

## OTHER SOCIAL AND BEHAVIORAL SCIENCES

# Gendered Experiences of Adaptation to Drought: Patterns of Change in El Sauce, Nicaragua

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The changes men and women in a rural community in Nicaragua say they have implemented over the past decades differ in ways that relate to their vulnerability to drought. Short-term coping was more common among the women, especially the female heads of households, while adaptive actions were more common among the men. The Community Capitals Framework offers a tool to understand the differences. A gendered culture meant that the division of other types of capital (natural, human, social, financial, built, cultural, and political) as well as the division of labor in the case study area were also highly gendered. These gendered inequalities in access to and control over different forms of capital has led to a gender-differentiated capacity to respond to climate change, men being able to adapt and women experiencing a downward spiral in capacity and increasing vulnerability to drought.

Los cambios que hombres y mujeres en una comunidad rural en Nicaragua dicen que implementaron en las últimas décadas difieren en aspectos relacionados con su vulnerabilidad a sequía. Medidas para hacer frente en el corto plazo fueron más comunes entre las mujeres, mientras medidas de adaptación fueron más comunes entre los hombres. El Marco de Capitales de la Comunidad es una herramienta útil para entender esas diferencias. La persistencia de una fuerte cultura patriarcal implica una división desigual del trabajo y de acceso a y control de capitales marcadas por el género. Estas desigualdades generaron una capacidad diferenciada por género para responder al cambio climático, resultando en hombres siendo capaces de adaptarse y mujeres experimentando una espiral descendente en la capacidad y un aumento de vulnerabilidad a sequía.

This article interprets gender differentiations in vulnerability in the interplay between structures and resources. Vulnerability is highly diverse and locally specific. The analysis is based on a qualitative case study in a drought-stricken part of northwest Nicaragua. I explore different socioeconomic and environmental aspects, along with their role in recent decades in gender differentiation in the capacity to reduce vulnerability through coping with and adaptation to an increased frequency of droughts and the increasing intensity of dry climate.<sup>1</sup> The findings on social-ecological interactions in Segnestam (2009) are developed here to give a richer appreciation of gender-differentiated vulnerability. In so doing, this article also contributes to the underexplored field of historical research on gendered adaptations.

Nicaragua is one of the world's most disaster-prone countries. It has experienced and continues to experience multiple types of hazard, such as hurricanes, drought, heat waves, and floods (INETER 2001; World Bank 2001a). As a result of natural disasters in combination with political conflict, civil war, and unfavorable economic conditions in recent decades, Nicaragua also suffers from severe poverty (World Bank 2001b, 2010a, 2015b). It is highly unequal, too, both in general and from a gender perspective (UNDP 2011; World Bank 2015a), although there has been an increase in women's mobilization since the early 1980s (e.g., Isbester 2001). Taken together, the social-ecological setting makes Nicaragua an illustrative case for a study on gender-differentiated vulnerability over time, especially given the continually changing climate, which increases the number of hazards, including drought, experienced worldwide.

<sup>1</sup> INETER (2001) describes four types of drought in Nicaragua: meteorological, hydrological, agricultural, and atmospheric. Examples of all these types were clearly visible in the case study area.

## Sources and Data

To represent the locally determined characteristics of gender as well as of vulnerability, the analysis is based on a case study of a rural part of El Sauce Municipality, a poor municipality that faces severe risk of drought. Ashwill, Flora, and Flora (2011, 1) argue that local studies are important because “climate change impacts are highly diverse and context specific.”

The data used in the article were collected in forty-seven semistructured interviews conducted on three separate occasions during dry as well as wet seasons with nine male heads of household, nine women living in male-headed households, and eight female heads of household, all of whom were mestizo (of mixed Spanish and indigenous ancestry). The interviews captured personal data, family composition, livelihoods and division of labor, natural resources, drought impacts and household strategies over time, division of assets and power, and cross-level strategies. With the consent of the interviewees, all the interviews were recorded and transcribed.<sup>2</sup>

Representatives of the Sustainable Land Management Project, funded by the United Nations Development Programme, facilitated the introductions to the first interviewees, after which the snowball method<sup>3</sup> was used to identify the rest. There was a bias toward older interviewees (two between twenty and thirty-nine years old, twelve between forty and fifty-nine, and twelve above sixty)<sup>4</sup> to facilitate investigations into people’s views on change over time. Those interviewees who related memories in the first session and showed a high interest in sharing their views on the research issues were selected for second and third sessions in the hope of capturing the changes they said had occurred over their life span and during their parents’ lives. In addition to the data from the interviews, the article uses information from separate focus groups with men and women, and from meetings with key informants from governmental and nongovernmental organizations in Nicaragua in 2008 and January 2010.

Interviews and oral histories are a way to begin to understand how people have had to negotiate their life situations, but they also provide elements of external realities, such as the date potable water was installed. Without a proper understanding of people’s experiences, it is not possible to appreciate their own place-based vulnerabilities and capacities as they perceive them, and how these have shaped their coping and adaptation. Furthermore, the interviewees and key informants provided information that is not available in official statistics. For example, of the four National Agricultural Censuses that have been carried out in Nicaragua, only two, from 2001 and 2011, are publicly available. Comparisons over time based on official statistics are therefore difficult to make. Nor do the agricultural censuses always include gender-differentiated data at the local level or cover enough aspects to enable an analysis of people’s lives and the grounds for their decision-making. Where official data are used in the text below, it is to place the situation in the case study area in a wider context. In addition to the primary sources, secondary sources have been used where available to contextualize some of the changes raised by the interviewees. In a similar way to how Malin Thor (2006) describes her oral history research, the results of the key informant meetings, interviews, and focus groups are thus used in two different ways: partly as subjective accounts of the history of gendered life during drought, and partly as factual accounts that complement and can be complemented by existing written sources in a reconstruction of the same history.

