Determining the vulnerability of women to the effects of climate change: A study on the economic, social, and political implications of climate change on the women of three rural communities in the *Valles Cruceños* region of Bolivia

by

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Abstract

The few climate change studies that have been done in the *Valles Cruceños* region of Bolivia have mainly focused on investigations of climate change impacts on the natural system. Adaptation and mitigation measures, therefore, addressed only the biophysical vulnerability of the system. This preliminary research on three rural communities in the *Valles Cruceños* region explores the social construction of women's vulnerability to the effects of climate change. Formal and informal institutions determine and distribute entitlements, and a system's level of vulnerability or its capacity to cope with external stressors is defined by its ability to access these entitlements. Although all community members are vulnerable to the effects of climate change, women in particular, have specific roles and responsibilities in the household and community levels that disproportionately affect their resilience to shocks and stresses. I argue that the vulnerability of women to the effects of climate change in the *Valles Cruceños* region of Bolivia can be attributed to the absence of support from formal institutions and the presence of constraints from informal institutions.

Keywords: vulnerability; women; climate change; entitlements; Bolivia

To Gretchen Hernandez
who opened the door to Bolivia for me

and to Robert Rueda Villaroel
for welcoming me in.

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List of Acronyms

ICO	*Insituto de Capacitación del Oriente*
IDH	Direct Hydrocarbon Taxes
INE	*Instituto Nacional de Estadística*
LPP	*Ley de Participación Popular*
NGO	Non-Governmental Organization

1. Introduction

A woman cradling her 2-year old girl looks resignedly around her dark adobe home as she declares that there is no future for the young ones in her small community in the *Valles Cruceños* region. Three other women mutter their assent, as their children, home from a regular half-day session in primary school, curiously mill around me. The women are all speaking at the same time of their hardship and poverty. They say government people never visit them because they have no interest in the community and their offices are so far away. After primary school, the only place for children to go is the *campo.* By *campo* the women are referring to their work fields. Lately their crop yields have been unpredictable. In the past 10 years citizens of rural mountain communities in the *Valles Cruceños* region of Bolivia have noticed a gradual change in climate conditions that is negatively impacting their agricultural livelihood. Varied and erratic weather conditions—lack of rain, too much rain, extreme hot and cold spells, and frost have contributed to poor crop yields and shorter growing seasons. Previous climate impact studies in this region were geared towards mitigation of climate change effects through technical amelioration—for example, building reservoirs to collect water—but no study, so far, has been done to determine the vulnerability of women to the effects of climate change. This preliminary study on the women living in the three Bolivian mountain communities of Loma 25, San Juan del Rosario, and Siberia, aims to narrow that gap.

Climate change vulnerability is socially constructed; that is, economic, social, and institutional dynamics create constraints that contribute to people's vulnerability to climate change. Although all community members are vulnerable to these effects, women in particular have defined roles and responsibilities in the household and community levels that disproportionately affect their vulnerability. I argue that the vulnerability of women to the effects of climate change in the *Valles Cruceños* region of Bolivia can be attributed to the absence of support from formal institutions and the presence of constraints from informal institutions. Formal institutions, or state agencies,

are legitimizing bureaucracies. How they create, implement, and distribute entitlements directly influences levels of poverty and inequality; and indirectly, levels of vulnerability to climate change. Informal institutions or structures include social and cultural norms, mores, ethics, and systems of knowledge that create social differentiation based on factors such as gender, class, and social status. To the extent that these structures constrain the political and social empowerment of women, informal institutions contribute to women's vulnerability to climate change.

To contextualize my Bolivian study, I begin this paper with an overview of some current approaches that researchers use to analyze the concept of vulnerability. I then explore the idea of the gendered nature of climate change effects. Men and women are reported to be affected differently by virtue of their particular social roles and responsibilities that expose them to different risks and opportunities. I link these theory analyses to my research by first presenting an overview of Bolivia's more recent political maneuvers with regards to decentralization, and then follow with a summary of the central government's social policies. This information backgrounds the presence or absence of government involvement in rural communities. I then present a description of the *Valles Cruceños* region and my work with the women in this area. My analysis highlights the roles of formal and informal institutions in the context of the entitlement theory approach, and I use this framework to link the women of these communities to climate change vulnerability.

2. Vulnerability

The concept of vulnerability is commonly used in the field of geography and is frequently found in analyses of risks, hazards and disasters in the natural environment. In the past two decades, the vulnerability concept has been more prominently used in climate change and development studies. The meaning of vulnerability varies, depending on the epistemological orientation of researchers—for example, in physical science, social science, or political ecology. These different starting points will influence the adaptation and mitigation measures that will be operationalised in the end (Cutter, 1996). In the case of the *Valles Cruceños* region in Bolivia, previous studies focused solely on the effects of climate change on the natural system of the area. Adaptation and mitigation measures, thus, addressed only the biophysical vulnerability of the system.

2.1. Physical and social vulnerability

Climate and social scientists differ in their focus on which factors to consider when studying a system's vulnerability to climate change. Brooks (2003) explains that climate scientists consider the probabilities of occurrence of weather-related events and its impacts on the natural system. Social scientists, on the other hand, study a system's ability to *cope* with the effects of climate change based on socio-economic factors that influence a system's coping mechanism. Allen (2003) contends that studies in physical vulnerability is concerned with structural factors that contribute to a system's susceptibility to damage from physical hazards, and with outcomes, such as the (potential) damage to a system resulting from exposure to the physical hazard. Brooks (2003) further points out that studies on social vulnerability are concerned with the internal state of a system before its exposure to the hazard event. Vulnerability is inherent in the system as a result of its internal characteristics, and vulnerability exists independent of external hazards. Some determining factors to social vulnerability

include poverty and inequality, marginalization, and food entitlements. Social vulnerability can be seen as determining biophysical vulnerability, as exemplified when factors to social vulnerability interact with a physical hazard. Leary, Conde, Kulkarni, Nyong, and Pulhin (2008) also differentiate between investigations of climate change impacts and vulnerability studies. The former emphasizes "quantitative modeling to simulate the impacts of selected climate change scenarios on Earth systems and people" while the latter considers an understanding of climate "drivers related to demographic, social, economic and governance processes" (Leary et al, 2008, p.4) as an essential guide to formulating adaptive strategies. Berkes and Folke (1998) write that biological and biophysical processes fall under natural systems, while socially-constructed rules—institutions, systems of knowledge and ethics—fall under social systems. Adger (2006) analyzes the concept of vulnerability in the context of the whole social-ecological system. The vulnerability of this system is closely tied to its level of resilience—its ability to absorb shocks and stresses on the system, its capacity to respond through self-organization, and its ability for adaptive action in advance of and in reaction to shocks.

The Intergovernmental Panel on Climate Change (IPCC), the leading international body in climate change assessments, defined 'vulnerability' in its 2007 Fourth Assessment Report as:

> Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, the sensitivity and adaptive capacity of that system. (Intergovernmental Panel on Climate Change, 2007)

The above definition illustrates some common terms used across different theoretical approaches to conceptualize climate change vulnerability. These often include the elements of 'exposure', 'sensitivity', and 'adaptive capacity.' Exposure considers the "nature and degree to which a system experiences environmental or socio-political stress"; sensitivity pertains to "the degree to which a system is modified or affected by perturbations"; and adaptive capacity is "the ability of the system to evolve in

order to accommodate environmental hazards or policy change and to expand the range of variability with which it can cope" (Adger, 2006, p.270). There is an explicit reference to biophysical vulnerability in the IPCC definition, and an implicit reference to social vulnerability in its mention of 'sensitivity and adaptive capacity.'

