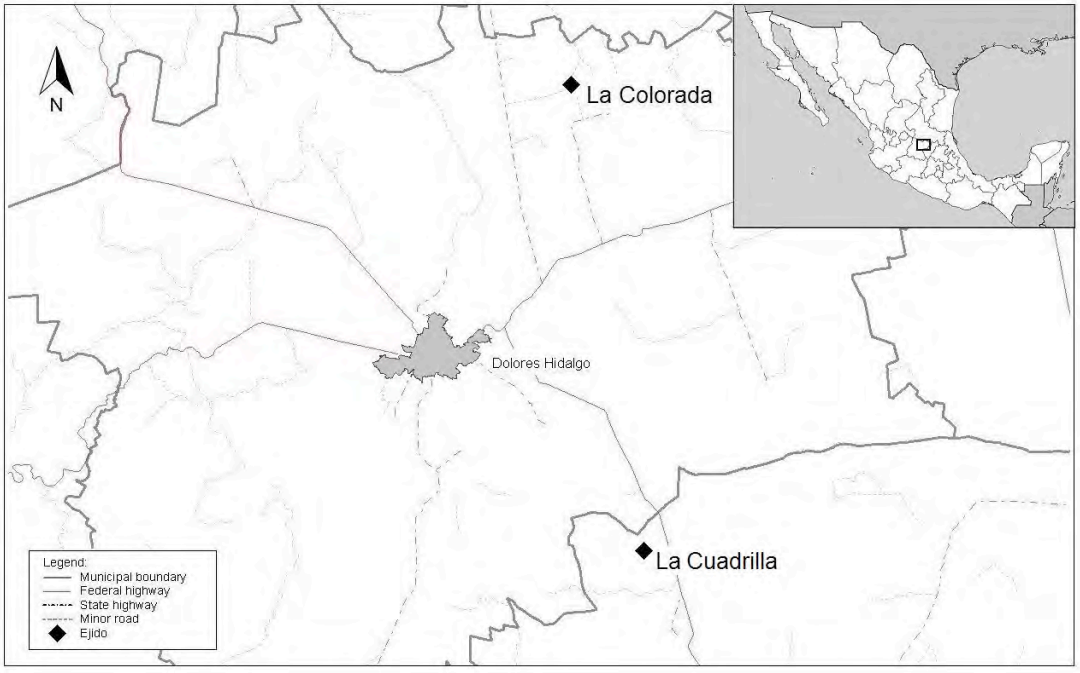

Figure 1: Location of the study area in northern Guanajuato, Mexico.

The findings presented in this article draw upon a combination of qualitative ethnographic, and visual/ participatory methods with participants that included primarily women from both farming and non-farm households, selected through purposive and snowball sampling. Specifically, I utilized household interviews[4],

[4] I conducted 70 household interviews in both communities, in which women were the primary respondents. 42 of these households were farming households. 14 of the households were single female-headed and an additional 6 households were married female-headed as their spouse was located in the US at the time. The remaining 50 household interviews were conducted with married women. Of the 70 women who were primary respondents for the interviews, 12 were grandmothers (currently living with grandchildren and possibly other extended family members), 50 were mothers (currently living with children and possibly other extended family members such as in-laws and daughter-in-laws), and 8 households had no children under age 20. The average age of these women was 51 years. Their occupations included, home-makers (66%), commercial or a small store (9%), self-employed agriculture (8%), agricultural wage worker (6%), domestic workers (4%), non-remunerative community work (3%), and other salaried work (4%).

participant observation, and gender resource maps, which are a means to visually demonstrate the spatial and gendered division of labor, responsibilities, and control over a variety of resources in the home, community and beyond (Slocum et al., 1995). I also facilitated mental map activities in each community designed to elicit specific knowledge of the causes and consequences of climate change (Tschakert, 2007; Tschakert and Sagoe, 2009; Zaksek and Arvai, 2004). This combination of methods provided me with a greater sense of the significance of gender for the provisioning of resources, the production of knowledge, the valorization of labor, and the different ways that households cope with climate change.