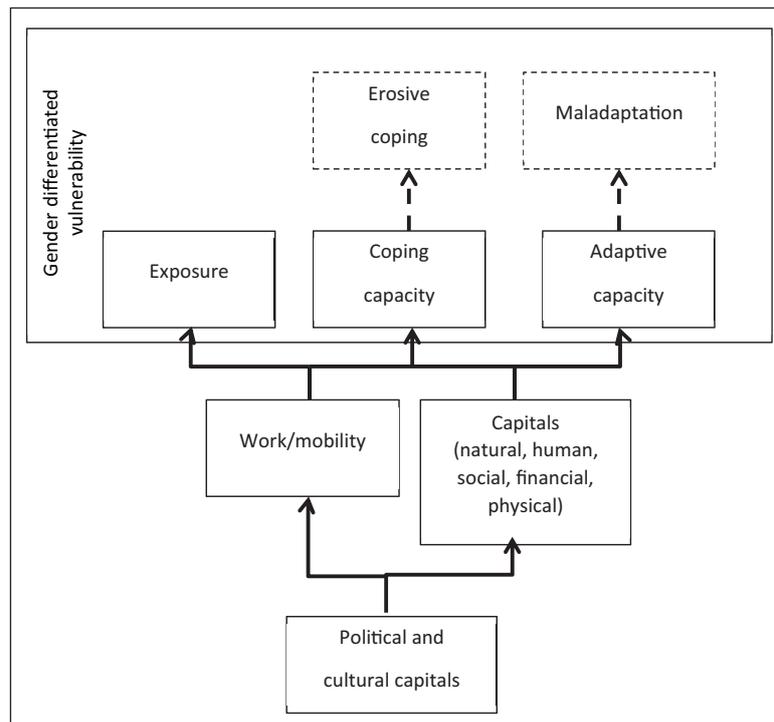
## Gender and Vulnerability: A Conceptual Framework

An integrative framework that combines vulnerability, gender, and a capital framework is used for the analysis in the sections below (see **Figure 1**). Vulnerability, or “the susceptibility to be harmed” (Adger 2006, 269), is in this article a function of three dimensions: individuals’ and households’ (1) exposure to drought; (2) capacity to cope by implementing loss management activities directed at the situation during or immediately after a drought (coping strategies aim to reduce losses in the short term in order to prevent the hazard from becoming a natural disaster—the outcome of the combination of a hazard and vulnerability); and (3) capacity to adapt to a climate that has become drier and drier since the beginning of the 1970s. Adaptation strategies generally have a more long-term objective than coping: to reform, restructure, and reorganize social-ecological systems to fit contexts and needs that have changed due to a continuous threat from hazards. A decrease in vulnerability is more likely to be achieved through adaptation (Smit and Pilifosova 2001; Segnestam 2009). However, there is also a risk that the adopted

<sup>2</sup> For further details on the research process and related issues, see the section on fieldwork in Segnestam (2014). All names of the interviewees are pseudonyms since they were promised anonymity. Quotes from the interviews have been translated from Spanish by the author. Quotes from sources written in Spanish have also been translated by the author.

<sup>3</sup> A technique for identifying other interviewees with the help of the initial interviewees thus increasing the sample.

<sup>4</sup> Life expectancy at birth was seventy-three years in 2008 (World Bank 2010b).



**Figure 1:** Conceptual framework.

strategies will have unintended negative impacts that might increase rather than reduce vulnerability among different sectors and social groups. This is erosive coping (Warner et al. 2012) or maladaptation (McDowell, Moe, and Hess 2010).

The capacity to reduce vulnerability to hazards depends on freedom of choice regarding work as well as access to and control over resources such as land, credit, agrochemicals, social relations, and healthy household members. These are commonly distributed unequally between men and women, and are dependent on social constructions of masculinity and femininity—that is, gender.

The impacts of gender on the distribution of resources, and thus on drought vulnerability, can be analyzed using the Community Capitals Framework (CCF) developed by Flora, Flora, and Fey (2004). (See Flora 2015 for an application of the CCF as an analytical tool in the context of gender and climate change.) The CCF is based on seven types of capital (natural, human, social, financial, built, cultural, and political), which together capture both internal and external aspects of capacity. (For a more detailed definition of the capital types see Segnestam 2009). The definitions of cultural and political capital in Flora, Flora, and Fey (2004) have been adapted to capture the consequences of the social structures—formal rules and informal norms—that shape gender inequalities in society and, by extension, the differences in vulnerability between women and men. Hence, people possess cultural and political capital when the humanly devised informal norms and formal rules (North 1990) that society sets up to distribute and control resources work in their favor. In the case study area, access to such capital, in turn, resulted in a gendered division of the other types of capital and in a division of labor. For example, in the case study area there was a norm that men were free to find salaried employment off-farm. Thus they possessed the necessary cultural capital to be able to choose a strategy through which they could access financial capital, thereby increasing their capacity to cope and adapt.

### Exposure: Drought and Livelihoods in the Case Study Area

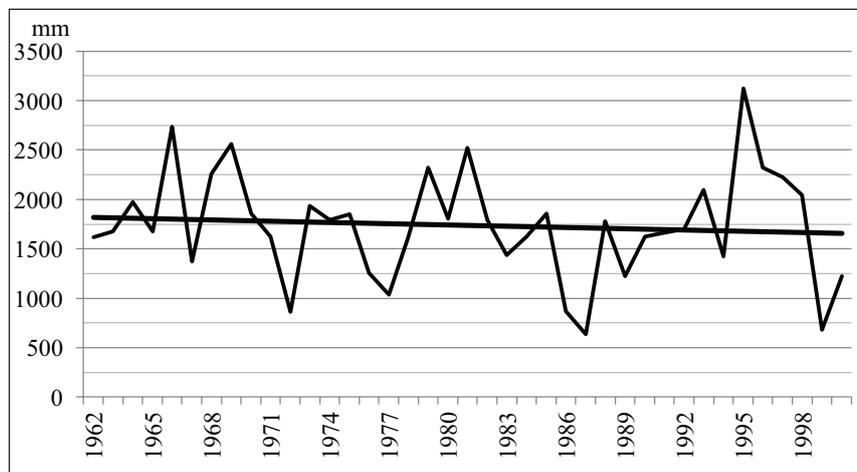
The case study area is located in El Sauce, a rural municipality in the northwest of Nicaragua. Almost 500 households (90 female-headed) live in the area, which is among the poorest in El Sauce: 230 of its households live in extreme poverty (INIDE 2008, 11, 20).<sup>5</sup> Agriculture (corn, sorghum, and beans) and livestock rearing are the main economic activities (INIFOM 2007). The climate is tropical dry with two

<sup>5</sup> INIDE (2008) does not define extreme poverty.

distinct seasons: the dry season (summer) extends from November to April and the rainy season (winter) from May to October. The rainy season is interrupted by the *canícula*, a brief dry spell from mid-July to mid-August, which separates the first (*primera*) from the second (*postrera*) farming season.

