2014

Environmental stresses and community responses in four communities of southwestern Uruguay

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by

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A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Sociology and Sustainable Agriculture

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Ames, Iowa

2014

DEDICATION

To my wife Silvina, my son Felipe, the rest of my family, and my friends.

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ANP - Administración Nacional de Puertos

CCC - Community Cultural Capital

CCF - Community Capitals Framework

DINAMA- Dirección Nacional de Medio Ambiente

GDP - Gross Domestic Product

GMO - Genetically Modified

GNI - Gross National Income

GT - Grupo de Trabajo (por Nueva Palmira)

FA - Frente Amplio

FDI - Foreign Direct Investment

FV - Fuerzas Vivas

ICT - Information and Communications Technology

IMF - International Monetary Fund

INC - Instituto Nacional de Colonización

INIA - Instituto Nacional de Investigación Agropecuaria

MDRs - Mesas de Desarrollo Rural

MDR-C - Mesas de Desarrollo Rural-Cardona

MDR-D - Mesas de Desarrollo Rural-Dolores

MDR-NH- Mesas de Desarrollo Rural-Nueva Helvecia

MDR-NP - Mesas de Desarrollo Rural-Nueva Palmira

MEF - Ministerio de Economía y Finanzas

MERCOSUR- Mercado Común del Sur

MNGUP - Movimiento de Nuevas Generaciones por la Unidad y el Progreso

MGAP - Ministerio de Ganadería, Agricultura, y Pesca

MIDES - Ministerio de Desarrollo Social

MTOP - Ministerio de Trabajo y Obras Públicas

MVOTMA- Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente

NGOs - Non-Governmental Organizations

NH - Nueva Helvecia

NP - Nueva Palmira

OIE - World Organization for Animal Health

OPP - Oficina de Planeamiento y Presupuesto

OPYPA - Oficina de Planeamiento y Políticas Agropecuarias

OSE - Organismos Sanitarios del Estado

POT - Planes de Ordenamiento Territorial

UdelaR - Universidad de la República

WB - World Bank

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Cornelia Flora, and my committee members, Dr. Jan Flora, Dr. Robert Mazur, Dr. J. Gordon Arbuckle, Jr., and Dr. William Gutowski, for their guidance and support throughout the course of this research.

In addition, I would also like to thank my friends in Ames, colleagues, the department faculty and staff for making my time at Iowa State University a wonderful experience. I want to also offer my appreciation to those who were willing to participate in my interviews, without whom, this thesis would not have been possible.

Finally, thanks to my family for their encouragement and to my wife for her hours of patience, respect and love.

ABSTRACT

Worldwide, communities are becoming more vulnerable, facing new environmental stresses driven by globalization and climate change. Since the turn of the 21st century, climate change and globalization have critically affected the southwestern region of Uruguay. Community responses to environmental stresses can be influenced by cultural capital, significant changes in all community capitals, and by social and political capitals under decentralizing governance and programs. This study explores the community capitals that influenced community adaptations to environmental stresses in *Nueva Helvecia* (*NH*), *Nueva Palmira* (*NP*), *Cardona*, and *Dolores*, in southwestern Uruguay. Research methods of this study include semi-structured interviews with key local informants from market, state, and civil society, and participant observation and reports from local public meetings and assemblies. Results from *NH* show that social and political capitals were influenced by community cultural capital. Cultural capital strengthened social and political capital to develop local adaptations rooted in the local culture/s. Results from *NP* and *Dolores*, show that collective mobilization of social and political capitals (collective agency) for local adaptations occurred when negative changes in all community capitals (especially *financial*, *built*, and *human* capitals) undermined community well-being. Decentralized multi-level governance organized by *Municipios* and *Mesas de Desarrollo Rural* (MDRs) made environmental stresses more visible at the four communities. Decentralized multi-level governance (social and political capitals) facilitated consultation and information exchange between the actors involved, but community empowerment for adaptive actions at the local level was minimal, due to the limited resources and historic dependency on regional and national governmental institutions.