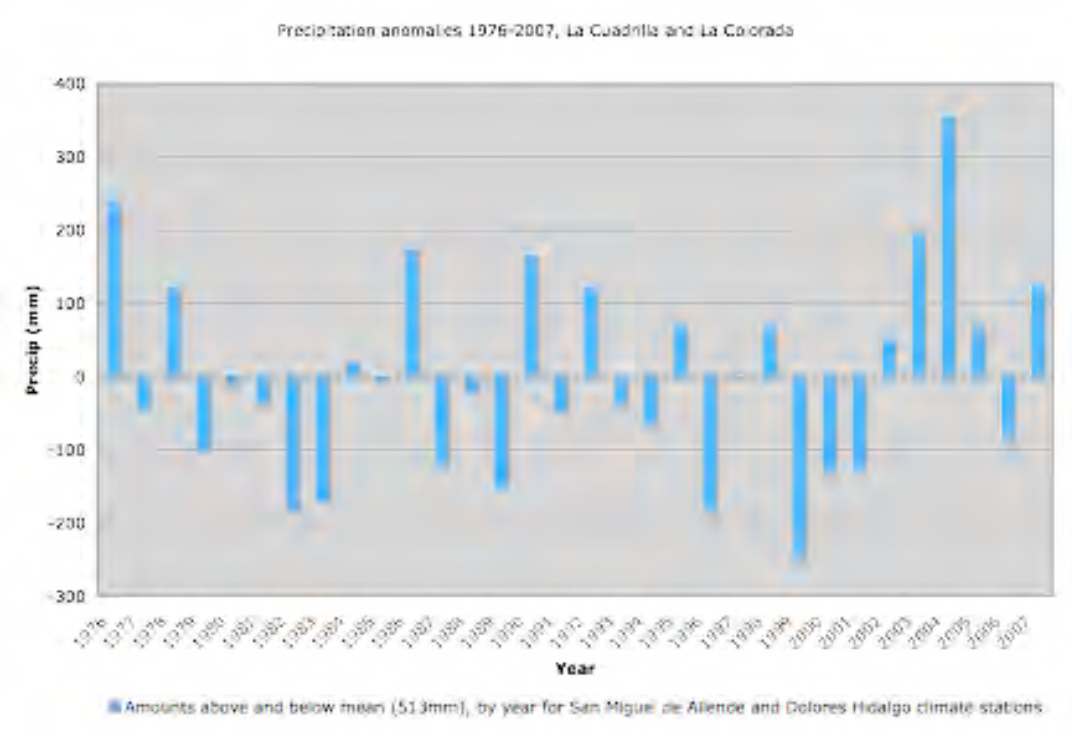

Figure 2: Precipitation anomalies 1976-2007 for La Cuadrilla and La Colorada.

In the following section, I describe women's role in agriculture in Mexico and how this shapes their access to and control over resources. Then, following a brief overview of the vulnerability and adaptation literature in Latin America and Mexico, I establish the theoretical framework for the case study by expounding on feminist standpoint theories and social reproduction and why these are useful tools for interrogating power imbalances and the constant negotiation of resources within the household, and across scales. This is followed by an analysis of the results, focusing on the intersection between knowledge production, resource distribution, and adaptation in the two field sites, as revealed by my methodological and theoretical approaches.

Women and Agriculture in Mexico

In Mexico, while there had been an eight percent decline in men and women occupied in agricultural activities between 2000 and 2007, agriculture remains a primarily male activity, with 60.7 percent of male occupations dedicated to this activity while only 21 percent of females are involved (Appendini, 2009). However, these numbers inaccurately represent the number of women who participate in non-remunerated farm activities, but who appear in the official statistics as identifiable "farmers." The lack of recognition of women's contributions to agricultural production means that the human resources expended in this sector are greatly underestimated. Furthermore, as Radel (2011) notes, the discursive construction of men as "farmers" and women as "housewives" creates differential access to and control over resources between men and women.

Throughout Mexico's land reform history, women have counted as only a small number of *ejiditarias*[5] largely due to inheritance practices and agricultural policy (Deere and León, 2001; Hamilton, 2002). According to the 2005 Agrarian Census, women *ejiditarias* control roughly 13.5% of all *ejido* land area dedicated to cultivation (parcels) while men control 57% and the remaining land area for parcels are controlled collectively (INEGI, 2007a). This represents only a three percent increase in the number of *ejiditarias* since 1984 (Deere & Leon, 2001). Another 24% of women are considered to be *possesionarios* or subjects that have land but do not have *ejido* rights (e.g. cannot participate in assembly meetings, do not qualify for agriculture-related government benefits), and 32% are considered to be "landless" women (INEGI, 2001). In the state of Guanajuato, 17.8% of *ejiditarios*, 18% of *posesionarios,* and 47% of the total landless subjects are women (INEGI, 2007b).

Other authors have emphasized that economic restructuring has led to a feminization of agriculture as there has been an increase in the number of women employed as agricultural wage workers, as well as growing number of women become farmers. Carmen Diana Deere (Deere, 2005) associates this last trend with the growing number of female-headed households in rural areas due to predominantly male migration or off-farm employment. Economic restructuring in Mexico and throughout Latin America, along with the resulting increase in male migration, has also resulted in an intensification of women's unpaid labor on family farms while simultaneously shouldering the responsibility of child-rearing, elder care, and other home-based and community responsibilities (Beneria and Feldman, 1992; Stephen, 1992). Yet this feminization of agriculture and increased workload is not simultaneously accompanied by an equal increase in women's access to and control over resources. As I will demonstrate, the differentiated

[5] *Ejiditarios/ejiditarias* are ejido members with land and its associated rights and priviledges. These individuals have the right to use and enjoyment of their parcels, as well as the right to participate and vote in ejido assembly meetings and any other rights that correspond to land holders (such as receiving government benefits).

access to and control over resources between men and women shapes both women's knowledge, as well as their capacity to create long-term adaptations to an increasingly uncertain climate.

Smallholder Adaptation and Vulnerabilities to Climate Change

Studies on household adaptive capacities in Mexico have found that income diversification, land access, and information provide households with enough flexibility to mitigate costs associated with changes in agricultural strategies and land use. Eakin (2006) argues that although farmers may possess the knowledge and skills to minimize crop losses, the availability of credit, insurance, technical support, and market conditions shape the strategies they select and the effectiveness of these decisions. With regards to farm household decision-making around risk and uncertainty in northern Mexico, Eakin and Bojórquez-Tapia (2008) found that although they did not have enough material capital to offset their sensitivity, *ejiditarios* were only low to moderately vulnerable compared to private property owners. These *ejiditarios* were following a traditional risk management strategy of income diversification, complementing their crop income with non-farm and livestock income. However, while this strategy effectively reduces their sensitivity to shocks, it does not necessarily enhance their capacity to deal with climatic stress (Eakin and Bojórquez-Tapia, 2008).

Eakin also argues that the role of subsistence agriculture as insurance in the process of economic diversification should not be underestimated (Eakin, 2005). In fact, she writes, "Policies that facilitate processes of economic diversification while not underestimating the fundamental viability of family farm production will not only help households deal with the environmental uncertainties that have persistently faced agriculture, but also conversely provide them the subsistence security to mediate survival in the evolving economy" (Eakin, 2005, 1936). In this context, she further argues that policies that marginalize small-scale farmers run counter to the need to build capacities and offer alternatives in the face of social and economic uncertainties (Eakin, 2005).