The Nicaraguan Institute of Territorial Studies (INETER) (2001, 43) classifies El Sauce Municipality as being at severe risk of drought, defined as a 30–40 percent risk of rain deficit. According to the key informants, it is affected by droughts that have become both prolonged and more frequent over time. Similarly, Mariano Gutiérrez Cruz (1994), in his report on meteorological drought in Nicaragua, speaks of irregular rainy seasons with a *canícula* that can last until mid-September, and the second half of the rainy season ending early at the end of October, followed by a prolonged dry season well into what previously was the rainy season. The interviewees and other studies (see, e.g., Caura S.A. 2005) speak of a disturbed seasonal rhythm. Governmental key informants and documents attribute the drought partly to the global climate phenomenon El Niño and partly to local factors such as deforestation and inadequate agricultural practices (Gutiérrez Cruz 1994; Caura S.A. 2005; Municipality of El Sauce 2007; Government of Nicaragua 2010).

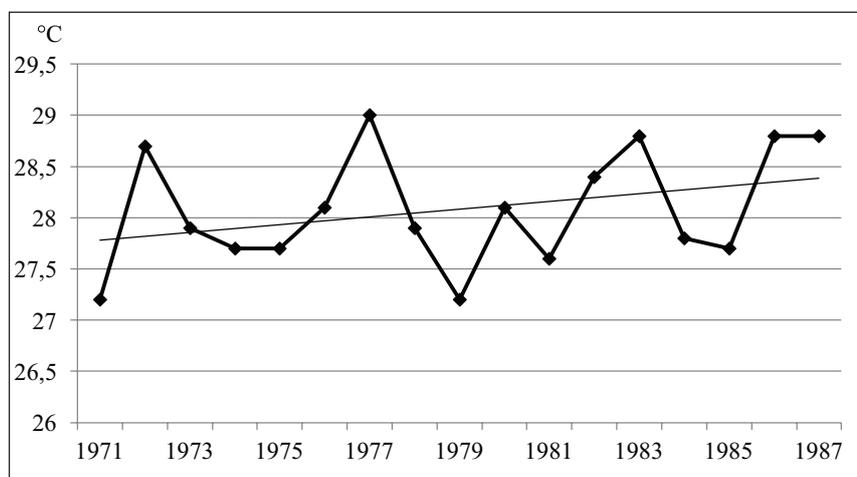
National statistics on annual precipitation and average temperature confirm the changing drought pattern (see **Figures 2 and 3**). According to CEPAL (2011), both these trends are set to continue in Nicaragua.



**Figure 2:** Annual precipitation, 1962–2000, El Sauce meteorological station.

Sources: INETER (2007a) and Caura S.A. (2005).

Note: Considering that La Niña years tend to result in “excessive precipitation” in Nicaragua (Milán Pérez 2009, 103), the heavy rainfall in 1995 can probably be explained by the fact that a La Niña was formed in that year (NOAA 2012).



**Figure 3:** Average temperature, 1971–1987, El Sauce meteorological station.

Source: INETER (2007b).

**Table 1:** Livelihoods of the interviewees.

|  | <b>Said to be a livelihood in their household by</b>  |
|--|---|
| Natural-resource-based livelihoods     |   |
| Agropastoralism                        | Six male heads of household<br>Six women in male headed households<br>One female head of household  |
| Agriculture only                       | One male head of household<br>Two women in male headed households<br>Four female heads of household   |
| Chicken only                           | One female head of household  |
| Non-natural-resource-based livelihoods | Four male heads of household (carpenter, constructor of silos*, responsible for potable water system*, and community leader*)<br>One woman in a male headed household (midwife*)<br>Six female heads of households (potter*, shop owner, living off remittances, gifts, and loans*) |

\*These also had natural-resource-based livelihoods.

Perceptions among the interviewees of when the climate began to change differed somewhat, but most said it was sometime between 1970 and 1990 that the rains began to decrease, with consequences for wells, springs, and river levels.

The interviewees identified a number of livelihoods, past and current, most of which had been affected by the drought (see Segnestam 2014 for more details). Most had inherited their parents' livelihoods and mainly lived on subsistence agriculture (primarily corn and beans) and livestock rearing, but there were a number of additional livelihoods not based on natural resources, particularly in the female-headed households (**Table 1**).

The heavy dependence on natural resources meant that drought exposure had had severe consequences for livelihoods. Even those with non-natural-resource-based livelihoods were highly exposed, albeit indirectly due to the increase in food prices and declining demand for their goods as a consequence of the lack of rain and failed crops. (For a discussion of the downward spiral caused by drought in the case study area, see Segnestam 2009). Two interviewees described the impacts of the drought on livestock rearing and fishing:

Angela: [Before I left home twenty-eight years ago] the winters were good and there was enough pasture. Now there are more problems because even though many times it rains, it seems as if, I do not know what happens because the food does not develop the same way, it is little, it is not the same. (October 6, 2008)

Interviewer: What did you see before, when you were young?

Juan: It was different; at least the river did not dry up before, it was very different. There were fish. One went there to fish, all sorts of fish, now, no. (May 16, 2008)

Other researchers writing about climate impacts on crops in Nicaragua note similar impacts to those mentioned in the interviews. Spoor (1995) describes how the drought in 1982–1983 led to higher imports of corn, mainly for fodder due to failed sorghum harvests.

## **Drought Responses in the Case Study Area**

According to the interviewees some changes had been implemented by women and some by men as a result of a drought cycle that appears to have become shorter and a chronic reality. These are presented below. First, however, there are those changes that interviewees said both men and women had experienced and implemented.

### ***Responses by Both Women and Men***

Both women and men had reduced consumption (by buying less food, reduced or rationing food consumption, reducing forage consumption, and reducing nonfood spending); diversified food consumption (by collecting wild foods and buying different foods); migrated and worked outside their farms; diversified incomes (by selling animals and other products, or making and selling nonagricultural

products); used social networks (informal loans and “receiving help,” including remittances); bought food and forage; and installed potable water systems.

Food and fodder had never been plentiful in the case study area, and the production of both crops and animals had been affected by climate change. Thus many of the women and men said they had completely excluded meat, fish, eggs, and cheese from their diets and rationed what beans and rice, and at times fruit and vegetables, they had access to. This demonstrates a lack of capacity to adapt to reduce their vulnerability. Many others said they had had to eat less in general, going hungry.

In order not to starve when drought struck and their own crops failed, the majority of the interviewees mentioned that they had no other option but to buy food. A few, primarily those who did not have any or enough land for their livestock to graze on, said that they also had to buy fodder. The increased food prices that follow droughts had forced those who did not have agriculture as their main livelihood to buy less and eat a less varied diet.