CHAPTER 1. GENERAL INTRODUCTION

Stresses and Communities

Anthropogenic and natural changes in communities include slow-onset phenomena and sudden incidents. Often, they induce stress.[1] That stress could negatively affect or change the social, economic, built, political, cultural, financial, and environmental resources (*community capitals*) of communities. Stresses (also referred as disruptions) can be created by remote factors (exogenous or from outside communities), such as those created by global climate change or globalization (such as Foreign Direct Investment (FDI)) or by internal factors in the community.

Rural communities are social systems where local people meet their needs through organizations and institutions (Flora and Flora 2013). Worldwide, rural communities are becoming more vulnerable, facing new stresses driven by globalization and climate change (Wilson 2012). This study explores how rural communities of southwestern Uruguay have been impacted and have responded to environmental stresses created by climate change and globalization.

Climate Change in Communities of Southwestern Uruguay

Climate observations from the last century have shown a substantial increase in climate variability and severe weather events in southwestern Uruguay (Giménez et al. 2009).

Noteworthy changes in Uruguayan rainfall and temperature means occurred between the periods 1931-1960 and 1971-2000 (Giménez et al. 2008; Giménez et al. 2009). Rainfall increased with decreasing high temperatures in the summer and increasing minimum mean temperatures throughout the year (Giménez et al. 2008; Giménez et al. 2009). Recent studies

[1] Stress is a potential loss, an undesirable outcome.

(Giménez et al. 2008; Giménez et al. 2009) show that the highest temperatures were 4.3°C average lower than those recorded in 1931. The differences ranged from 1.5 to 12.3°C. The minimum absolute temperature increased 1.9°C on average (ranged from 0.9 to 3.5°C) between 1931 and 2000. Frosts are less intense and shorter in duration. Frost dates occur later in the fall, end earlier in the spring, and are less severe than in the past (Giménez et al. 2008; Giménez et al. 2009). Droughts, which seriously affected natural pastures, are more frequent. Although each of these weather phenomena varies from year to year, the trend of greater climate variability is clear. Climate variability is related to low agriculture productivity (Giménez et al. 2009; Bettolli et al. 2010). For example, variability in climate and changes in frost regimes have negative impacts on new vegetable crops and trees, affecting flowering, fruit formation, and causing foliar necrosis (Giménez et al. 2009). Rural communities of southwestern Uruguay, which rely on agriculture, continue to experience stresses created by these climate changes.

Estimates based on models and simulations for 2020 (based on data from 1971 to 2000) indicate that daily, seasonal, annual, and decade climate variability will increase in this region (Intergovernmental Panel on Climate Change (IPCC) 2007; Giménez et al. 2009), increasing environmental stresses and associated risks at community level. Recent severe weather events, including excess precipitation in late 2000 and 2001 and in 2014, a late frost in October of 2008, droughts in 2000, 2008-2009, and 2010-2011, and severe storms, are projected to increase (IPCC 2007; Giménez et al. 2009).

Socioeconomic Transformations and Intensification of Agriculture in Southwestern Uruguay

International and national socioeconomic transformations have impacted communities of southwestern Uruguay. Stresses experienced by communities can be consequences of anthropogenic transformations driven by the economy of the country and international economic contexts. Many of the changes recently experienced by communities of this region are consequences of historic socioeconomic processes, especially since the beginning of the 21st century. These socioeconomic transformations need to be described and analyzed to better understand why and how communities of this region have experienced environmental (and other) stresses described in this research. This sub-section is an attempt to summarize and describe the main socioeconomic transformations that led to intensification of agriculture and consequent changes experienced by the communities of southwestern Uruguay explored in this study.

The Uruguayan economy historically has been cyclical, with periods of prosperity and periods of crises (Benavente 2011; Oddone 2011). During the last decades, Uruguay faced two regional economic crises[2] of significant proportions. In 1982, Gross Domestic Product (GDP) fell 14% and unemployment reached 14%, and in 2002 the GDP fell 12% and unemployment reached 18% (Oddone 2011). Domestic currency was devalued in these two episodes, and real wages fell more than 20% during both periods.