Yet while Eakin has shown that the broader policy environments constrain farmer's responses to climatic variability in Mexico, I demonstrate that a close look a gender relations within households and within the Mexican social fabric reveals that women's responses to climatic variability are shaped by not only the policy environment, but broader relations of power. Within the broad adaptation literature, there is a growing concern regarding how capacities to adapt are shaped by larger social, political and economic factors, which influence the decision-making process (Agrawal, 2008; Bohle et al., 2006; Carr, 2008; Eakin and Lemos, 2006; O'Brien and Leichenko, 2000; Pelling, 1998; Tschakert, 2001; Tschakert, 2007). At the same time, there is general agreement that decision-making and actions in response to or anticipation of climate uncertainty are embedded in social processes that reflect the relationship between individuals, their networks, capabilities, social capital and the state (Adger et al., 2003). Furthermore, while

communities in Mexico, and indeed across the globe, are differently affected by climate change, feminist scholars argue that these affects will be further exacerbated along axes of differences that influence resource distribution (Nightingale, 2009; Onta and Resureccion, 2011; Arora-Jonsson, 2011). Yet, few studies have ventured to analyze the various social processes and relations that regulate the production of knowledge, and how this knowledge is then translated into action. I propose that examining women's material practices provides greater insights into how social categories, in this case gender, produce and reproduce knowledge and social relations of power. In the next section, I explore the benefits of utilizing feminist standpoint theory as a lens to tease apart how material practices produce and reproduce situated knowledge and power relations that then shape the capacity to adapt to climate change.

Feminist Theories of Knowledge Production and Power

Feminist standpoint theory is primarily concerned with how women's daily activities, responsibilities, and material realities shape their perceptions, knowledge, and experiences, including those pertaining to climate change and adaptation (Hartsock, 1998; Smith, 1990). Central to this understanding is an emphasis on all knowledge as situated knowledge, as outlined by Donna Haraway (1988). Haraway argues that social hierarchies (gender, class, race, etc.) affect the production of knowledge and represent ongoing constraints to any achievement of universal knowledge. Particularly, she develops the idea of "embodied" knowledge and argues that knowledge production should begin at the scale of the "body, always a complex, contradictory, structuring, and structured body, versus the view from above, from nowhere, from simplicity" (Haraway, 1988, 589). The body, in this theorization, represents the material grounding of the subject in relation to structural relations of power. The body represents both the site for locating identity as well as the ground for extracting knowledge from real people, who occupy real places and who engage in social activities via their embodiment.

In identifying structural relations of power, such as gender, feminist standpoint theorists such as Haraway and Hartsock utilize a systemic or constitutive notion of power to locate power in women's life experience and in their reproductive and productive activities. In this article, I draw on Hartsock's (1990) conceptualization of power as always "essentially contested" (158). In other words, power is continually struggled for, opposed, shared, exchanged, and negotiated. Because agency is intimately linked with power, it can also be contested and as a result, can comply with power at times, and contest power at other times. Although some feminist theorists view agency as strictly oppositional (Goddard, 2000), by employing feminist standpoint theory, this article understands both power and agency as non-static and continually disputed. I draw on feminist standpoint theory (and social reproduction, as described below) for it's usefulness in bringing attention to women's agency, their capacity (or lack of) to act, and recognizing women as subjects that are not only constructed by, but also responding to, unequal and oppressive power relations (Liddle and Wright, 2001).

The concepts of situated knowledge and social position are especially useful for analyzing how women's daily activities and social locations shape what they know and how they respond to forces beyond their control, such as economic restructuring and long-term climate variation. This work also facilitates studies of the ways that women's knowledge and structural relations of power contribute to or reduce their vulnerabilities and shape their capacity to adapt to an uncertain climate.

Also key in this feminist scholarship is the engagement of both production and reproduction. In Marxist theory, social reproduction refers to creation of a labor force as well as the structures of class inequality that maintain the marginal status of that labor force (Katz, 2004; Laslett and Brenner, 1989). Feminist scholars have broadened this definition to include the work-mental, emotional, manual-to create and maintain life on a daily and long-term basis as well as the reproduction of systems of gender inequality (Laslett and Brenner, 1989). As sociologists Barbara Laslett and Johanna Brenner suggest, a feminist approach to social reproduction holds that "renewing life is a form of work, a kind of production, as fundamental to the perpetuation of society as the production of things. Moreover, the social organization of that work, the set of social relationships through which people act to get it done, has varied widely and that variation has been central to the organization of gender relations and gender inequality" (Laslett and Brenner, 1989, p. 383).

Feminist scholarship on the geographies of care further expands this literature to include spatial aspects. Particularly important for my study is the work of feminist geographer Cindi Katz, who elaborates a geopolitical concept of social reproduction. Katz writes that social reproduction is both the "fleshy, messy, and indeterminate stuff of everyday life" and a "set of structured practices that unfold in dialectical relation to production, with which it is mutually constitutive and in tension" (Katz, 2001, p. 711). In her study of children's lives in Sudan, she focuses on the seemingly mundane activities of children-work and play-as a way to understand the processes of development and global change. In doing so, she illustrates how children's daily activities and everyday interactions provide opportunities to acquire, try out, and alter environmental knowledge, as well as personal and group identity. As a consequence, children's daily activities contribute to the social reproduction of village life, both through the generation of knowledge and identity. She also emphasizes children's production and exchange of environmental knowledge as a means to understand the tensions between social reproduction and the transformations taking place in rural Sudan. Her study thus combines Marxist geographic theories of spatial production with feminist standpoint theories that explore the relationship between environmental knowledge production and resource distribution.