All of the interviewees had domesticated animals, mainly chicken and pigs. These were often sold in times of hardship to raise cash that would pay for food or fodder. Rocio, a woman living in a male-headed household described the strategy:

Rocio: I have sold my chickens to be able to buy other things, to buy food.

Interviewer: And do you always have to sell the chickens or only when you feel affected?

Rocio: When I am affected. Because look, one has nothing to eat, so I don't have enough to give the animals to eat and so they die. So it is better that I sell them. (May 14, 2008)

The female heads of household had access to fewer and smaller animals, such as chickens and pigs, while the women and men in the male-headed households often mentioned larger animals as well, such as cows, heifers, or oxen. Ownership of the larger animals was, however, commonly assigned to the men (see Deere, Alvarado, and Twyman 2010, for similar findings). Those who had not sold their livestock seemed either to have enough resources to avoid ending up in a food-insecure situation or to have been able to find cash in other ways, such as those men and women who earned an income of some sort. It could also be that they did not have enough to sell without ending up in an even worse situation. This was the impression gained primarily from the female-headed households. The male-headed households in general, and the men in particular, could therefore be said to have had greater capacity to cope with the drought and to turn things around when the opportunity arose.

Both men and women cited informal loans and store credit as ways to cope with losses caused by drought. According to the interviewees, these were more accessible than formal credit, since no collateral was required and no interest had to be paid. On the other hand, they were not as substantial and could therefore only be used for minor consumption purposes, such as to buy food or fodder.

One of the more commonly mentioned consequences of the deteriorating agricultural conditions and lack of job opportunities in the case study area was migration by household members, either to other countries, primarily Costa Rica (consistent with the findings of IFAD 2010), or to urban areas within Nicaragua. This was something both men and women had done, although more often young people did so than the older generation. There are no differences for women and men in Nicaragua's formal migration rules and regulations, but cultural aspects, primarily regarding the division of labor within households, meant that more of the men interviewed than the women had used migration as an adaptive strategy. Migration seemed to be the activity that had changed the most over time, from being internal, seasonal, and in relatively small numbers, to migration to other countries in substantial numbers. Elisa, one of the female heads of household, told me in our May interview how her husband, when he was alive, had not left the country, “like the young people do today to look for a life,” but only the county in which the case study area is located.

The remittances sent by migrant household members were an important source of income for the interviewees, and for Nicaragua as a whole. According to the 2005 Population and Housing Census, 110 of the 500 households in the case study area contained international migrants, and 80 of these received remittances (INIDE 2008, 11). However, most interviewees, men as well as women, were unsure about when or if their children were going to send money next, or how much they would send. This income source is also dependent on the prevalent norm of sending money back to the family and therefore could not be counted on entirely.

In 2007 community members had organized themselves to convince the municipality to invest in a potable water system to reduce dependence on the river and the dug wells, which had become unreliable. This potable water had also enabled cultivation in the yards, according to some, such as the only man who had a kitchen garden and used the water to grow vegetables all year around. Most of the community members had decided

to participate and bear the cost in order to reduce their vulnerability to drought. The cost was around C\$60<sup>6</sup> per month for each household for 10m<sup>3</sup>, an amount some said they were careful not to exceed in order to avoid paying an extra charge of around C\$6/m<sup>3</sup>. A few had not installed it since they lived in a part of the case study area that still got its water from a nearby river or dug wells. Two female heads of household said that they could not afford to pay for the water. One gained access to it anyway by paying a small amount to a neighbor, who gave her and the young woman staying in her household some of theirs. The other, with the help of her daughters, had bought pipes to get access to a well in the community. This water was not enough to wash clothes with, however, forcing her to walk several kilometers to do her laundry.

Very few of the interviewees had left agriculture due to the unreliability of the weather. The former husband of Claudia, a female head of household, had established the community's small grocery store, which she now ran with the help of her adult son. Claudia said he had done this "to help us," despite being a farmer, indicating that farming was not sufficient to sustain them. Another man, Juan, had decided to become a cabinetmaker instead, and here it was clear that the drought was the reason behind his decision:

Juan: After I left the army I only worked for two years in agriculture, then I got into cabinet work for the reason that here, in our zone agriculture is a failure.

Interviewer: Why?

Juan: First and foremost the drought, sometimes pests come with the drought, so one can't, agriculture isn't profitable practically. (May 16, 2008)

In sum, the actions said to have been taken by both men and women were more to cope with drought in the short term, even if a few more adaptive strategies were also mentioned. Financial capital had been central to the capacity to respond in the short term, since buying food and fodder was the main option. Thus small animals, a resource typically owned by women, and migrated family members, more common in larger, male-headed households, were key.

### ***Responses by the Men***

In addition to the changes that had been implemented by both women and men there were some activities that the interviewees talked about as specifically "male" or "female." Those said to be responses implemented by mainly the men were land management change (such as sowing during the second farming season, the postrera, or using agricultural inputs); access to formal credit; and working off-farm, including seasonal migration.

The first was linked to a change in how the seasons were depicted and characterized, from the familiar to the whimsical, and associated with mistrust and losses of investments in labor, seed, or other inputs when the rains failed. One of the changes in agricultural practice, implemented primarily by the men since agriculture was primarily their domain, was a change in cultivation pattern. What was usually mentioned was either that the primera was delayed from April to May, or that there was no cultivation at all in the primera, since this was the less reliable season and the one with the drier climate almost every year. Over time the practice of farming in the primera had become rare, according to the interviewees. This had left the households dependent on the second farming season for their food security. This was commonly the more secure season, except in the years affected by El Niño.

To adapt to the drier climate in the case study area, men in the households, with the exception of the three female-headed households that did not have an agricultural livelihood, had begun to apply fertilizers, insecticides, and herbicides in the postrera. Interviewees perceived that the change had occurred somewhere between ten and forty years ago, because the soils would otherwise not yield any harvest or the harvest would be destroyed by pests due to a combination of factors, including drought.

To be able to afford the chemicals and to sow, buy animals, or in other ways improve or expand their livelihoods, many of the men said they had taken formal loans, primarily from the National Union of Farmers and Ranchers, and from banks. Since men were most commonly identified as the owners of the land and the houses that, unless one had access to a guarantor, were required as collateral, men had much better capacity to borrow money. Two women in male-headed households and one of the female heads of household were the only women who said they had had access to credit, the latter thanks to having a sister who acted as

<sup>6</sup> US\$1 = C\$ 19 (Nicaraguan *córdobas*) at the time of the interviews.

guarantor. This gendered pattern is also found in the third agricultural census, where 88 percent of the farmers who had received some type of credit in El Sauce Municipality are reported to be men (INIDE 2001).