2.2. Political economy / entitlement theory

The ability of individuals and groups to access and use resources needed to sustain a livelihood "is always based on social and economic relations" (Blaikie et al*.,* in Adger & Kelly, 1999, p. 260). The political economy approach in vulnerability studies asks which individual or groups of people are most vulnerable and why this is so. Adger and Kelly's 'architecture of entitlements' (the pattern of access to entitlements) explores a system's vulnerability to climate change based on social and political processes that may be impacting that system's adaptation to external stressors. The vulnerability of a group "is determined by the availability of resources and, crucially, by [their] entitlement to call on these resources" (Adger & Kelly, 1999, p.253). Economic and institutional dynamics create differentiation in social vulnerability that affect an individual's or group's access to resources (Kelly & Adger, 2000). The connection goes on, because "the extent to which individuals, groups or communities are 'entitled' to make use of resources determines the ability of that particular population to cope with and adapt to stress"(Adger & Kelly, 1999, p.256). In other words, differential access to resources creates social vulnerabilities that affect the coping and adapting capacity of the human system.

The entitlement theory supports the idea that climate change vulnerability is a socially-constructed phenomenon. Adger and Kelly (1999) define entitlements succinctly as "the material and social aspects of resource use" (Adger & Kelly, 1999, p.257) and access to these are institutionally-determined. The government, or the state, is the formal political institution that acts as a legitimizing body that creates, implements, and distributes entitlements; hence, it plays a major role in determining an individual's or group's vulnerability levels. A state of inequality exists when the distribution of available resources is unevenly concentrated in a few hands. In times of external stress, poverty and inequality can constrain a system's coping and adapting mechanisms (Adger &

Kelly, 1999). Additionally, the effects of climate change or other physical hazards even tend to exacerbate and magnify inequalities (Adger & Kelly, 1999).

Informal institutions include ethics, mores, customs, and systems of knowledge that perceive social differentiation based on groupings of class, social status, or gender. These informal structures may not serve as legitimizing bodies under most rules of law, and people may simply take them as a matter of fact, but these structures are as equally influential as formal institutions in the definition and distribution of entitlements.

3. Gender and climate change vulnerability

The past decade has seen a growing body of literature on the gendered nature of the effects of climate change, where men and women are perceived to be affected differently by climate stressors. Central to advocates' call for a more gendered approach to climate issues is the premise that women, especially those in developing countries, stand to be disproportionately affected by the negative effects of climate change. This is due to gender-specific roles and responsibilities in households and communities that expose men and women to different risks and opportunities. The general literature focuses on two major contributing factors to women's vulnerability to climate change: poverty and inequality. Lambrou and Piana (2006) explain that the way poverty influences the vulnerability of different people is through "mechanisms such as the access to those resources that are fundamental to allow coping with extreme weather events and the marginalization from decision making and social security" (Lambrou & Piana, 2006, p.20).

Osman-Elasha (2009) writes that women are reported to make up the majority of the world's poor. The livelihoods of women in developing countries are generally dependent on increasingly threatened natural resources, creating vulnerability to poverty and marginalization. Skutsch (2002) is concerned that there is not enough gender-oriented climate change discourse on the ground level and in the formulation of climate change policies on the global level. Involving women in all levels will ensure that their specific concerns will be addressed.

Terry (2009) cautions against making broad generalizations about the conditions of women in the global South. Because most discourses on the gendered nature of climate change effects focus on women's vulnerability, there is a tendency to portray women as victims instead of agents of change. More context-specific analyses are needed to identify the appropriate responses because women's conditions in the global South are not necessarily homogenous. Gender alone does not make women

vulnerable to climate change effects. We need to consider other intersecting social, economic, and political factors that define women's space in the household and community level.

3.1. How are women more vulnerable to climate change effects?

A large percentage of poor women's livelihoods in most developing countries are dependent on natural resources that are now being impacted by climate change, (Skutsch, 2002). The impacts on livelihoods such as agriculture and fishery magnify women's poverty and their lack of access to much needed resources, hence, making them vulnerable to climate change effects. In rural areas, women are usually responsible for procuring water and firewood for cooking and heating. This is extra work they have to do over and above child bearing and rearing, and working in the fields. Additionally, they have to travel farther to find water and firewood when these resources become scarce due to recurring dry weather spells and the depletion of forests. Nelson, Meadows, Cannon, Morton, and Martin (2002) explain that women are also considered the traditional caregivers in a family, and as such, they will bear the burden resulting from increased incidence of illnesses due to climate change. Another impact of increasing weather variability is the migration of male workers to other places in search of alternative sources of income. This increases the burden of responsibilities on women who are left behind to care for the rest of the family. Food insecurity due to poor harvests also affects the stress level of men who feel incapacitated to provide basic goods for their family. This can affect family dynamics, and women are vulnerable to increased incidents of household violence (Lambrou & Nelson, 2010). Women are also reportedly more vulnerable in times of disaster events and therefore have a higher mortality rate. For example, during the Asian tsunami, women and children under the age of 15 made up the largest group of fatalities. Women in Bangladesh reportedly delayed leaving their homes during the floods due to cultural constraints, and those who ventured out could not swim in flood waters (Arora-Jonsson, 2011; Nelson et al, 2002).

3.2. Why are women more vulnerable to climate change effects?

Skutsch (2002) does not refute the validity of the link between gender and climate change vulnerability, but she posits that we need to take a closer look at this relationship. She questions whether we should "approach vulnerability from the point of view of *gender*, or more generally from the point of view of *poverty*" (Skutsch, 2002, p.34). In other words, are women more vulnerable to climate change effects because they are relatively poorer than men, or because "they are *women*, with particular roles and responsibilities which are especially prone to the effects of climate change" (Skutsch, 2002, p.34)? Skutsch recognizes poverty as the main contributing factor to women's vulnerability because poverty limits their capacity to adapt, lowers their resilience to cope, and leaves them with no access to social safety nets. She underscores the role of poverty with the interesting point that "most of the gender-specific characteristics that make people vulnerable to climate change (heavy dependence on local natural resources, lack of alternative income possibilities, responsibility for care of the sick, and so on) are in fact characteristics of women in societies of extreme poverty." Moreover, "in better-off societies, the effects of climate change will have less gender differentiation." Her emphasis then is on "the gender aspects of climate change vulnerability of the poor" (Skutsch, 2002, p.34).

Inequality is another contributing factor to women's vulnerability to climate change. Although social differentiation based on class and ethnicity encompasses the lives of both men and women, women can be disproportionately impacted due to the additional influence of informal institutions that are deeply embedded in society. These can either empower or constrain women to be part of the decision-making process in the household or community level. Many women in developing countries are disempowered by restrictive cultural norms that position them as passive members of society that are dependent on decisions made by men. To the extent that this limits women's ability to voice their concerns and be part of the solution-seeking process, restrictive cultural norms contribute to women's vulnerability to the effects of climate change. Additionally, these norms create conditions of inequality that confer secondary status on women in the labour force and deny many of them the rights to hold title to the land they work on (Lambrou & Piana, 2006).

4. Vulnerability and the 'femenisation of poverty'

Women's vulnerability is a common theme found in literature on gender and climate change. This vulnerability is based on the premise that women in developing countries are relatively poorer than men (Arora-Jonsson, 2011). Seventy percent of the developing world's 1.3 billion poor people (1993 figures) are women, while 40% of poor urban households are headed by women. Women own less than 10% of land despite contributing from 50% to 80% to the world's food production (Osman-Elasha, 2009; UN Women Watch).