In my work, I combine Katz' approach with that of the feminist standpoint theorists to understand how women develop knowledge that affects their responses to climate change and economic restructuring in central Mexico. Focusing on

gender and social reproduction within the household reveals how the work of social reproduction is distributed between men and women, and between the family and other institutions. In this way, a focus on gender and social reproduction opens space to question how the material realities of women's lives reflect their opportunities and capacities for adaptation. This focus, in dialogue with a feminist standpoint perspective that also highlights the situated production of knowledge, provides additional insights into the socio-ecological transformations, such as neoliberal agricultural policy and climatic extremes like drought, taking place in the Mexican countryside and the capacities of individuals, households and communities to respond. Given that numerous studies reveal that women are disproportionately vulnerable to natural and social stressors (Enarson and Morrow, 1998; Fordham, 2004; Moser, 1996; Roy and Venema, 2002; Schroeder, 1987), and the unequal intra-household allocation of resources, particularly with regards to food and healthcare, becomes accentuated during times of crisis (Agarwal, 1992; Kabeer, 1994; Quisumbing and Smith, 2007; Sen, 1981), feminist theories of knowledge, power and resources offer new ways of thinking about adaptive capacities.

The Gendered Distribution of Social Reproduction

In the Fields

Women's labor in the fields was a critical factor in the production and reproduction of knowledge and relations of power. As reflected in the gender resource maps (figure 3), women's labor in farming families contributed to the maintenance of the parcels through planting, *desquelitar* or weeding as much as three times each season, and helping with the harvest. Following the harvest, they are responsible for shucking maize and cleaning the maize and beans. They also often cooked meals for men working in the fields and, following the harvest, many shepherd the goats or sheep to graze in the fields. Studies that document food choices and food security in Mexico have noted the shift away from labor intensive, "traditional" foods in many households to fast and convenient options like Maruchan[6] and hot dogs (Sanchez, 2007). However, as both communities required physical labor for weeding parcels, many of these households consumed the traditional *quelites,* or wild edible plants that grow in the *milpa*[7] alongside the maize and bean plants. These plants, gathered and prepared by women, are an important source of food security in rural Mexican households, especially in times of crisis (Bee, 2011; Vázquez García, 2008).

[6] Maruchan is the company name for the makers of ramen noodle soups and instant lunch soup in a cup.

[7] The term milpa is a swidden agricultural system associated with the intercropping of maize, beans and squash (and other products), as well as with the edible greens (quelites) that grow beside them. This practice has descended from pre-Columbian agriculture and creates a system that produces not only calories from the basic grain but also vegetable protein and the base of condiments that are central to Mexican cuisine (Brush and Chauvet, 2004; Vázquez-García, 2008).

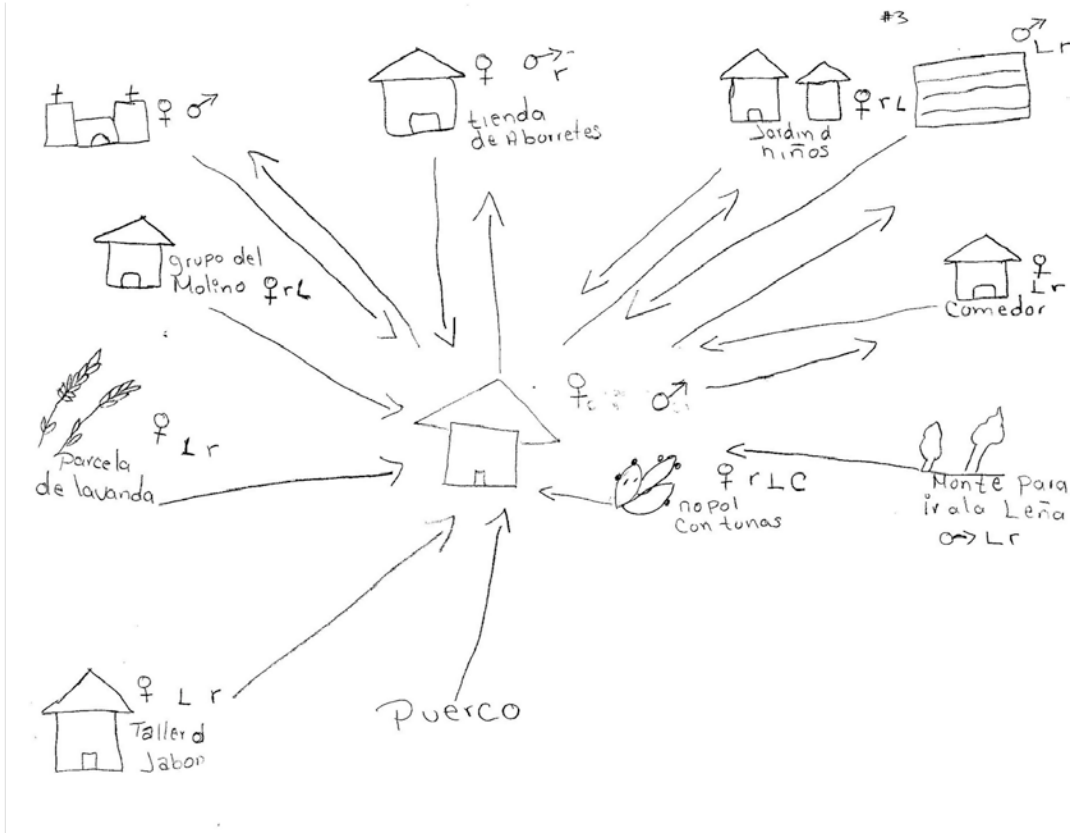

Figure 3: Example gender resource map. L=labor, R=responsibility, C=control.