To cultivate in only one farming season is a drastic measure but one that had made salaried work possible, either in agriculture in other locations or in nonagricultural activities. As a result of the gendered division of labor, it was mostly the men who worked off-farm, but age and health were also important factors. Juan José López Centeno, a representative of the Nicaraguan Institute of Agricultural Technology (INTA) in El Sauce, agreed that seasonal male migration was common in the municipality and largely took place for about three months during the primera, due to the high risk associated with cultivating during this season. The men returned for the postrera in an attempt to secure a food supply for the following year.

To work for a salary at the nonfarming time of year was already a strategy in the time of the interviewees' parents. However, it had increased as an adaptation to the more long-term consequences of drought on agricultural livelihoods. For example, one of the women talked about her eighteen-year-old son who had begun to migrate seasonally to increase his access to cash, a resource which has the potential to minimize food insecurity and negative health impacts, enable repayments of credits and informal loans, and provide opportunities for new investments, such as in seeds or other agricultural inputs.

Generally, the activities undertaken primarily by the men focused on work, agriculture, and direct access to financial capital to be able to enhance their livelihoods and their overall situation. These activities can also be described as proactive, aiming to adapt to the drier climate and not be as vulnerable when the next drought occurs.

### ***Responses by the Women***

In comparison, the women seemed to have had less capacity to implement long-term, adaptive changes. To the question of what they would do if another drought occurred, the female heads of household were more likely to express a trust in God:

Interviewer: What do you think you would do if you see that the drought is returning this year so that it does not affect you as much as previous years?

Valeria: Well, first pray to God that he takes care of it all, because he is the one who can, and with his help maybe we can. (May 16, 2008)

Hansen (1986, 242) describes "praying and other rituals" as a coping strategy in a case study of famine in Nigeria. Rather than viewing praying as a conscious strategy in the Nicaraguan case, other than to cope mentally with the situation, the expressions used by the female heads of household are interpreted here as reflecting their perception of their own lack of capacity to do anything about their situation other than to endure (see Segnestam et al. 2006 for a similar finding from Honduras).

Other literature (see, e.g., Howden et al. 2007; Olesen 2010) discusses the option of drought-resistant crops. This was only mentioned by the woman who identified herself as a farmer and who had access to credit. In 2009, with the help of a project on sustainable land management in dry areas in Nicaragua organized by INTA and El Sauce Municipality, she had changed to crops known to be drought resistant—pigeon peas, cow peas, and mung beans—in order to "be prepared" and be able to "face what is coming."

Apart from this exception to the general gendered pattern, the overall impression given by the interviewees was that the women in general, and the female heads of household in particular, had implemented fewer strategies, and strategies requiring much less capacity than those of the men.

### **Gender-Differentiated Spirals and Vulnerability**

The gendered pattern of women coping (short-term changes aimed at a reduction in losses) and men adapting (long-term changes to reform, restructure, and reorganize social-ecological systems) has been found in other parts of the world, such as Ethiopia (Legesse 2006). Since, as mentioned above, a decrease in long-term vulnerability is more likely to be achieved through adaptation than coping, the men in the case study area were perceived as having better capacity to reduce their vulnerability.

How can the gender-differentiation in coping and adaptation be understood? The gender division of labor as well as access to and control over different types of capital appear to be key factors in the interviewees' capacity to act, both currently and over time. Segnestam (2009), Rakodi (1999), and others (e.g., Vosti 1999) reach similar conclusions. Each of the seven types of capital included in the CCF is important in itself but also interacts with the other types, thus creating opportunities or obstacles to reducing vulnerability to drought. The use of one form of capital can lead to losses in others, resulting in a downward spiral of assets.

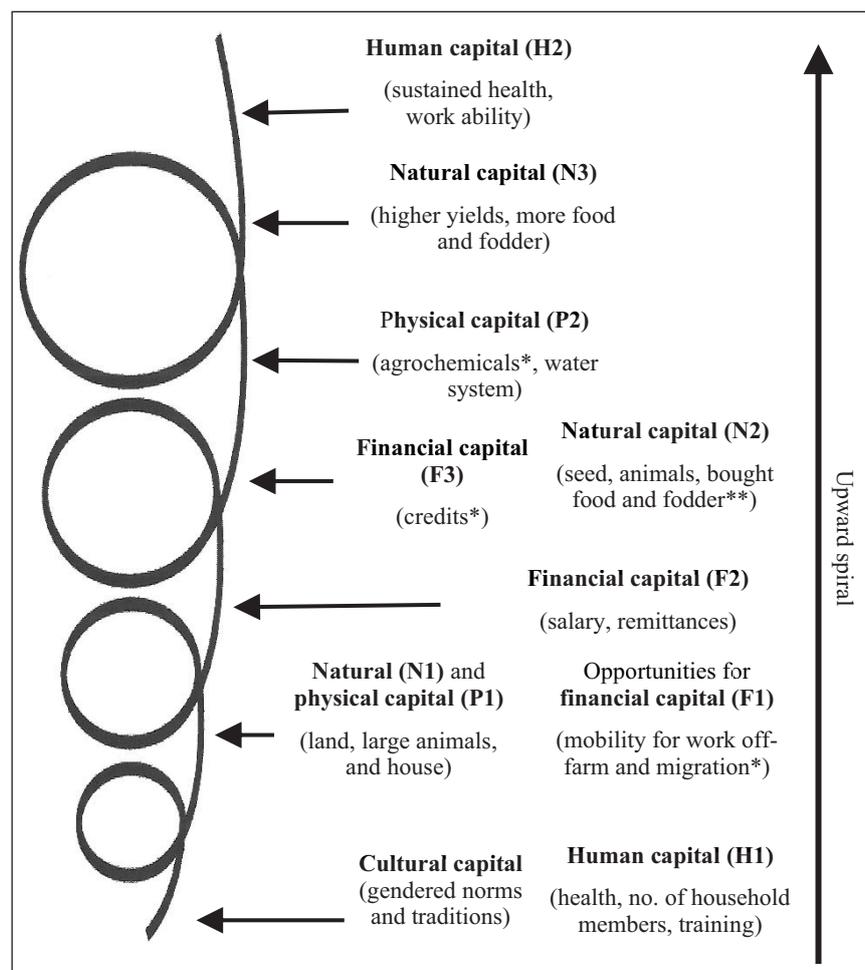
This is mainly a risk of coping but also at times one of adaptation. However, a “process of assets building on assets” (Emery and Flora 2006, 22) leading to an upward spiral with an increase in adaptive capacities can be a result of some interactions.