Arora-Jonsson (2011) deconstructs some of the existing assumptions surrounding women's vulnerability in relation to climate change. The theory on the 'feminisation of poverty' "has been used to explain differences between male and female poverty in a given context as well as changes in male and female poverty over time," feeding "the perception that female-headed households, however defined, tend to be poorer than other households"(Arora-Jonsson, 2011, p.746). Several scholars have contested the statistics used to support this generalization, and empirical work has proved these figures to be inaccurate (Medeiros & Costa, 2008). For example, the assertion that 70% of the developing world's 1.3 billion poor people are women is not based on empirically rigorous findings; rather, this assertion is anecdotal in nature (Chant, 2010). Marcoux (1998) examined data from 1995 and he concludes "that the 70/30 ratio of poor women to men is implausible given the age distribution of the global population and its household characteristics" (Marcoux cited in Arora-Jonsson, 2011, p.746). According to Marcoux, the gender bias in poverty is real and may be growing, but realistically, demographic data do not support the high level of bias that is attributed to the 70/30 ratio. The scale and rate of growth of gender bias in poverty also is not homogenous across regions. He points out that when studying poverty it is also essential to examine the causes of female household headship. The number of female-headed households is on the rise, and there can be several factors influencing this trend, including women choosing not to accept the injustices in their conjugal homes (Marcoux,

1998). Female headship and poverty are not necessarily associated (Kabeer, 2008). Another approach to determining gender bias, besides income assessment, is by using social indicators, such as health and mortality (Marcoux, 1998). More gender disaggregated studies are needed to determine how men and women are differentially impacted by poverty (Arora-Jonsson, 2011).

One may argue that the 'femenisation of poverty' is useful in the sense that it calls attention to the plight of poor women; therefore, much needed support gets directed to them. Unfortunately, the downside of this is the simplification of the concepts of poverty and gender (Chant, 2010). The meaning of poverty as a gendered experience is overridden by the idea that the poor are mostly women (Jackson, 1996), leading to the fallacy that if poverty was alleviated, things will get better for women, and gender equality follows. Additionally, making generalizations that equate women with poverty, and poverty with vulnerability, tends to overlook other important factors to vulnerability. There is no contesting that poverty contributes to an individual's or group's greater vulnerability to climate change, and the outcome of this, in turn, perpetuates poverty. But poverty and vulnerability are not directly correlated. Multiple processes generate vulnerability, and various individuals and groups experience vulnerability in different ways, as well as over time (Arora-Jonsson, 2011). Therefore, we need to look for linkages between poverty and vulnerability (O'Brien et al, 2007) in a given situation, instead of relying on generalizations.

Another argument found in literature on gender and climate change is that there is a higher mortality rate among women, than men, in the aftermath of a natural calamity. Several studies show that male/female life expectancy ratios are "contingent on the extent of socially constructed vulnerability . . . women died more where they were socio-economically disadvantaged" (Arora-Jonsson, 2011, p.746). Discrimination contributes to vulnerability, and it takes many forms. Some common bases for discrimination include socio-economic status, ethnicity, and caste. Women's vulnerability to the effects of calamities has to be seen, not simply from a gender and poverty perspective—these alone do not serve as the best predictors of impact—but there is a need to factor in inequality (in the form of discrimination). The particular context of a vulnerability needs to be considered because "responses are subjective and will be framed by individual

understandings of appropriate behaviour which, in turn are shaped by cultural norms, including gender norms" (Bradshaw, 2010, p.3).

Arora-Jonsson problematizes the positioning of women as subjects that are vulnerable to the environment because it "presents a static conception of women's roles" (Arora-Jonsson, 2011, p.748). Generalizations have the effect of defining women as a homogenous group, vulnerable to the effects of climate change, and with a higher mortality rate than men. This works the same way with men. When they are lumped under a generalization that does not consider them vulnerable, we tend to overlook the groups of men that are vulnerable to climate change effects—for example, the farmers in India committing suicide because they cannot provide for the needs of the family. We tend to overlook the effects of cultural norms on men and how these can equally put them in positions of vulnerability. The cult of 'machismo' can push Latino men to keep up with socially constructed roles that make them assume risky behaviours in the face of danger (Arora-Jonsson, 2011). Generalizations overlook context-specific needs; therefore it fails to come up with context-specific climate change mitigation measures. More importantly, generalizations do not address power imbalances, and power inequality is a major contributor to vulnerability.

5. Bolivia

Economic and institutional dynamics at the national level of Bolivian politics influence policies at the municipal level. I present a brief background of the Law of Popular Participation, and the different government social programs that are currently in effect. I believe government policies initiated from the national level strongly impact the social construction of women's vulnerability to climate change in the *Valles Cruceños* region.

5.1. *Ley de Participación Popular* – Law of Popular Participation

The Bolivian state introduced the Law of Popular Participation (LPP) in 1994 as part of a decentralization process that aimed to construct a more participatory civil society and establish local governments that are more responsive to specific population needs. Faguet and Sanchez (2008) define decentralization as "a process that relocates power and resources from officials at the center to others at the periphery" (Faguet & Sanchez, 2008, p.1311). In Bolivia, decentralization altered the flow of resources and political power from the central government to the municipalities. The latter's share of national tax revenues doubled to 20%, and were apportioned on a per capita basis. Municipalities were handed the titles of all local infrastructures, free of charge—for example, those related to health, sports, roads, and education. Municipalities were given full responsibility for the administration and upkeep of these infrastructures. *Comites de Vigilancia* (Local Oversight Committees) were created as a check-and-balance mechanism, charged with the task of overseeing how Popular Participation funds were used. The members of these committees came from grassroots groups and they had the power to freeze funds if they deemed them to be misused (Faguet, 2004). Proponents for decentralization say that a shift from state to local governance means greater participation of local actors in rural affairs, and local needs can be identified and

addressed more efficiently. In Bolivian municipalities there was a marked difference in local investment patterns based on real local needs. While the central government prioritized investments in the transportation and energy sectors (economic production and infrastructure), local governments, after decentralization, prioritized education, urban development, and water and sanitation (human capital and social services) (Faguet, 2004; Faguet & Sanchez, 2008).

Although decentralization appeared to be a good fit for a country that is diverse in both its physical and human geographies, the process encountered problems on the legal aspects of implementation. According to Fisher and Clegg (2006), the mismanagement of municipal funds was a major challenge. When this happened, the response of the national government was to freeze further funding until the municipal government could prove its finances were in order. This negatively impacted the creation or completion of municipal projects, such as road repairs, school programs, and health facilities. The Bolivian *Government Administration and Control Act* contributed to the problem. Municipalities failed to file annual financial statements as mandated by the *Act* because "it was difficult for them to comply with complicated financial accounting and reporting requirements" (Fisher & Clegg, 2006, p. 11). Some of the smaller communities do not even have local banking services (an example is Samaipata, the capital of Florida province), and their limited financial and human resources made it difficult to comply with the requirements of the *Act.* Additionally, the law was drafted in a complicated and obscure way that made it hard for mayors and councillors, and even lawyers, to make practical sense of it (Fisher & Clegg, 2006).

5.2. Decentralization – an ebb and flow

In 2009, the Constitutional Assembly of Bolivia enacted a new Constitution. Despite the legal recognition of departmental, regional, municipal, and indigenous autonomies, government authoritarianism overrules this legality, and a re-centralizing trend can be observed. For example, whereas resources and responsibilities were handed over to municipalities during the decentralization period, today the Plurinational Legislative Assembly is charged with approving any changes in autonomous budgets. These pendulum swings towards and away from decentralization are nothing new. Ayo

(2011) notes that there were six period changes towards and away from decentralization from 1994 – 2011. More recently, since 2010, there has been a trend away from decentralization and we see talent being brought back to the central level. One of the consequences of such a move will be the spread of bureaucracy (Ayo, 2011).