In 1999, Uruguay entered into a recession, as Brazil, the leading country in MERCOSUR[3], devalued its currency. Uruguay's GDP significantly decreased, and public finances (tax revenues, public savings, etc.) declined, while public debt significantly increased (Antía 2003). The economic environment of the region became worse and more uncertain, and

[2] The world-wide resection of 2008-2009 did not significantly affect the Uruguayan economy, which continued growing.
[3] Common Market of the South, founded in 1995.

less capital was invested in Latin-American countries. Internationally, prices of agricultural products decreased, while petroleum's price significantly increased. Global economic growth declined in 2001.

Uruguay suffered a severe drought during the summer of 1999-2000 and excess rainfall in 2001. These two natural phenomena decreased agricultural production, particularly of grass-fed beef, the main Uruguayan export at the end of the 20th century. In 2001 there was an outbreak of *aftosa* (hoof and mouth disease; *Aphthae epizooticae*) in the southwest region (in Soriano). Uruguay had been declared free of aftosa in 1995 by the World Organization for Animal Health (OIE). The new outbreak significantly decreased Uruguayan exports of beef. The GDP and Gross National Income (GNI) had increased until 1999[4], when the national economy went into a recession. At the end of 2001, Uruguay faced an economic crisis, which worsened in 2002, after Argentina defaulted on its external debt, making Argentina's serious banking crisis even worse.

The Argentinean economic crisis significantly affected Uruguay in 2002, when there were rumors of a Uruguayan banking crisis, and many bank depositors withdrew their money from the Uruguayan banks. In 2001, 41.3% of the Uruguayan bank depositors were non-residents, most were Argentineans, and most had their savings in U.S. dollars (Comesaña 2012). Ninety-eight percent of the national debt was in dollars, representing 48.1% of the GDP (Comesaña 2012).

In February 2002, Uruguay lost its international credit rating of Investment Grade, which was triggered by a sharp increase in the country's risk premium, a drop in production (GDP for the first half fell 7.8%), deterioration of public finances (the fiscal deficit in the twelve months ending in July of 2002 amounted to 4.5% of GDP), and a crisis of confidence (Antía 2003).

[4] See data from the World Bank: http://search.worldbank.org/all?qterm=uruguay+2001&title=&filetype=

Together, this caused a tremendous run on bank deposits (Antía 2003). The Uruguayan economy contracted by 11%, unemployment climbed to 21%, and "over one-third of the country's 3.5 million citizens found themselves living below the poverty line" (Meyer 2010: 2). However, the banking crisis of 2002 in Uruguay did not have many of the same consequences as in Argentina, which defaulted on its international debts. In 2002, the Uruguayan government signed an agreement with the International Monetary Fund (IMF) and the World Bank (WB) to repay the financial assistance they had received. Uruguayan macro-economics and the government's commitments to pay the international debts facilitated its stability and potential for growth (Antía 2004; Maggi 2011).

In 2003, the Uruguayan economy started to grow again. From then until the second decade of the twenty-first century (2013), the economy has been characterized by long periods of slow, but sustained economic growth (Oddone 2011). That growth was driven in part by the growth of FDI in its agriculture (International Monetary Fund (IMF) 2014), especially in the southwestern departments of Colonia and Soriano.[5]

These two departments make up a highly productive agricultural area with fertile soils and a history of diversified agriculture, including a mix of row crops with livestock, dairy, horticulture, citrus, and crops, accounting for great part of Uruguay's total agriculture production area (World Bank 2009). The region attracted nearby Argentineans farmers and other foreign investors, who sought to evade restrictions and taxes on grain and oilseeds exports (especially soybeans) in their home country, finding more economic stability and growth in Uruguay and fewer taxes on exports. The gross public debt was "above 100% of GDP in 2003" (Oddone 2011: 81), but Uruguayan devaluation facilitated the growth of exports, mostly beef and soybeans, which stimulated economic recovery among communities in these two Uruguayan departments.

[5] Uruguay is administratively divided into 19 departments with local elected governments (states in the U.S.A).