Several women commented that they had either been "raised in the fields", raised their own children in the fields, or both. Young children often accompanied their parents and grandparents to the fields before they started school. Once they started school, many accompanied their families on the weekends. Doña Arlene[8], a 56 year old *ejiditaria* with access and rights to her own fields, told me that she took her grandchildren with her to the fields whenever possible. "It's an important part of who they are and learning how to take care of the fields, so the fields take care of them," she emphasized. As Doña Arlene's comment shows, women were aware of the importance of transferring useful agro-ecological knowledge to their children, even though they did not have access to resources that men had, which would enable them to act on this knowledge to secure their livelihoods. So although they may possess certain kinds of agro-ecological knowledge, and reproduce this knowledge through their children, broader social relations of power shape their access to certain resources and as a consequence, their capacity to adapt. At the same time, this transfer of knowledge also represents their ability to act within the constraints of their labor responsibilities, which introduces a scalar element of adaptive capacity (Adger et al., 2005). In other words, although they

[8] I use pseudonyms for all names.

may not be able to translate their agro-ecological knowledge to action beyond the household, their ability to reproduce this knowledge among their children and grandchildren is an example of how they exercise agency and can mobilize resources in small ways within the scale of the household.

In and Around the Home

The gender resource maps also revealed the daily and seasonal activities of women, which demonstrated the gendered relations of production and reproduction throughout the *ejidos*. The resource maps detailed how women's work in the space of the home is the space over which most women not only contributed their labor and had the responsibility of maintaining, but over which they also had decision-making control. Women were responsible for preparing and serving meals, cleaning dishes, washing and hanging laundry, sweeping and/or mopping inside the home, sweeping the *solar* or area surrounding the home, and tending to plants such as flowers and vegetables. Young women and girls were most often charged with helping in these activities and, in so doing, were involved in the reproduction of these roles and responsibilities. Women's household labor, regardless of whether or not they or their husbands have land, also contributes to the care and maintenance of small livestock, which is kept in the space of the *solar* or the space surrounding the home.

Livestock was a central livelihood strategy for rural families. Other studies have shown that the raising of livestock is an important form of savings (Appendini, 2006) while others demonstrate that the selling of livestock is an important strategy for coping with hazards (Eakin, 2006). Numerous families had sold livestock in the past year because they needed the money. Most of the women reported that they needed the money to meet basic needs, while a handful reported that the needed the money for a special occasion such as a celebration or a wedding.

As demonstrated in the gender resource maps, the area in which women had the most control was the purchasing of food products or other items for the home. When time permitted, they made these purchases in community stores or after taking an hour-long bus ride to the larger towns of San Miguel de Allende or Dolores Hidalgo. Because women's labor responsibilities often kept them in the home or the fields, they typically sent their kids on errands to the local stores to buy refreshments and other small items. When I asked Louisa, a 33 year old mother of four and ejiditario wife, about who is *responsible* for going to the store that she had included in her resource map, she responded, "I send the girl. I have to take care of things here [at home], so it's easier if she goes." Delegating this responsibility to her 12 year old daughter was not unique to Louisa. It was a common response among many women with children old enough to run this errand. When I probed her about who makes the purchasing decisions and who effectively has *control* over this resource (the store) she didn't hesitate, "I do. I'm the one who has to decide we need this or that."

Women's role in managing daily household purchases made them expertly aware of the rising price of consumables as well as the costs for such things such as electricity, and water use for the home and the fields. This situation reflects an example of embodied knowledge whereby women's responsibilities and activities contribute to the production of knowledge. Women's home-based activities and subsequent knowledge were critical material practices that contributed to the ongoing maintenance of the household and community. However, as feminist standpoint theory emphasizes, women's knowledge of available resources and steps to take to adapt does not necessarily lend to their full ability to act when they are constrained by relations of power. Yet, when you take scale into account, women's agency and their opportunities to translate knowledge into action becomes apparent at the household scale and within the spaces of their responsibility-in the home and in the fields. However, their ability to implement this action across networks and scales beyond the spaces they occupy is questionable.

The Production and Reproduction of Climate Knowledge

Communities throughout Mexico are unequally affected by climate-related events. However, women face a "double exposure" that is not necessarily economically defined, but defined by the social relations of gender that significantly shape the production and distribution of knowledge and material resources. To get a broader sense of women's knowledge of the causes of long-term climate change, as well as how the current drought has affected them, I conducted a mental modeling activity in each *ejido*. To begin the activity and the conversation about climate change, we began by clarifying what is meant by climate change. As I made my way through the communities, I came to realize that almost everyone had heard about "global warming", but talking about "climate change" was more difficult. This is primarily because the word for climate in Spanish, *clima*, is the same term used to describe the weather. As a consequence, climate change could be interpreted to mean that "it was cold yesterday and today it is hot." So I was certain to explain that climate change takes into account global warming but it also includes the long-term, sporadic changes in seasonal weather and rainfall, or what a lot of people in the communities have expressed as the "unpredictability" of long-term weather patterns. In this way, I was also participating in the production of knowledge through my facilitation of the mental model activity. Together, we (the women and I) described, clarified, exchanged and acquired knowledge about the surrounding environment and the social, political and economic contexts that provide opportunities for, or limit action.