### ***Spiraling Up with Adaptation***

#### **More adaptive capacity with cultural capital and land tenure**

When informal norms, value systems, and traditions in a society put you in a position that gives you access to and control over other resources, you possess cultural capital. From the interviews, it is apparent that men and women had unequal access to cultural capital and therefore perceived themselves as living in a hierarchical society even if they did not use those words explicitly. Other research on gender and women’s situation in Nicaragua demonstrates the influence of patriarchal traditions (e.g., Dore 2006), the machismo culture, and “a political climate which is attempting to recover more traditional identities for women” (Cupples 2005, 306), confirming that cultural capital is highly gendered. Traditional norms on the view of women and their roles in society as mothers and those responsible for the household have not changed much over time, despite other transformations the country has gone through and the “Sandinista rhetoric about the need for the emancipation of women” (Fernández Poncela 1996, 62). This means that the division of other forms of capital as well as the division of labor in the case study area were also highly gendered, which leads to gender-differentiated vulnerability to drought, as I discuss below.

One resource that was affected by the unequal access to cultural capital was land, a form of natural capital central to adaptive capacity. **Figure 4** shows the upward spiral of adaptation, from cultural and human (H1) capital moving upward to the other types of capital. Note that the upward spiral obviously has



**Figure 4:** Spiraling up with adaptation.

\*The downward spirals resulting from the negative impacts of credits, agrochemicals, or migration are not included in the figure.

\*\*To buy food and fodder was described by the interviewees in terms of coping, not adaptation.

a limit due to such things as the aridity and accessibility of land. In Nicaragua, women's access to land is limited. The 1981 agrarian reform law, amended in 1986, stated that the title to land went exclusively to the applicant—commonly the man—and not to the family. A law stipulating equal rights for women and men to receive land titles and prioritizing women in access to credit was introduced in 1995. In 1997 the principle of joint title for couples, whether married or not, further strengthened women's rights, albeit only in cases where land is distributed through agrarian reform (Galán 1998; Ceci 2007; USAID 2011).

Although women's political capital had increased through Nicaragua's formal attempts to make land tenure more gender neutral, this had not brought about any changes in the case study area. The women in male-headed households all said it was their husband who owned the land. A majority of the female heads of household said that they owned or borrowed land to cultivate, although in all but one case, who at times borrowed one *manzana* (0.7 hectare), the land was less than one manzana or only the plot of land where the house stood. In general, the men owned more land, albeit that there were big differences here too—from only the plot of land the house stood on to 120 manzanas, but most commonly between 8 and 15 manzanas. The bias in land tenure is also evident elsewhere in Nicaragua (Galán 1998, 42; INIDE 2005, 15–16). One explanation could be that the legal framework on joint titling is mainly about agrarian reform, since only one interviewee had received land in that way (the rest had either inherited the land from their fathers or bought it themselves). A significant explanatory factor was also customary norms and practices, which had led the women who were not born in the community to move to their husbands' homes on marriage. Similar norms created expectations that the man would be the one to apply for land tenure, or the one to own the large animals (N1 in **Figure 4**). The one exception to this, where the man had moved to the case study area “to look for something better,” was a case where the wife owned the land.

All the interviewees said that owning the land made a difference. One reason was the ability to decide what to do with the land, as Francisco noted in October 2008: “Of course there is a difference because here I can't decide directly, I can't say some things here because [the land] is not mine.” Another reason was the positive effect of the care and management of the land, which households only invested in once the land was theirs. Milagros described this using a proverb in our October interview: “[To improve land that is not your own] is like building an altar for somebody else to give Mass.” A couple of the women also brought up the aspect of future security in relation to owning land, here in the words of one of them:

Interviewer: And when you are married and the husband is the owner, do you think there is a difference to when you are the owner?

Yamileth: Of course.

Interviewer: Why?

Yamileth: Because if we separate, we split up, he is the owner and if he doesn't give me anything, there is nothing you can do. (October 9, 2008)

Another advantage mentioned was that ownership of land made access to credits possible, since land was required as collateral (F3 in **Figure 4**). Even though there are no laws discriminating against women's access to credit in Nicaragua (CEDAW 2005), the interviewees said it was mainly men who could access loans. This bias can also be seen in official statistics (Agurto et al. 2008). Men's financial capital had enabled the male heads of households to invest in physical and natural capital, such as water systems, chemicals, seed, and animals. Their capacity to adapt to and cope with drought was therefore increased (going from F3 and upward in **Figure 4**). However, several described how a debtor could be put in a position where he was forced to migrate or sell assets such as animals, which were an important part of the livelihood. The use of credit in such situations became a maladaptation. Whether the result becomes an upward or a downward spiral depends on what the money is used for and whether the investment pays off. In the case study area, the latter is often dependent on the climate as the money is commonly invested in agricultural activities. Credit was therefore considered a potentially effective but insecure strategy.

Similarly, the use of agricultural inputs in the case study area was a highly complex issue. Both men and women emphasized the need for chemicals to get something out of the land. At the same time, the increased use of agricultural inputs was recognized by one male and a couple of the female interviewees as a maladaptation leading to downward spirals due to the impacts on their natural and human capital, resulting in less capacity to withstand dry spells. A few of the farmers (all men except for one), though, mentioned that they had received support from INTA to begin to use organic fertilizers and herbicides in

order to reduce the negative impacts on land and water. This increase in human capital through training thus improved the adaptive capacity.

In sum, as Ceci (2007, 89) concludes, “While statutory reforms, and legal rules and regulations (where these exist), guaranteeing equal rights for men and women have in theory promoted women’s access to land, in practice cultural factors persist in obstructing rural women from gaining equal access to productive resources.”

Time may be a factor, too. Both women’s land tenure rights and access to credit are relatively recent phenomena in Nicaragua, having been introduced as late as the 1980s and more generally only in the second half of the 1990s. The same seems to be true for houses and large animals—physical and natural capital that can be used as collateral or sold. These are owned by the men in the case study area, as in other areas of rural Nicaragua (UN-HABITAT 2005, 34). That the men were the owners increased gender inequality in access to credit and therefore in adaptive capacity, and can also be said to have become a barrier to women forming social capital with those organizations that offer formal loans, thus reducing their adaptive capacity. In general, the women were left with fewer options in terms of natural-capital-based strategies and subsequently had less capacity to achieve an upward spiral (see **Figure 4**).