In 2004, Uruguay's GDP was 12% greater than 2002, accompanied by a significant growth of exports (25% above those for 2002) of agricultural products (Antía 2004), which included beef, dairy products, and mostly soybeans. According to Antía (2004), economic growth and agricultural intensification began in 2002, bringing with it longed-for direct foreign investment (see Figures 1-1 and 1-2). Increasing production of GMO soybeans in this region was facilitated by higher demands (from Asian countries, especially China), which was accompanied by soybean's higher prices in the international markets. Increasing production of livestock was facilitated by higher prices in international markets and the recovery of the status "aftosa-free", declared by the OIE in May of 2003, which allowed export to different international markets. The growth of agricultural production facilitated the rapid expansion of related sectors, including agro-industries, port operations, and construction of grain elevators in rural communities of southwestern Uruguay.

Devaluated currency and high prices for goods from regional and international markets (since 2003-2004) facilitated import substitution and industrial expansion. Internal national commerce increased and empowered businesses like restaurants, hotels, transportation, and communication, which grew approximately 11% in 2004 (Antía 2004).

Recovery from the banking crisis of 2002 was facilitated by agreements and commitments made by the Uruguay government, the International Monetary Fund (IMF) and the World Bank (WB) to keep a substantial primary fiscal surplus, low inflation, considerable reductions in the external debt, and several structural reforms designed to attract foreign investment (Meyer 2010), especially in agriculture. In 2006, Uruguay terminated this agreement following early repayment of its IMF debt, while maintaining a number of the policy commitments (Meyer 2010). Between 2004 and 2011 the GDP grew an average of 6.3%

annually, stimulated by sustained external demand for agricultural commodities, especially beef and soybeans. FDI increased to levels unknown in the past, government debt to GDP was reduced, and the unemployment rate was the lowest level in the contemporary history of the country (Oddone 2011). Although the 2008-09 global financial crises put a brake on Uruguay's vigorous growth, the country managed to avoid a recession and continued positive growth rates. Since the crisis of 2002, Uruguay's strong economic performance has allowed the nation to consolidate larger bank reserves, which helped Uruguay withstand external shocks like the international crisis of 2008-2009 (World Bank 2014), which did not undermine the sustained growth of the national economy (6% in 2011). In the 2010s, unemployment is at the lowest rate in the country's history.[6]

Social programs promoted by Uruguayan governments since 2005 with a leftist party, the Broad Front (*Frente Amplio* (FA) in Spanish), in power have helped to further improve socioeconomic indicators, consolidating expansion of the economy during the past years. In 2005, the FA won the presidential election for the first time, winning a second five-year term in 2010. During these two periods (2005-2010 and 2010-2015), the FA developed strong social programs of public expenditures to reduce poverty. The two last national governments have promoted development and extension of the government's social protection network through such programs as the Equity Plan and other reforms intended to stimulate social participation, improve inclusion, and create opportunities for the entire population (World Bank 2014) through new decentralization programs and new governance structures, based on the collaboration of market, state, and civil society for economic development. The empowerment of social organizations and labor rights is another important characteristic of recent governments. Increase

[6] 5.3% of the population (able to work) at the end of 2011.

in the number of unions and workers' organizations increased workers' labor rights and real salaries have significantly improved during the past decade, particularly from 2006 to 2014.

Between 2004 and 2014, markets for Uruguayan agricultural products expanded to new destinations in the Middle East, Europe, North America, and Asia, avoiding the regional dependency created in the 1990s—one of the main causes for the financial crisis of 2002. Uruguay relies on a few raw materials and agricultural commodities like soybeans, beef, cellulose pulp, meat, and dairy products. In 2009, soybeans became the main export (in U.S. dollars) of Uruguay, which currently represents the 15% of the total exports (in U.S. dollars) (Observatory of Economic Complexity 2014).[7] Despite national socioeconomic achievements, dependency on fewer commercialized commodities like soybeans has increased rural communities' vulnerability to external shocks created by global markets.