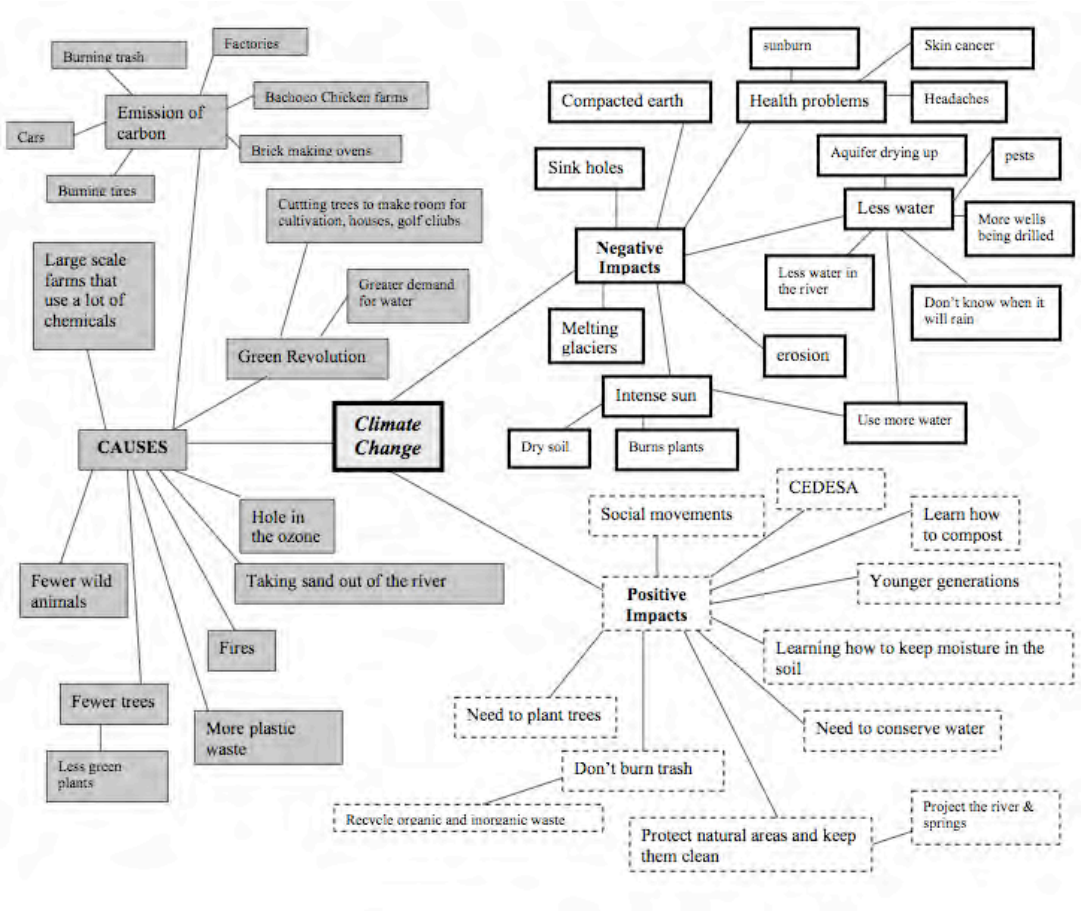

Figure 4: Composite concept map of causes of climate change, as well as positive and negative impacts.

When we began the mental model (figure 4), we started with the *causes* side of the map. Responses included deforestation, the Green Revolution, and the hole in the ozone layer. The emissions of carbon, through transportation, large factories, and burning trash were included as reasons. Negative impacts were numerous. The most prominent response was the dwindling of water resources, which was caused by the overuse of water (also attributed to the increased heat and sun). Declining water resources were viewed as also contributing to pest problems, as pests were seen to be more of a problem in particularly drier or wetter years. Health concerns were also substantial, such as headaches, skin cancer and sunburn and were raised repeatedly in the household interviews in response to the question, "How has the changing climate affected you and your family?" Responses to this question were slightly more diverse and responses included more references to colds, flu, heat rashes, heat exhaustion, and a general concern that children and older adults were more susceptible. The increased intensity of the sun, the heat, and the frequency of more extreme daily temperatures (higher highs and lower lows) were considered the main causes of these problems in the mental model activity. Finally, soil erosion and compaction were concerns regarding soil

absorption of rainwater. Sink holes were also mentioned as a problem because as it had been explained to a couple of group members, the decrease in water levels in the aquifer lead to "open spaces" under the surface that are no longer stable and can collapse, creating a sink hole.

Positive impacts were much more difficult to come by and one participant even asked me if I could provide examples of positive outcomes of climate change because they just could not think of any. In La Cuadrilla, although I attempted to elicit impacts that had already taken place, participants preferred to talk about what "should" be done rather than what has already occurred. With regards to actions they had already taken, they did talk about their participation in reforestation program that paid *ejido* members to replant close to 100 maguey plants around their fields, in an effort to prevent soil erosion in and around agricultural plots. The women in La Colorada discussed steps they had already taken too, largely due to their involvement in the non-governmental organization CEDESA (Center for Agricultural Development) in the city of Dolores Hidalgo. Here they learned how to compost, install and maintain composting toilets and water catchment systems, among other things. The participants felt that CEDESA played a vital role in building their knowledge, as well as their capacity to respond to the changing environment. Interestingly, not a single participant in either community discussed positive impacts in terms of the biophysical environment, but rather focused solely on human impacts and actions taken to correct perceived problems.

Although the mental model activities illustrate women's knowledge and responses to climate change as well as their vulnerability to multiple stressors, the point here is to highlight what allows individuals and households to mobilize their resources in response to different types of change. Examples of this are seen in and around the home and the fields, as discussed above. However, the gendered division of labor and land tenure also shapes available resources and strategies utilized by various families during the drought.