### The role of the division of labor and human capital in the upward spiral of adaptation

Cultural aspects also influenced the division of labor, another reason for the differentiated adaptive capacity in the case study area. The following quote illustrates the interviewees’ unambiguous perception of the role of tradition in the gender division of labor: “Look, it is the culture. The grandmother taught it to the daughter, to the granddaughter, that she had to be there and so she was raised. In that way you will control the culture and you will uphold it and you will pass it on” (Jorge, May 14, 2008).

However, this case study shows that, in addition to cultural capital, human capital, primarily in the form of healthy men and younger household members, can explain the options the interviewees had in diversifying their livelihood on and off the farm, their differentiated access to the forms of capital, and ultimately the capacity to reduce their drought vulnerability. The men had the capacity, as a result of gendered norms, to look for a job off-farm and earn an income, which enabled several of the coping and adaptive actions mentioned by the interviewees (**Figure 4**). One woman in a male-headed household said they were less affected by the drought since her husband had a monthly pension from a sugar refinery he had worked in, so they could buy food and fodder when needed. In comparison, the female interviewees were unable to leave home to work or to migrate to increase their financial capital. This particularly concerned the women who, due to the division of labor, were taking care of children or disabled household members (see also IFAD 2010). Olivera, de Montis, and Meassick (1992, 68) go so far as to call the home “women’s prison.”

In contrast to what was said about the interviewed women’s labor, the interviewees said their daughters were working off-farm, having moved to urban areas in Nicaragua and to other countries, thus minimizing their exposure to drought. This could be interpreted as the traditional division of labor beginning to disintegrate among the younger generation. At the same time, it had fortified the gender division of labor in the case study area since the older women were taking care of the children of those who had emigrated, further reducing their own capacity to diversify their livelihood. Without this gender and generational division of labor and the human capital of female labor, it would not have been possible for the younger women to leave to work, since women in Nicaragua are still expected to take responsibility for the reproductive tasks, even after having entered the workforce (Chavez Metoyer 2000; Fauné and Matute 2007).

The way remittances were used differed. Both men and women said they bought food to cope with the food insecurity that followed a drought. But they also described how remittances or salaries were used by men to pay off credits used to buy agrochemicals (from F2 to F3 to P2 in **Figure 4**). The female-headed households and younger families, who either did not have enough resources or had too much invested in their current location to migrate, or whose children were still too young to migrate, were therefore likely to experience a smaller reduction of vulnerability compared to other, often male-headed, larger households.

It is important to emphasize that while migration has been an adaptation strategy adopted by many people in the case study area and Nicaragua in general, and as such has been helpful to many people in reducing their vulnerability, it is not an alternative without cost. During the interview session in January 2010, a mother could not stop crying due to her son’s recent return to Costa Rica after having spent Christmas and New Year with the family. Finally, as a result of the on-farm division of labor, several of the

interviewees, men as well as women, spoke of the disadvantage of migration in terms of the shortage of male labor it brought with it. One of the women in a male-headed household, despite having three daughters of seventeen, twenty-two, and twenty-seven years old still at home, expressed the need for her son's help with the household's agricultural activities: "He decided to go and send from there so that he could help us more, but the truth is that I think he would help us more here, because . . . a man's arm is not the same as that of a woman in this case" (Angela, May 15, 2008). Migration thus becomes an adaptive strategy that in certain contexts could be understood as a maladaptation for those left behind, leading to a downward spiral in capacity (see also Ashwill, Flora, and Flora 2011, and Chinsinga, Chasukwa, and Zuka 2013).

Another adaptation commonly implemented in the case study area, moving from two farming seasons to one, had primarily meant a cut in losses—in seed, labor inputs and agrochemicals—rather than an upward or downward spiral in capital. Otherwise, the adaptive strategies seemed to involve an upward spiral.

An exception to the pattern of men having greater adaptive capacity while women had had to focus more on coping with the recurrent droughts was the installation of the potable water system. Since the potable water was, during the dry seasons, used for drinking, cooking, cleaning, and watering small animals, as well as, in a few cases, kitchen gardens, it can be seen as having led to an upward spiral in the households in terms of increased access to both natural (vegetables and small animals) and human capital (improved health) (N3 and H2 respectively in **Figure 4**). A reduced need for women and children to carry water, as well as fewer conflicts around water, had also improved the human and social capital in the community. The two female heads of household that did not have their own potable water were therefore likely to have experienced a downward spiral in adaptive capacity and higher drought vulnerability as a consequence.

### ***The Spirals of Coping: Short-Term Upward and Long-Term Downward***

The need declared by both men and women to begin to ration their food intake demonstrates the risk of a downward spiral if this has to continue for any length of time, or if it is a recurrent response to a drought situation. Those who said they had had to take such drastic action indicated a definite lack of capacity to adapt and reduce their vulnerability.

Most of the actions implemented to cope with the food insecurity caused by drought (e.g., buying food or seeking store credit) can, nonetheless be seen as attempting to turn a downward spiral into an upward one by increasing the household's food security (see the short-term upward spiral in **Figure 5**). However, over time several coping strategies, such as selling animals or hunting, are likely to become erosive due to the risk of downward spirals from a decrease in the stock of natural capital (domesticated or wild animals) to a reduction in human capital (the negative impacts on health and ability to work) (see the long-term downward spiral in **Figure 5**). One of the female heads of household explained that since she had sold her chickens in time of need, she no longer had any left to sell, leaving the household with no other financial capital than the remittances her children sent whenever they could. Like the maladaptations mentioned above, these strategies risk limiting the choices available in the future, as is also suggested by Legesse (2006, 79).

The other ways for the interviewees to secure money to purchase food and fodder were to rely on store credit, loans or gifts from friends and neighbors, or on remittances from migrating household members. Adriana, one of the women in a male-headed household, described the dependence on remittances (May 17, 2008):

Adriana: Our children help us to buy food. I look after these girls for my children and they pay me so that I take care of them and we buy food. . . .

Interviewer: What have you done to buy [crops to replace those you lost due to drought]?

Adriana: Sometimes we sell an animal, or our children help us. . . .

Interviewer: Has your husband or you had a credit, a loan or something like that sometime?

Adriana: Yes, to him they give a credit.