5.3. Social programs

The Supreme Decree 29565 that was enacted in May 2008 declared that among other purposes, "the increased revenues coming from the direct hydrocarbon taxes (IDH) should be used for social protection programs" (Escoffier, 2009, p. 22). Although most of these programs are applicable to the general population, resources tend to get funneled geographically based on municipalities' ratings under the Index of Food Safety Vulnerability and the Index of Basic Needs. The country's high revenues from IDH have resulted in more revenues for social programs in different municipalities. Conversely, because this dependency on volatile IDH revenues is dependent on world prices, the sustainability of these social investments is in a vulnerable position. Additionally, there is still a lack of clarity as to the distribution of IDH resources from the central government. This being said, some programs are in place that serve children, mothers, and elderly people. The *Bono Juancito Pinto* is a cash transfer program that serves as an incentive for parents to send their children to school. There is an allotment of US$28 per year, per child between 6 – 14 years of age that attends a public primary school. The *Bono Juana Azurduy de Padilla* is another cash transfer program that focuses on rural and suburban women, with the aim of reducing child and maternal mortality rates. The state gives pregnant women US$6.50 for each prenatal appointment (to a maximum of four visits), US$18 for each postnatal appointment, and US$18 for bimonthly medical visits with a child under-two years of age (Escoffier, 2009). The *Renta Dignidad*, or seniors' pension, is a cash transfer program offering universal non-contributory pension to people age 60 and over (Riggirozzi, 2010).

6. The *Valles Cruceños* region

Bolivia is made up of nine departments or *departamentos*. These are subdivided into provinces, and then municipalities. The communities at the center of this study are located in the *Valles Cruceños* region in the *departamento* of Santa Cruz, in the provinces of Vallegrande, Florida, and Caballero, and in the municipalities of Vallegrande, Samaipata, and Comarapa. To contextualize my study on these small mountain communities, I present some background information on the physical features of the region; the political division of the land; the social, economic, and political characteristics of the population; and an overview of contributing factors to the problems of rural farmers. Following this, I will commence with a description of my research, the methodology I used, and the results from the interviews I conducted with the women of select communities in the *Valles Cruceños* region.

6.1. Physical features of the land

The *Valles Cruceños* region lies at the foothills of the eastern Andean mountain chain of Bolivia. It is located in the western side of the department of Santa Cruz, close to the borders of the departments of Cochabamba and Chuquisaca (see *Fig.1)*. The *Valles Cruceños* region covers an area of 12,855 km², with elevations ranging from 500 to 3,000 meters. The variation in mountain altitudes and valley depths make for a mosaic of microclimates that range from very dry to very wet, with warm temperatures in deep parts of the valley as well as cold temperatures in the highlands. Generally, the rainy season covers the months from October to March, and the dry season is from April to November (Cardenas, 2003).

Figure 1.

Map of Bolivia – divided by departments

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6.2. Demographics

The *Valles Cruceños* region is politically and administratively divided into three provinces: Vallegrande, Florida, and Caballero (see *Fig. 2*). These, in turn, are divided into 11 municipalities. Of interest to my research are the municipalities of Vallegrande

(the same name as the province where it is situated), Samaipata (in Florida), and Comarapa (in Caballero). According to the last census in 2001, the total population of the *Valles Cruceños* was 74,886 inhabitants—this represents about 4% of the population of the department of Santa Cruz (INE, 2002a). An average of 3.91 people lives in each household; this number is below the department average of 4.6 people per household. In the rural areas, the population is made up of 54% males and 46% females (Cardenas, 2003). The indigenous and *mestizo* (of mixed heritage) people form the two ethnic and cultural backgrounds of the population. Ninety percent of the population speaks only Castilian and the remaining 10% is bilingual Quechua and Castilian (M.C. Calzadilla, personal communication, August 2, 2011).

6.3. Agriculture as livelihood

The *Valles Cruceños* region is situated in an ecosystem that lends itself to small-scale, low investment agricultural production. The terrain is characterized by a rugged topography, with few valleys and slopes suitable for agriculture, and limited areas suitable for intensive agriculture. In terrains with productive soils, surface and ground water is minimal. Rainfall is concentrated in a few months, and precipitation can be irregular and scarce. Extreme climate phenomena, in the form of drought, frosts, and hailstorms are not uncommon (Cardenas, 2003).

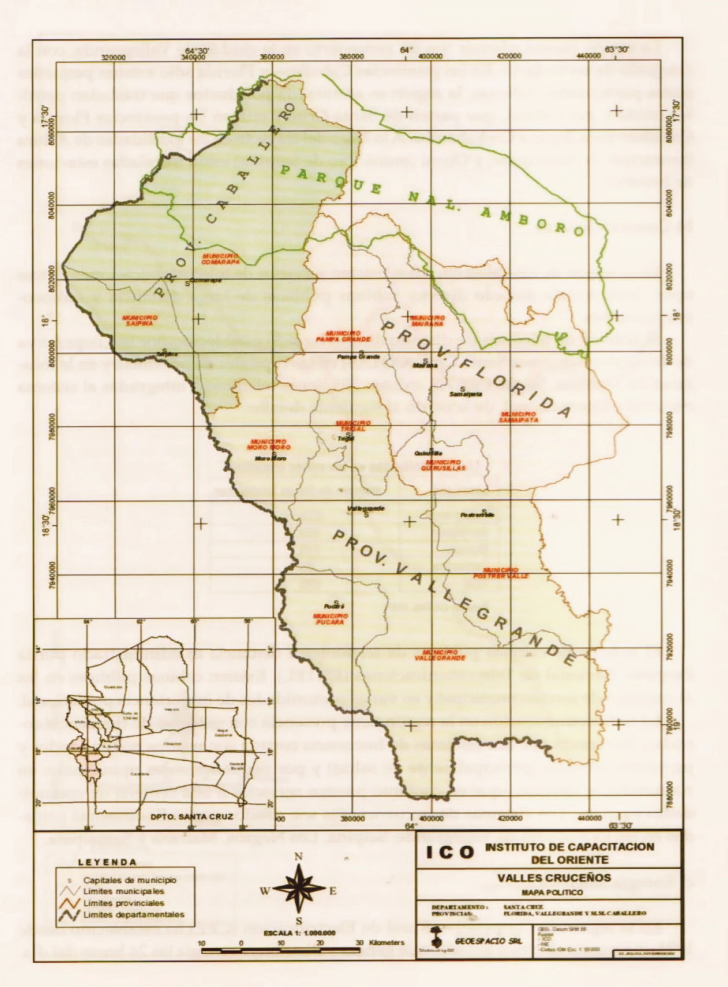
The dominant production system—farming and livestock—requires relatively low investment, with products mostly geared towards family consumption and local markets. Some industries that focus on a few, more specialized products requiring relatively high investment, are also present—for example, poultry and dairy farms (M.C. Calzadilla, personal communication, August 2, 2011). While some farmers are minority tenants of their fields, and others are farm labourers, in general, most farmers own their land (Cardenas, 2003). Only a little more than half of the land owners hold documents showing legal ownership of the land. Single-family or individual production units predominate in the *Valles Cruceños* region. Agricultural products are used for local consumption, with the majority of these produce being transported to domestic markets outside the *Valles Cruceños* región—for example, to the cities of Santa Cruz de la Sierra and Cochabamba. There is virtually no marketing infrastructure in place. Informal

exchange operations are performed on farms or fairs conducted in communities or towns (Cardenas, 2003).

Figure 2.

Map of *Valles Cruceños* region

Divided by departments and municipalities.