Changes in agriculture and associated modes of production in rural communities of southwestern Uruguay have been driven by developmental models of national and international, state and private institutions promoting the New Developmentalism and the Commodity Consensus, which support export of agricultural and mineral commodities as the best path to development. During the first two decades of the twentieth-first century, governments of both right and left in Latin America implemented a "new developmentalism" as an alternative to old economic paradigms established during the 1980s and 1990s, based on the Washington Consensus (Bresser-Pereira 2007; 2009; 2012). This new structuralist economic strategy is generally characterized by enhancing domestic demand and exchange rates that guarantees profitable investment opportunities and export of commodities through institutional public-private partnerships. This model is widespread in Latin America, but also in other parts of the world.

[7] See more: http://atlas.media.mit.edu/profile/country/ury/

In Uruguay, many of the economic projects of "national priority" (such as production of soybeans and mining) rely on the intensification of exploitation of natural resources with significant environmental impacts in rural communities. Production of soybeans, pulp wood to make paper, and the extraction of minerals have been recently promoted by the state and its national institutions, including the *Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente* (MVOTMA), *Ministerio de Trabajo y Obras Públicas* (MTOP), *Ministerio de Economía y Finanzas* (MEF), *Ministerio de Ganadería, Agricultura y Pesca* (MGAP), *Presidencia de la República*, and *Oficina de Planeamiento y Presupuesto* (OPP), among others.

Recent Uruguayan economic growth based on the exploitation of its natural resources has been rooted in what some authors (Shiva 1995; Escobar 2005; Foladori 2005) describe as western and dominant representations of the capitalist economic development. Similar to what the dependency development school proposed several decades ago,[8] some of these approaches to development have focused on catching up with developed countries through the continuing use of fossil fuels, consumption, and other unsustainable practices, which can undermine and ignore mitigation of environmental stresses and/or communities' capacities and resources (Dunlap 2010; Urry 2010; Ashwill, Flora, and Flora 2011a, 2011b; Eriksen et al. 2011).

Environmental Stresses in Communities of Southwestern Uruguay

Since the Uruguayan economic recovery (2002-2003), rural communities from southwestern Uruguay have been critically affected by environmental stresses triggered by climate change and FDI in agricultural intensification (World Bank 2009).

Rural communities of southwestern Uruguay, including *Nueva Helvecia (NH)*, *Nueva Palmira (NP)*, *Cardona*, and *Dolores* selected for in-depth study (see Figure 1-3), are highly

[8] See: So (1999)

dependent on their agro-ecosystems for their agricultural production and their ecosystem services, including quality of air and water, biodiversity, and recreational and conservation areas. The local soils were until recently covered with natural prairies. With its removal, the soils are vulnerable to extreme natural and anthropogenic perturbations. Recent Uruguayan economic growth facilitated availability of new technologies for row crops, improved prairies, and tree plantations to produce paper, displacing agricultural systems based on natural pastures (Arbeletche, Ernst, and Hoffman 2011; Pérez Bidegain et al. 2011) and impacting communities that depended upon them. These shifts have altered *NH*, *NP*, *Cardona*, and *Dolores* and their agro-ecosystems, all located in the most agricultural productive region with a long tradition in diversified agriculture. From 2003 to 2013, these and other rural communities in that region were the epicenter of the Uruguayan agricultural growth and its associated transformations.

Recent agricultural intensification not only significantly impacted agro-ecosystems but also increased land speculation and land prices. These communities have been significantly affected by climate change and FDI in the industrial agriculture sector, mostly for soybeans.

The capacity of communities such as *NH*, *NP*, *Cardona*, and *Dolores* to recover from economic disturbances and associated environmental stresses has been challenged. In 2010 and 2012, similar environmental stresses in three of the four communities were identified by the *Planes de Ordenamiento Territorial* developed by *Intendencias*[9] and local actors. Officials in *NP*, *Cardona,* and *Dolores* identified environmental stresses that included pollution of rivers and creeks due to the use of agrochemicals, air quality deterioration due to the emissions of gases and micro-particles, erosion and pollution of soils with solid waste, reduction of biodiversity, and other environmental problems created by urban sprawl (Intendencia de Soriano 2010a, 2010b; Intendencia de Colonia 2012a, 2012b).