Land Use and Irrigation

Just before my arrival to the *ejidos* of La Colorada and La Cuadrilla, farmers had been hit by one of the worst droughts in recent memory (Camarena, 2009). As evidence of this, about 78 percent (n=16) of farming families I interviewed in La Cuadrilla lost over 90 percent of their maize crop to the 2009 drought, while roughly half lost over 90 percent of their beans that same year. In La Colorada, 54 percent (n=27) of farming families lost over 90 percent of their maize, and half lost over 90 percent of their beans (figure 5).

When I asked farming households if there had ever been years in which they did not plant maize, the response was a resounding "no"-not one household considered this to be an option. Maize was grown primarily for household consumption, with the added benefit of providing forage for animals. Very few households expressed that they sold a small percentage of their maize for income, and then, only if the yield was high enough to do so. Unlike the studies mentioned

above that document farmer's strategies for adaptation in Mexico (e.g. Eakin, 2006; Eakin and Bojórquez-Tapia, 2008), almost none of the farming households in either community cultivated cash crops for sale either through contracts or to local and regional markets.

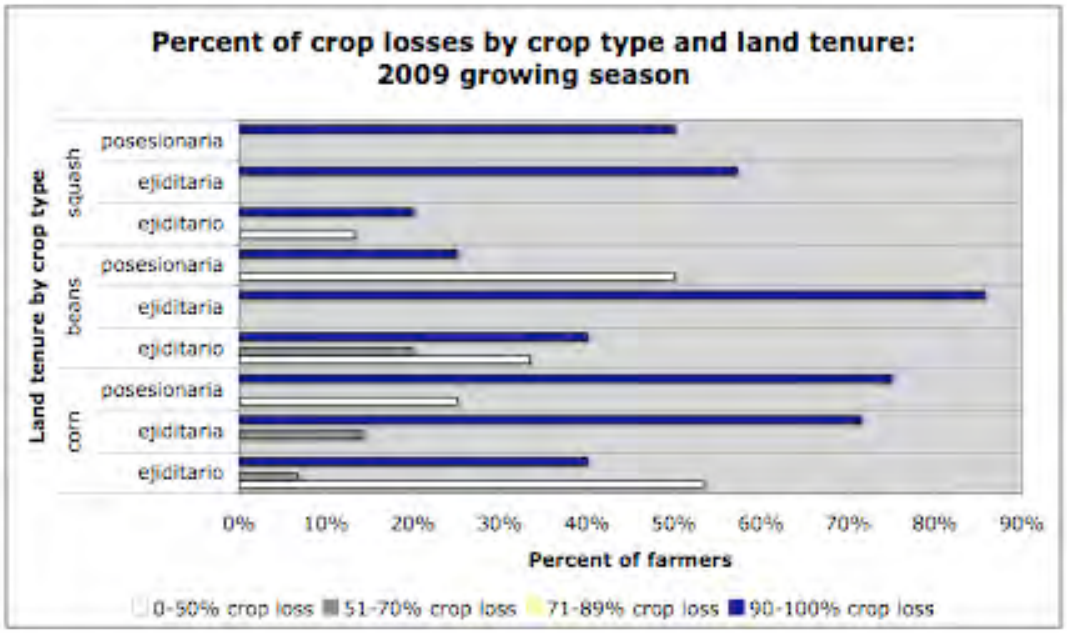

Figure 5: Percent of crop losses by crop type and land tenure. (source: household interviews, farming households, n=42)

Fewer than half of all farmers in this study (male and female *ejiditarios* and *possessionarios*) in La Colorada (40 percent) had access to irrigation for their fields. Among the *ejiditarios*, roughly half the men and slightly less than half the women (43 percent) had access to irrigation, and even then, this irrigation was only available for part of their allotted fields. In the irrigated fields, the male *ejiditarios* in this study planted roughly equal amounts of maize, beans and alfalfa, which was primarily for forage, and then sold locally if the yield permitted. The planting of an equal amount of maize and beans in an irrigated field helped to offset the risks posed by climatic variability. Although it prevented the total loss of crops during the drought, it did not save all the crops, as farmers, both men and women, could not afford to increase the amount or frequency of water to the fields. However, the female *ejiditarias* without access to any irrigation mentioned that they would have irrigation if they could afford it. Most significantly, a main well near their parcels had broken and they had not had the financial capital to fix it. One well irrigates eight different fields and everyone who has an adjacent field must contribute financially to both fix and maintain the well. For this reason, when wells and pumps are working, fields are irrigated once every eight days. However, the cost of irrigating alone can be prohibitive. Over the course of a month, one *ejiditario's*

wife explained that they paid between $800 and $1200 pesos (80-120 USD), per hectare of land to irrigate, depending on how much it rained. Women without extra income were extremely hard-pressed to contribute.

The 43 percent of women *ejiditarias* in La Colorada with access to irrigation had more varied cropping strategies than their male counterparts. One woman evenly divided the area between maize, beans and alfalfa. Another woman sowed only maize and beans, and twice as many beans as maize. Her rationale for this was that if she needed to buy one or the other, she would prefer to buy maize because of its cheaper price. The third woman planted one hectare[9] each with alfalfa and maize, and three hectares with beans for the same reason stated above: price. At the time maize cost six pesos/kilo (≈$.25 USD/lb.) and beans cost 22 pesos/kilo (≈$.90 USD/lb.).