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6.4. Contributing factors to the problems of rural farmers

6.4.1. Poverty

In the *Valles Cruceños* region, 56% of the working population have jobs tied to farming, and 75% of this group employ a mixed pattern of production involving farming and livestock. Paz, Gonzales, and Garcia (2006) refer to the results of a Dutch climate change study conducted in Bolivia in 1998 that point to the vulnerability of the Bolivian agricultural sector to climate change. This vulnerability is due to the fact that this sector relies directly on favourable climate conditions for a good harvest season; this is further exacerbated by the farmers' minimum use of technology. Vulnerability of the agricultural sector translates to food insecurity for much of the country's population that relies on local production. Additionally, a major concentration on one industry puts producers at the mercy of market volatility, with no other sources of income to fall back on. The national census that mapped the country's poverty levels in 2001 indicates that 66.15 % of the population in the *Valles Cruceños* is poor, with 82% of the total poor concentrated in rural communities (Cardenas, 2003, p.57). All the municipalities in the region have seen their poverty rates decline significantly since the 1992 census. Significant reductions occurred in the municipalities of Vallegrande (20.6%) and Samaipata (26.6%), while Comarapa (9.5%) showed a minor decline (Cardenas, 2003). Despite these advances, the percentage of poor people is still high, as observed in Table 1. The municipalities of Vallegrande and Samaipata have poverty rates slightly lower than the national average, and the municipality of Comarapa with a poverty rate 17.21% higher than the national average (Cardenas, 2003). Over half of the population of each of the three municipalities of Vallegrande, Samaipata, and Comarapa are considered poor. The INE's criteria for structural poverty is based on minimum levels of basic needs associated with housing, availability of water and sanitation services, energy inputs (electric power and fuel for cooking), educational level, and access to health services (INE, 2002b).

Table 1 Poverty Map -Target Municipalities of the Valles Cruceños

	Population Private Households	Population – Not Poor		Population - Poor	
		Total	%	Total	%
Bolivia	8,014,380	3,318,916	41.41	4,695,464	58.59
Department of Santa Cruz	1,958,463	1,213,392	61.96	745,111	38.05
Valles Cruceños	72,693	24,606	33.85	48,087	66.15
Province - Vallegrande	26,792	9,711	36.25	17,081	63.75
Municipality - Vallegrande	16,373	7,644	46.69	8,729	53.31
Province - Florida	26,783	10,171	37.98	16,612	62.02
Municipality - Samaipata	9,408	4,147	44.08	5,261	55.92
Province - Caballero	19,118	4,724	24.71	14,394	75.29
Municipality - Comarapa	14,075	3,406	24.20	10,669	75.80

Note. Adapted from Valles Cruceños: Diagnóstico del sector agropecuario (p.57) by C. Cárdenas, 2003, La Paz, Bolivia.

6.4.2. Inequality

There is an unequal distribution of land in the *Valles Cruceños* region wherein less than 10% of landowners have roughly 90% of the land, while more than 90% of food producers have either no land or they control only 10% of available agricultural land. This latter group encompasses almost all productive units of the *Valles Cruceños* region. The consolidation and endowment of lands is a slow and conflicting bureaucratic process that results in the presence of farms without legal documentation of ownership, and creates uncertainty among producers (Cardenas, 2003).

Inequality in literacy rates between males and females can be observed in Table 2. Although the rates of literacy of the overall population over 15 years of age improved in 2001 relative to 1992 census figures, the gap between the literacy rates of men and women in both years remain wide (Cardenas, 2003).

Table 2 Percentage rates of literacy of the population over 15 years of age

Province & Municipality	1992 Census		2001 Census	
	Male	Female	Male	Female
Province – Vallegrande	85.45	71.86	89.53	78.76
Municipality – Vallegrande	86.48	75.34	89.91	81.56
Province- Florida	85.01	72.38	89.68	78.73
Municipality – Samaipata	80.93	67.33	87.88	77.36
Province – Caballero	84.77	65.34	90.90	72.33
Municipality - Comarapa	83.64	64.27	90.21	72.03

Note. Adapted from Valles Cruceños: Diagnóstico del sector agropecuario (p.55) by C. Cárdenas, 2003, La Paz, Bolivia.

6.4.3. Technical and economic aspects

The productive units in the *Valles Cruceños* region have low incomes and are experiencing a technological lag, a disadvantage common to other farmers in the rest of the country. Farmers generally do not have sufficient capital to invest in farm improvement and to cover the operation costs entailed by the production process. Their lack of capital means a lack of, or limited adoption of, innovations and technology that can help improve yields for their own food security and for the production of goods for the consumer markets (Cardenas, 2003).

6.4.4. Political aspects

The *Valles Cruceños* region is a predominantly peasant population. In quantitative terms the citizens could carry some clout in effecting change in their communities. Realistically, the numbers do not translate to citizen participation. There are existing limitations that constrain the population's exercise of its civil rights. Many citizens, mainly women, are not aware of their rights, and many of them do not have basic identification documents. These constraints contribute to low individual and group involvement in political and economic decision-making processes in the local and national levels. Territorial and sectoral organizations of producers are weak, and they have a low participation rate in processes dealing with specific issues of the industry.

There is, therefore, an absence of mechanisms to assess and influence the process of agricultural production and marketing, and identify and support sectoral demands (Cardenas, 2003).

6.4.5. State policies

There is a general perception in the rural areas that the country, which is run by a few powerful groups, is adopting an 'anti-farmer' approach. Commercial agricultural production geared for exportation is being stimulated, to the detriment of small-scale agricultural production which is not being prioritized. The government has pushed for policies lowering the prices of local food products, and supports importation of food for mass consumption. It has systematically reduced public investment in the rural areas, negatively impacting the availability of fertilizers and much-needed equipment; the creation of productive infrastructure such as irrigation and water storage systems; training services; and credits for small farmers (Cardenas, 2003).

7. Bolivian women and vulnerability to climate change

This paper documents a study I conducted from June – August, 2011, in three Bolivian mountain communities in the *Valles Cruceños* region. The *Instituto de Capacitación del Oriente* (ICO), a Bolivian non-governmental organization (NGO) initiated this study. Founded in 1981 in Vallegrande, ICO has been actively helping rural farmers in the *Valles Cruceños* region for the past 30 years. They run programs that support the social and political empowerment of the peasants, as well as support local sustainable economic development, with the active involvement of community members.

My research focused on three groups of communities—one group is represented from each province in the *Valles Cruceños* region, in the department of Santa Cruz, Bolivia. These communities and their respective provinces are: Loma 25 (Vallegrande), San Juan del Rosario (Florida), and Siberia (Caballero). Loma 25 is composed of 12 small communities that border each other. Although Siberia is a community on its own, I have included 4 other communities under the Siberia study. This is because they are all small communities that are close to each other and share common land features and climate change problems. For the most part, I was based in the municipality of Vallegrande, but I travelled to these remote mountain communities, together with the designated ICO representative for that particular area.

7.1. Methodology

My research methods included interviews and participant observation. Women from the three groups of communities were interviewed in different locales: in their own homes or in community classrooms, and in the *Escuela de Lideres* in the municipality of Vallegrande. ICO runs classes in the *'Escuela'* for adult *campesinos* and *campesinas* (peasant farmers) with the aim of strengthening the grassroots through education in

social, economic, and political self-empowerment. Most of the women I initially interviewed were attending this school. I later visited them in their communities and from there my references 'snowballed', with these women recommending other women in their community.