[9] *Intendencia* is the Departmental Government.

Background and General Description of *NH*, *NP*, *Cardona*, and *Dolores*

Contemporary social, economic, and environmental conditions of communities are the result of recent and long-term historic events and processes. This section of the dissertation summarizes and describes the most important historic socioeconomic events and processes of *NH*, *NP*, *Cardona*, and *Dolores*, to better understand recent changes and their responses to environmental stresses explored in this study.

Nueva Helvecia (NH)

Nueva Helvecia is also known as '*Colonia Suiza'* (Swiss Colony). It is located in the Department of Colonia, in the southwest region of Uruguay (see Figure 1-3). Its population is approximately 10,630 inhabitants (Instituto Nacional de Estadística (INE) 2011). This community was founded as a colony of immigrants on April 25, 1862 by people from Switzerland, Germany, Austria, and France (among other countries), but was officially declared a town on May 26, 1894.

The first immigrants arrived via the Rosario River in 1861, fleeing struggles in their home countries such as economic crises (mostly between 1845 and 1865), wars, and urbanization and industrialization that displaced artisans and small farmers (Moreira 2010). The productive lands and new opportunities they could explore in this region were very attractive (Moreira 2010). The Swiss financial company, Siegrist and Fender (in1861, associated with the business of Doroteo Garcia in Uruguay) owned and divided the land of this region, which was sold in small parcels to immigrants who wanted to move, live, and farm there (Fischer 2012). The land was previously owned by *Sociedad Agricola Rosario Oriental*,[10] which had sold land in the

[10] *Sociedad Agricola Rosario Oriental* also promoted the settlements of immigrants from the Piedmonts in *Colonia Valdense*, a nearby community.

region to small immigrant farmers before 1861 (Fischer 2012). Private investors, financial institutions, and the national government promoted the creation of immigrant colonies in the Colonia region. They considered colonies like *NH* an opportunity to bring qualified and skilled people to 'modernize' rural communities and agriculture (Moreira 2010).

The first immigrant farmers who settled in the community faced multiple struggles, such as the bankruptcy of their chief financial supporter, Siegrist and Fender, in 1864, and severe droughts in 1863 and 1864. Immigrants from Germany and Switzerland were familiar with these types of struggles in their home countries, which included severe winters, wars, and economic crises (Fischer 2012). The struggles the first settlers had to face in *Nueva Helvecia* were seen as an opportunity to explore new ways of living for many of the immigrants who migrated with a non-agricultural background, but with multiple and specific skills. They started to grow diverse crops and explored diverse agricultural practices (Moreira 2010; Fischer 2012).

Local organizations and institutions historically had an important role in this community, nationally known for its democratic direct participation, attributed to its historical ties with Switzerland. For example, after the settlement of the first immigrants, the community created a *Consejo Comunal* (Community Council, unique in Uruguay) to gain political autonomy from departmental and national governments. The local community council was composed of local elected officials. In 1865 there was sufficient rainfall, and the wheat yields were very good. Consequently, the *Consejo Comunal* built a common storage bin for the wheat, storing each person's surplus of wheat for the near future (Fischer 2012). This was the first documentation of how the community prepared collectively by storing agriculture reserves and the importance of such community strategies to avoid negative consequences of environmental circumstances.

Agriculture became the main economic sector of the community, which geographically benefited by its proximity to the country's capital (approximately 120 km from Montevideo), where most of its products were commercialized. At the end of the ninetieth century and the first part of the twentieth century, the community's main product was wheat that was processed in the capital's flour mills and the "*Molino Quemado,*" the local private hydraulic mill.