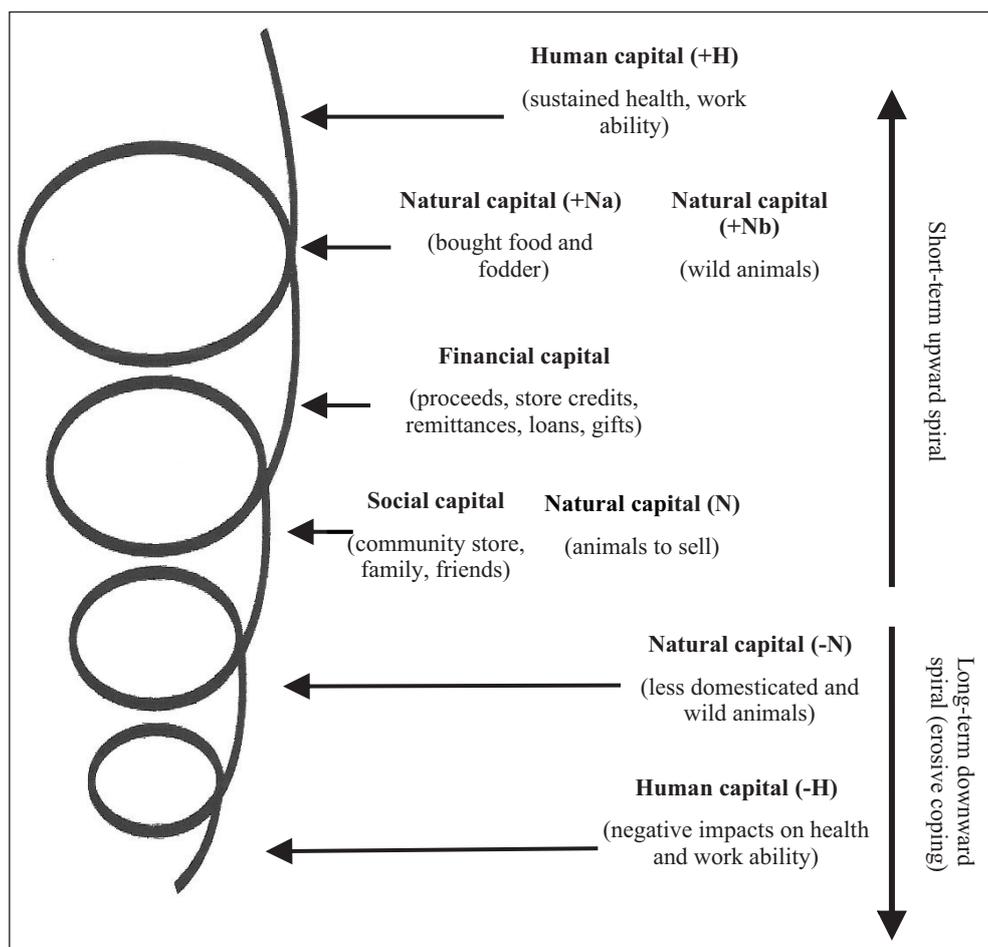
Interviewer: And have you had problems [due to drought] with paying off this credit?

Adriana: Yes.

Interviewer: And what have you done, how have you paid?

Adriana: Yes, our children that we have helped us.

Unlike selling animals, an intensified use of remittances does not have to lead to a worse situation since, so far, there had been a relatively continuous inflow of such financial capital. Instead it opens up greater



**Figure 5:** The spirals of coping.

possibilities for an upward spiral as described above. However, this was more likely to be achieved by those with large families, leaving the female heads of household no other option than to sell their animals and with relatively little access to financial capital.

The unequal distribution of cultural capital and the resulting social hierarchy is clearly significant for the interviewees' vulnerability. The analysis of the spirals of increasing or decreasing capacity exposes the interplay between cultural capital, the gender division of labor, and access to the other types of capital that leaves the women with less control over their own situation, and thus with less capacity to exert influence and to be able to invest in and change their own or their households' livelihoods to make them less vulnerable to drought. Based on the above analysis of the importance, for one's adaptive capacity, of opportunities and ability to work, one conclusion that can be drawn is that short-term coping, with its high risk of negative impacts on health and ability to work, influences adaptive capacity, and thus risks resulting in increased vulnerability in the long term (erosive coping).

Interviewees said both men and women had implemented these actions in order to cope with drought, and it might therefore be assumed that both groups had experienced the same increase in vulnerability. However, the men in particular were also said to have implemented several more long-term adaptive strategies in response to the changing climate. This was more unusual for the women in general and the female heads of households in particular, indicating that men had a greater capacity to reduce their drought vulnerability over time.

The importance of access to land is also obvious, which other vulnerability studies of the region and elsewhere also highlight (Wangari, Thomas-Slayer, and Rocheleau 1996; Segnestam et al. 2006). Those who are either landless or own very little land are, together with female-headed households, identified as the most vulnerable households by Oxfam (1998) in its assessment of the drought in Nicaragua and Honduras caused by the 1997 El Niño. As described above, the land politics in Nicaragua do not restrict access to political capital by men or women with regard to the possibility of owning land. In reality, however, land tenure is yet another issue identified in the interviews where cultural capital plays a central

role, due to a culture that has for centuries perceived “the women [to be] of the house and the men of the land” (INIDE 2005, 114).

The available literature does not commonly use forms of capital to understand the details of the three dimensions of vulnerability (exposure, coping capacity, and adaptive capacity), or as an integrative framework for the analysis of gender and vulnerability to climate change. The application of this integrative framework to the case of vulnerability to drought in a rural community in Nicaragua's *zona seca* demonstrates the value of using a multidimensional perspective to analyze the socioeconomic and cultural contexts that construct the opportunities people have to reduce vulnerability in the short and long term.

The framework is also more transparent, without being too simplistic, than many of those that exist in the literature, which are often criticized for being too complicated or difficult to operationalize, or for overlooking variables that are vital for a vulnerability analysis, such as gender or institutions. Finally, the findings on the roles of cultural capital and political capital contribute to an enhanced understanding of these “particularly challenging organising concept[s]” (Booth Lanjouw, and Herbert 1998, 100).

## Acknowledgements

The research presented in this article was funded by the Swedish International Development Cooperation Agency (Sida).

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**How to cite this article:** Segnestam, Lisa. 2017. Gendered Experiences of Adaptation to Drought: Patterns of Change in El Sauce, Nicaragua. *Latin American Research Review* 52(5), pp. 807–823. DOI: <https://doi.org/10.25222/larr.220>

**Submitted:** 01 June 2015

**Accepted:** 21 April 2016

**Published:** 12 December 2017

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