I prepared a survey questionnaire that I filled in during the interviews; this also included some open-ended questions. With the signed consent of the women, I recorded the interviews with a digital voice recorder. Two women declined to have their interviews recorded. I listened to these recordings later on, checked them against the answers in the filled-in surveys, and I then tabulated my findings. I also interviewed the ICO agents who were responsible for each community because their knowledge of the area, its history and its people could greatly enrich my findings. These interviews were also recorded and later transcribed.

7.2. Research studies

7.2.1. Loma 25 (Vallegrande)

Loma 25 is a group of communities that belongs to the province and municipality of Vallegrande. Twelve communities comprise Loma 25: Aguaditas, Alto Citanos, Chujllas, Churo la Collpa, Hornos, Islas, Kasamonte, Manchones, Palmitas, Plan Citanos, Torneado Chico, and Torneado Grande. On average there are between 20-35 families per community.

The main activity in this region is farming. The area is mostly devoted to growing fruit, especially citrus fruits such as tangerines, oranges, and limes. Other crops that are grown in small quantities include potatoes, corn, beans, peanuts, sweet potato, rice, yucca, lettuce, and onions. Generally, corn is not grown in large quantities. About 60% of produce from the communities is sold in the market while 40% is for local consumption. The communities are engaged in raising livestock to sell, but this is done in small scale. Very little is left for local consumption. Small animals, such as hens, are raised in small quantities for consumption. Although some institutions have looked into climate change in the area in the past, these studies were done at a superficial level. Today climate change is more pronounced in the area, with days of heavy rain and

thunder in the winter. This has not been seen in the past (L. Caballero, personal communication, July 27, 2011).

The study on the vulnerability of the women of Loma 25 was done in July 2011. Twenty women in total were interviewed from the different communities. Churo la Collpa, Kasamonte, and Torneado Chico are not represented in this study. The majority of the women are involved in full-time farming, three women farm part-time, and there is one school teacher. The following information is based on women's responses to survey questions and their anecdotal remarks.

The majority of the women interviewed were between 30 - 60 years of age. Half of the women had family members owning the land they worked on; that is, the land was registered under the names of other family members–such as husbands, fathers, or brothers. Two women had joint ownership of the land, together with their husbands. Only one woman held sole title to her land. The other half of the women rented their land. The size of the plots ranges from 1 - 4 hectares. The distance women walk to get to their work plots varies from 1 - 3 hours walk every day. The nearest government office is in Vallegrande.

The women interviewed have noticed changes in the weather in the past five years. These changes include: the sun is stronger; there is less rain; seasons are drier resulting in drought; the rain comes later, and there is increased cold weather. Two women have not noticed any change in the weather.

Climate change has had an impact on the communities' agricultural activities. Farmers reported poor crop yield that resulted in shortage of food, loss of crops, decrease in amount of livestock, a shortage of drinking water, and increased health problems. When there is too much rain the corn plants suffer. When there is no water, animals suffer and women have to take them farther to graze.

The sources of water for the communities are wells, springs, river, and rain. Although Torneado Grande has no shortage of water, their water supply is permanently weak.

The majority of the women believe they have a serious problem and they talk about the effects of climate change with other members of the community. Some of their suggestions to counter the negative effects of climate change are:

1. There is a need to look for sources of clean water. It is important to keep these areas free from contamination.

2. Ask for outside help regarding clean water and water for irrigation.

3. There is a need for reforestation measures.

Although the majority of the women interviewed believe that both men and women are actively involved in the affairs of their community, the women believe that they themselves are only partially active in making decisions about their community. Some reasons given for this are:

1. Women are shy and passive.

2. Men usually tell women that they do not know anything.

The majority of the women interviewed think they can confidently pursue climate change issues with their government. They believe that all members of the family, not just the men and women who work the fields, are equally affected by the economic challenges resulting from climate change. The women unanimously believe that they do more extra work than men—their work continues when they get home from the fields.

How are women's lives different today as a result of climate change? More than half of the women reported an increase in the following: household violence, pressure to provide food for the family, health problems, fights and arguments among family members, and less quantity of food available. When the harvest is poor because of lack of rain, the majority of women reported a family member migrating to another place to look for other kinds of work. Almost half of the women reported a family member taking a loan. Four women felt pressure to get loans.

The household sources of food are crop production, livestock, and the market. When asked to describe the amount of food the family eats, the majority of the women

responded that in general, there is enough food to eat. Six women responded that sometimes there is not enough food to eat. When this happens, all family members eat less, not just women.

Except for a few benefits received for the children and old people, the women reported not receiving other benefits from the government. They also do not receive any government support for their agricultural activities. Some of their suggestions on how the government can support their community include:

1. Improved access to drinking water.

2. Assistance with irrigation.

3. Help with seed supplies.

7.2.2. San Juan del Rosario

San Juan del Rosario is a community of approximately 100 families and has a population of around 400 inhabitants. The community belongs to the province of Florida, and the municipality of Samaipata.

The main activities are farming and livestock production. Ninety percent of the family economy is based on agricultural production. About 95% of families own their land. Some of the crops grown are: potatoes, corn, beans, peas, and citrus fruits. These are intended for local consumption, and some surplus are bartered or sold in local markets. In livestock production, the community raises cattle, pigs, and poultry. The average family has horses or donkeys and these are used mainly for transporting farmers' produce.

A small percentage of the population is in service industries, such as: transportation, masonry, carpentry, wood crafts, and animal leather. These do not represent much of their economic income (M.C. Calzadilla, personal communication, August 2, 2011).

Past survey and interview results from the citizens show that 10 years ago the area experienced favourable conditions for farming. The weather was good—the rains

were predictable, and the seasons of the year were well-marked. Whereas farmers were able to plan their growing schedule then, now the seasons are unstable for growing crops or raising animals. Over time, there has been less rainfall and the introduction of other factors that are negatively impacting production—very cold days, more intense heat from the sun, hail, frost and snowfall. The community gets its drinking water from two micro watersheds located at an average altitude of 1600 to 1900 meters; it is 2.6 miles west of the town of San Juan del Rosario. Aside from these reservoirs that resulted from an ICO project that was started two years ago to capture and store rain water for use during critical times, the community does not have an alternate water source. All farming is reliant on rain; the rainy season runs from November to March. The rest of the year it is dry in the area (Calzadilla, personal communication, August 2, 2011).

The study on the vulnerability of the women of San Juan del Rosario to the effects of climate change was done in July 2011. Twelve women were interviewed from the community. They are all involved in farming and/ or livestock production, either part-time or full-time. The following information is based on women's responses to survey questions and their anecdotal remarks.

The ages of the women interviewed varied. Five of them were between 21- 39 years of age, and seven of them were aged 40 and up.

A majority of the farmers in the community own their land. Half of the women interviewed hold titles to their land, while the other half has the land under their husbands' names. The size of the plots ranges from 1 - 3 hectares. The distance women walk to get to their work plots varies from 1- 5 kilometers every day. The nearest government office is in Samaipata.

The women interviewed have noticed changes in the weather in the past five years. These changes include: a more intense sun; less rain; drier seasons resulting in droughts; and increased cold weather. These changes have had an impact on their agricultural activities. They reported shortage of food because of poor crop yield, loss of crops due to droughts, a decrease in amount of livestock due to the cold and drought, a

shortage of drinking water, and increased health problems—for example, grip because of the cold.

The women believe the problem is serious and they talk about the effects of climate change with other members of the community. Some of their suggestions to counter the negative effects of climate change are:

1. People in the community should seriously organize to look for solutions to their problems.

2. Consult outside sources on how to lessen contamination of their water supply.

3. Look for alternate sources of water.

4. Seek government help on their water problem.

A majority of the women interviewed believe that both men and women are actively involved in the affairs of their community; that is, women are also active in making decisions about their community. Half of the women believe they can confidently pursue climate change issues with their government. The other half does not believe anything can change. They claim the government is too far away to care; they never come to visit; they are not interested in the community.