The above examples illustrate how women's decisions regarding what to plant were a function of both the resources available to them (such as irrigation), as well as their knowledge regarding the cost of consumables. Irrigation was viewed as an important strategy for mitigating the potential risks posted by the climate; however, it was a resource that required a considerable amount of financial capital, which most women did not have. At the same time, the differing costs of maize and beans, knowledge derived from women's responsibility for making food purchases for the home, shaped some women's decisions to plant more beans than maize. Yet women who had control over decision-making in the fields made these decisions. As I have demonstrated, and as feminist standpoint theory posits, there is often a gap between what women know and what they are able to do, and this difference has something to do with the relations of power in their families and communities. Understanding a woman's relationship to landownership and to the decision-making processes within the household, for instance, is critical for understanding the limits to how women's environmental knowledge, which can be extensive as the above research illustrates, can turn into effective action. The difference between having environmental knowledge and having decision-making authority is a key issue when developing policies focused on helping people to adapt in real life circumstances.

Conclusion

Utilizing the concepts of situated knowledge and social reproduction, this paper attempted to highlight the ways in which knowledge and relations of power influence knowledge production, resource distribution, decision-making and thus, adaptation to climate change. The goal is not to highlight the capacities of women to adapt to a changing climate per se, but rather to bring to light the ways in which the political dynamics of knowledge, the gendered dynamics of decision making, and the social-political dynamics of resource provision contribute to understandings of adaptive capacities to climate change. The material realities and

[9] 1 hectare (ha) ≈ 2.5 acres

practices that circumscribe women's lives in La Cuadrilla and La Colorada draw attention to the important questions such as: What is meant by adaptation? How is the capacity to adapt understood in relation to knowledge and power? The above examples demonstrate several aspects of how women's lived experiences and material realities shape what they know, how they know it, and how they are able to put this knowledge into action in the face of climatic uncertainty. Women's work-at home, in the fields, and in between-is a critical means through which families and the social relations within them are reproduced. Gender is the point around which relations of power, knowledge and the capacity to act pivots. Thus, any analysis of household vulnerability and adaptation to climate change requires a more in-depth approach to understanding how resources are shared and/or negotiated, and decisions are made.

Feminist environmental geography and political ecology scholarship has brought to light how gender is a critical factor in understanding environmental change, conflict and management (Agarwal 2000; Reed 2000; Rocheleau, Thomas-Slayter, and Wangari 1996; Sultana 2006). Yet while the literature on the gendered nature of climate change continues to grow, very few scholars are engaging their arguments with the already extensive research on vulnerability, adaptation, and adaptive capacity (Alston, Sachs, and Lambrou 2007; Boyd 2002; Brody, Demetriades, and Esplen 2008; Buechler 2009; Dankelman 2010; Denton and Parikh 2002; Lambrou and Piana 2005; Masika 2002b; Omari 2010; Seager 2009). At the same time, scholars are increasingly interested in what shapes adaptation decision-making in response to a changing climate, although the focus has been at the community and household scales (e.g. Carr 2008, Eakin & Tapia 2008). Such studies have largely left questions of gender and decision-making unanswered. This paper was an attempt to begin to reconcile this deficit by putting feminist theory in conversation with adaptive capacity approaches to understand how gender and its associated power dynamics affect resource production, access, distribution, and decision-making in the face of climate change. I argue that utilizing a feminist standpoint and social reproduction framework provides useful tools to enhance rigorous analyses of the socio-political contexts that can hinder or enhance adaptive capacities. This kind of critical engagement between feminist and climate change adaptation approaches opens up a conceptual space for reflection and encounters that move the debates closer toward addressing the challenges that climate change presents.

Feminist geographer Cindi Katz (2004) illustrates that the occupational differences between girls and boys in southeastern Sudan reflected differently in terms of their environmental knowledge. For the *ejidos* of La Cuadrilla and La Colorada, women's knowledge is an essential part in the physical maintenance and reproduction of these communities. Yet the broader social and political structures, such as land tenure and the division of labor, which governed gender relations among households and community members, shaped the extent to which this

knowledge could be transferred into strategies for coping and adaptation during times of crisis.

Many of the choices made by women and families in La Cuadrilla and La Colorada might be seen as short term coping strategies, instead of long-term adaptive strategies due to a lack of assets and decision-making power. What is significant for climate change adaptation is not necessarily gender specific knowledge of farming practices or climate patterns, but the differentiated access to and control over resources and decisions that can influence successful, long-term adaptive responses. These points are significant for policy-makers intent on building the capacity of rural communities to adapt to climate change. For example, policy-makers need to consider the fact that women, despite the constraints to making decisions in the field, have a great deal of knowledge to contribute to adaptation policy development. Perhaps more importantly, the above examples highlight the role that social relations of power bear upon women's abilities to act on their knowledge. Building adaptive capacities to climate change in this context requires addressing the underlying causes of women's vulnerability, which then shapes her access to and control over resources. This requires accounting for gender and its associated power dynamics in order to be successful.

Although the particular case study here cannot be generalized to the rest of Mexico, it does share similarities both with literature on the gendered aspects of political, economic and cultural change in rural Mexico, as well as the literature on household adaptation to climate change (e.g. Eakin, 2006). What is clear is that additional research on household adaptation must address the socio-political structures—across time, space, and scale—that shape such things as decision-making, resource access and livelihood strategies if we are to fully understand the scope of household vulnerability to climate change. Furthermore investigating women's material lives and the production of knowledge demonstrates women's capacity to act within the spaces and scales of both the household and the fields, albeit in small ways. Consequently, gender must be considered a category of analysis in climate change adaptation research if we are to paint a more complete picture of the relationship between knowledge and action and how these things are influenced by time, space, and scale. As such, notions of situated knowledge and social reproduction are useful theoretical tools for critically examining the views of the vulnerable (Tschakert, 2007), while also acknowledging their capacity for action, at different scales, and the factors that constrain and enable this capacity.

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