The women interviewed think that all members of the family are equally affected by the economic challenges resulting from climate change. Half of those interviewed believe that men and women do the same amount of work when the harvest is not good, while the other half believe that women do more extra work—for example, they take care of the children and they worry about what to feed the family. Men rest when they come home from the fields.

How are women's lives different today as a result of climate change? The women interviewed reported less quantity of food is available. Their sources of food are crop production, livestock, and the public market. When food is scarce, women have to travel far to Samaipata to buy food. This entails over an hour bus ride on bumpy mountain dirt roads. When asked to describe the amount of food the family eats, most of the women responded that at times there is not enough to eat. When this happens,

half of the women responded that all family members eat less. The other half responded that men get priority with the food.

Except for a few benefits received for the children and old people, the women reported not receiving any other benefits from the government. They also do not receive any government support for their agricultural activities. Some suggestions on how the government can support their community include:

1. Improve access to the nearest town by upgrading the roads—this will help them transport their goods.

2. Financial assistance for wells and irrigation.

3. Provide subsidies for machinery—for example, to procure a tractor that can be used for cultivation.

4. Organize workshops for women on how to create extra or alternate sources of income.

7.2.3. Siberia (Caballero)

The communities of Siberia, Capilla, Churro, Manzanal, and Punilla are situated in the municipality of Comarapa, in the province of Caballero. The main economic activities are farming and livestock production. Strawberry is the major crop, but farmers also grow potato, wheat, corn, peas, beans, and apples.

The municipal government of Comarapa conducted a land use study plan in the past years. The study determined that there has been great deterioration in the area's natural resources, especially in the forests. Thirty years ago this region was almost inaccessible because of constant rain. At that time, wood was extracted in great amounts; the forest has since deteriorated rapidly. People in the community today are aware of the recent changes in weather pattern. Whereas in the past the seasons were well-defined and farmers could calculate when the rains would come, today, it is harder for them to anticipate its arrival. The rains used to stretch from November until May and June, and now the rainy season has been reduced to three months. This shortened

period does not give them enough time to grow the crops, and this results in major crop losses (A.S. Garcia, personal communication, August 4, 2011).

The study on the vulnerability of the women to the effects of climate change in Siberia and its four surrounding communities was done in July 2011. Ten women were interviewed from the combined communities. They are all involved in farming. The following information is based on their responses to survey questions and their anecdotal remarks.

The majority of the women interviewed were between 30 – 39 years of age. More than half of the women were *not* renting the land they worked on. Rather, half of these women had family members owning the land; that is, the land was registered under the names of other family members – husbands, fathers, or in-laws. The other half of these women held joint title to the land with their husbands. The size of the plots ranges from 2 – 3 hectares. The distance women walk to get to their work plots varies from ½ hour – 3 hours walk every day. The nearest government office is in Comarapa.

The women interviewed have noticed changes in the weather in the past five years. These changes include: extreme temperatures (colder and hotter); strong winds; snow; less rain, but when it rains, it rains a lot. Although they consider the changes mild at this stage, they are still concerned with the possible future outcomes. Climate change has had an impact on their agricultural activities. They reported poor crop yield, loss of crops when there was a drought, a decrease in amount of livestock, a shortage of drinking water, wells drying up, and increased health problems. As a result of these changes some of them have experienced food shortages, an increase in debts, and inability to pay loans.

The communities of Siberia, Churro and Capilla have natural sources of water supplied by springs and natural lagoons, but the communities of Manzanal and Punilla have absolutely no water for agriculture. Farmers rely only on rain. The communities have drinking water, but the systems are poor—the supply is small and water is not filtered.

The majority of the women talk about the effects of climate change with other members of the community. Some of their suggestions to counter the negative effects of climate change are:

1. Look for other sources of water.
2. Ask for outside help regarding potable water and water for irrigation.

A majority of the women interviewed believe that both men and women are actively involved in the affairs of their community, and that women are also active in the decision-making process. All of the women interviewed believe they can confidently pursue climate change issues with their government. They all believe that women are affected differently by climate change compared to men. Women do more extra work than men, normally, but with the added effects of climate change, their work load increases, and there are more things to worry about.

How are women's lives different today as a result of climate change? More than half of the women reported an increase in pressure to provide food for the family, an increase in health problems, and there is less quantity of food available.

Household sources of food are crop and livestock production, and public markets. When asked to describe the amount of food the family eats, the majority of the women responded that sometimes there is not enough food to eat. When this happens, the women eat less food.

Except for a few benefits received for the children and old people, the women reported not receiving any kind of benefit from the government. A majority of them claimed they do not receive government support for their agricultural activities, while three women claimed receiving some support. Some suggestions on how the government can support their community include:

1. Compensation for crop loss due to drought.
2. Subsidies for fertilizers.
3. Initiate water projects – for potable water and for irrigation.
4. Access to agricultural loans.

7.3. Notes and observations

For this project I interviewed 20 women from Loma 25, 12 women from San Juan del Rosario, and 10 women from Siberia and its surrounding communities. I believe interviewing 20 women serves as a good representation for the size of a group like Loma 25. I found that after 10 interviews the answers were already repeating. Additional interviews for San Juan del Rosario and Siberia are needed in the future to optimize results. There were time constraints in scheduling visits to the different communities. My trips were contingent on the scheduled visits of the different ICO representatives to each region, and the availability of a vehicle. All these remote mountain communities required at least over an hour of driving from the nearest municipality, on narrow and bumpy dirt roads that zigzagged along the sides of mountains.

Once in the communities, it was not easy for me to find women who were available to be interviewed. During the day, most houses were padlocked as men, women, and children left to work in faraway fields. This was especially evident in Siberia and its surrounding communities. This was also true for San Juan del Rosario, although there appeared to be more women here with small children that stayed home, at least for part of the day, or certain days of the week. The case for Loma 25 was different. The ICO representatives had scheduled meetings after work in the different communities around Loma 25, in order to do regular ICO business. This proved to be an ideal situation to do interviews too because many women were present. In the case of San Juan del Rosario and Siberia I could have interviewed in the evenings when the women and men were home from the fields. I did not think this was a good idea though, because based on previous experience, I know that when husbands are around, women not only tend to be shyer and passive to answer questions, but also, husbands tend to take over the interviews. Also, women would not have answered certain questions as sincerely or openly—for example, on the sensitive issue of violence in the family. Interviewing in the evenings may also be a constraint on women because all family members are at home demanding for the woman's time—for example, children and husband. I also recommend interviewing women individually, because when I interviewed two or more women together, there was a tendency for one or the other to simply agree with what the first person had said. Additionally, I originally started out with

a very long list of questions, but this proved unrealistic. Women often have little children with them during interviews that demand their constant attention.

8. Analysis

What is the state of government participation in the *Valles Cruceños* region today? Based on all the interviews I conducted in this area, the women asserted that government presence or assistance is very minimal. Farmers generally do not receive any support for their agricultural activities. In the three municipalities of Vallegrande, Samaipata, and Comarapa, the percentages of the population that are poor, based on 2001 figures, are all above the 50% mark, with Comarapa having the highest at 75.80% (see Table 1). The region's heavy reliance on a single industry—agriculture—creates a vulnerability to the negative effects of climate change. The supply of water, a resource that is being impacted in a major way by climate change, has become unpredictable. Additionally, the farmers' lack of sufficient capital to invest in technology and farm innovations perpetuates low incomes and food insecurity. The government, by systematically reducing public investment in the rural areas, and not prioritizing small-scale agricultural production, is contributing to the poverty levels in this region.

In the *Valles Cruceños* region, there is usually one primary school serving a community or group of communities. Classes are in session for only four hours per day. Mejia (2009) claims that primary education in Bolivia is almost at 100%, the number of girls and boys attending school is now equal, and secondary education is also on the rise. However, it is a different story in the isolated rural areas, where "lack of completion and repetition of grades persist" (Mejia, 2009, p.10). Attendance rates are high between first and fifth grades but these fall dramatically at the beginning of sixth grade. This may be partially attributed to the end of the monetary incentive, but can mainly be due to the fact that in many remote communities there is no option for further education after primary school. The next step would be to go to the nearest town or city, and for many of the families in these poor communities this is not an option. With regards to the *Bono Juana Azurduy de Padilla*, the cash transfer program that aims to reduce child and maternal mortality rates, the provision of health services to remote areas has been of

poor quality and of limited coverage, reducing the impact of payments to mothers (Perez de Rada, 2009).

The role of cultural norms plays an important part in creating gender scripts that define women's fields of responsibility. Water supply and delivery differs between the three community groups. In some places unfiltered drinking water is brought into households through a system of old pipes or tubes, while in others, the burden of collecting this precious resource falls on the women. Women and children have to walk a minimum of one hour a day to collect water. The men stay in the *campo* and continue working. Women are responsible for bearing and rearing the children; they also work in the fields, taking their children along. At the end of the day they continue to work at home, making sure there is food on the table for the family. It falls on them to worry about providing food when harvest is poor. Climate change has also affected the health of family members. Women are considered the traditional caregivers, and they have the additional responsibility of tending to the sick family members. Often times women's work is not valued by the family as this work does not count as income (A.S. Garcia, personal communication, August 4, 2011).

Gender scripts also contribute to inequality in accessing education. Note in Table 2 that 2001 literacy rates had gone up, both for males and females, compared to 1991 census rates. What has not changed is the literacy gap between males and females—males still predominate over women consistently. In poorer, paternalistic societies were gendered roles and responsibilities position women low in societal hierarchy, educating women is not a priority. The Bolivian census highlights this inequality. Heaton, Huntsman, and Flake (2005) refer to Latino cultural values and beliefs that socialize children differently at an early age; these are defined by the pervasiveness of two important scripts that influence male/female interactions—*machismo* and *marianismo*. *Machismo* dictates that men are dominant and authoritarian. Its positive features "include the notion of honor, pride, courage, responsibility, and obligation to one's family" . . . while *marianismo* "refers to the idealization of Latinas as submissive, self-sacrificing, and stoic" (Heaton, Huntsman, & Flake, 2005, p.290) and women are the caregivers and nurturers. The negative elements of *machismo* include ". . . aggressiveness, belief that men are superior to women, and resolution through dominance." Men control and women depend (Heaton

et al., 2005, p.290). In the context of the communities of the *Valles Cruceños*, these gender roles and expectations add to the already difficult economic situation of the women, and limit their participation as pro-active citizens.

The majority of the women I interviewed believe that they take an active role in the affairs of the community. During my visits, I noted that attendance in meetings differed from one community to the other. Attendance ranged from an equal ratio of men to women, to women outnumbering men, or men outnumbering women. There were a couple of meetings that were attended only by men, and another meeting where it was just all women in attendance. I observed a similar range of differences in how vocal women were in community meetings. In some places women confidently articulated their ideas, and in other places women let the men do most of the talking. The only time I observed some unanimity in women's behaviour was when the women hesitated to take on positions of responsibility. For example, when communities were organizing 'water committees' that would oversee conservation of their water sources, women had to be coaxed to be part of the council group. Through a vote procedure, the president and vice-president positions were always filled by the men and the secretary and treasurer positions by the women (albeit with much hesitance). It is difficult to ascertain if the women's passivity is due to a lack of confidence in their abilities (that has become part of their nature due to gender scripts), or perhaps due to a reluctance to add still another responsibility to their already full plate. The majority of the women in one community though, complained that men usually put women down, claiming that they, the women, do not know anything. Overall, although women claim they take an active role in community affairs, in general, the majority of the actual decision-making is still left to the men. Both men and women perpetuate these gender scripts as part of their cultural norms. The constraining role of this informal institution is made evident when women, in the face of climate change effects, cannot articulate their specific needs and are not actively part of the solution-seeking process.

9. Conclusion

Climate change effects are negatively impacting the communities of the *Valles Cruceños* region, and these are contributing to the vulnerability of the citizens. Although these changes affect both men and women by virtue of their common farming livelihood, women stand to be disproportionately affected because their specific roles and responsibilities in the household and the community expose them to different opportunities and risks.

This study focused on the socially-constructed institutions that contribute to the vulnerability of women. What internal characteristics of these societies exist, independent of the external hazard (that is climate change), that make women vulnerable to external stressors? I linked women's poverty and their experience of inequality, to a lack of access to entitlements. In turn, I attributed this condition to specific roles of formal and informal institutions. I argued that the absence of government support for these communities, and the pervasiveness of cultural norms that constrain women's empowerment, are major contributing factors to the vulnerability of these women to the effects of climate change.

The government, or the state, serves as the formal institution that legitimizes the differential access to entitlements. Informal institutions—in the form of mores, codes of conduct, or social and cultural norms—are embedded in human systems, and as such, they are not readily perceived as directly impacting vulnerability levels. Nonetheless, informal institutions play a role in determining the distribution of entitlements when they socially differentiate its members based on gender scripts.

Poverty and inequality are endemic in these communities and are constraining women's coping mechanisms to tackle additional stress. Poverty, a condition associated with a lack of access to entitlements, negatively affects an individual's ability to absorb shocks and stresses, and to take adaptive action in advance of, and in reaction to an external hazard. The women of the *Valles Cruceños* region are unable to access

resources that can help improve their economic position. There is an absence of state support for their farming activities, or for necessary education or training for alternative sources of income. Women need social safety nets and programs that are relevant in addressing the specific needs of people living in remote rural areas. The consequence of the Bolivian state's recent trend towards re-centralization of power to the national government may see the spread of bureaucracy that can further widen the gap between the state and the rural communities.

Social differentiation based on gender scripts creates inequality in the distribution of entitlements. Women stand to lose more in a society where they are located low in the hierarchal scale. In the *Valles Cruceños* region, equal opportunities for women to get an education that can open doors to other income sources, the ability to voice their concerns and be heard in community affairs, and respect for their contributions to the family and the community, are entitlements whose absence is disempowering to women.

It is important for me to reiterate here that the men of the *Valles Cruceños* region are also impacted by the government's lack of support for the farming livelihood in this area. Like the women, men experience poverty that results from the absence of entitlements, making them vulnerable to climate change effects. Unlike the women, cultural norms enable men to be part of the solution-seeking process, giving them a voice in the affairs of their communities. Having said this, I am cautious about making a broad generalization that would effectively portray all women in these communities as victims, instead of agents of change. This would unfairly gloss over the efforts of many of the women I met in whom I saw a determination to be heard and be part of the climate change mitigation and adaptation process. The adult women who attend the classes at the *Escuela de Lideres* all display a dedication to learning, especially when one takes into account the hardships they go through, travelling for hours, with little children in tow, from their remote mountain communities to get to the school in the town of Vallegrande. The community development work of *ICO* in this region is making a difference in the lives of the citizens, with the '*Escuela'* especially making strides in raising women's awareness of their social and political rights. These necessary first steps to empowerment have been laid out, but a long-term, sustained commitment from the government is imperative if a meaningful solution to the plight of these women is to be realized.

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