This community was known as diverse and technologically progressive, characteristics attributed to the knowledge and skills brought by its European immigrants. For example, the first steam threshing machine (1868) and the first steam mill (1876) in Uruguay were introduced by farmers from *NH.*

Since the beginning of the twentieth century, most *NH* farmers specialized in dairy production, especially cheese, butter, and *dulce de leche* (caramel), incorporating agricultural crops, but keeping local farms very diverse. The economy was driven by dairy production developed by small farmers who kept diversified agriculture as the main strength of the community (Fischer 2012). Local people developed diversification as a key strategy to overcome natural challenges, such as severe droughts (Fischer 2012).

Agro-tourism and heritage tourism have been important in the economy of *NH*. *Hotel Suizo,* one of the first hotels in Uruguay, was founded in 1872 and is still operating. The community has also had other hotels, such as *Hotel Central*, *Hotel del Prado* (still operating), and *Hotel Nirvana* (still operating) founded in the 1940s. The European cultural heritage, based on diversified agriculture, and the prosperity of the community provide the community's main tourist attractions.

Nueva Palmira (NP)

Nueva Palmira is located in the Department of Colonia, Uruguay (see Figure 1-3), with a population of 9,857 (INE 2011). In 1816, a few families settled this community in response to an order by the Uruguayan founding father, General José Gervasio Artigas (Pérez Fontana 1969). This community (initially named "*Higueritas*") was officially recognized on October 26, 1831, but its natural port attracted ships and families since at least 1815 (Frogoni Laclau 2001). Its strategic geographic location by the River Plate's shores has made this community an important port to defend against foreign forces and to engage in commerce, especially with Buenos Aires (Argentina) and Montevideo (Uruguay). During the nineteenth and first half of the twentieth century, this community was surrounded by small immigrant farmers (many from Spain and Italy), who produced diverse products that included wine, dairy produce, fruits and vegetables, wheat, and sunflowers. During most of the twentieth century, the community's economy focused on industrialization and transportation of commodities, such as sand (used in construction) to Buenos Aires, Argentina, the production of wheat four in the local mill, and sunflower oil production (*Aceitera Optimo* opened in 1936), which were sold in Montevideo and Buenos Aires. The community's port was officially founded by the national government in 1928. Port operations significantly increased in 1956, when the *Navíos Company* (an American-Greek company) began to transport Bolivian and Brazilian iron manganese, which used the port to transfer and ship to other countries, especially to the U.S.

The sunflower oil factory (*Aceitera Optimo*) closed in 1954, eliminating the local market for sunflower seeds. In 1962, Volkswagen (*Lestido* in Uruguay) opened a car assembly plant, which operated until 1989-1990 and employed many people in the community. After closure of the Volkswagen factory, the community refocused on its port operations. During the decade of the 2000s, port operations significantly increased, financed by FDI, to transport and store

soybeans, timber and forest products, including cellulose for paper, and minerals from Bolivia and Brazil. Since 2003, *NP* is Uruguay's main port exporting agricultural commodities, particularly soybeans, wheat, maize, and raw eucalyptus logs and cellulose to make paper. These raw materials are shipped to Asia, Europe, North America, and the Middle East for further processing.

With intensification of agriculture, especially increasing production of soybeans during the 2000s, the community and its agro-ecosystems significantly changed. Many of the small farms surrounding the urban area disappeared. These lands are now are occupied by the elevators of national and international agriculture companies that store grains and oilseeds (mostly wheat and soybeans) close to the port. Agricultural transformations in recent years have created multiple environmental stresses for the community, including pollution of rivers and creeks due to the use of agrochemicals, air quality deterioration due to the emissions of gases and micro-particles, erosion and pollution of soils with solid waste, reduction of biodiversity, and other environmental problems created by urban sprawl (Intendencia de Colonia 2012a, 2012b).

Dolores

Dolores has 17,174 inhabitants (INE 2011). *Dolores* and *Cardona* are the most important communities of Soriano (see Figure 1-3), after the capital city (*Mercedes*). These two communities are located in the center of one of the principal grain-producing regions in Uruguay.

In 1770, several households comprised the village of *"El Espinillo",* near the current location of *Dolores* (Bing 2000). The population of *El Espinillo* included people of European descent (57%), native peoples (mostly of Guarani origin), African descendants, and 'mestizos'

(Bing 2000). The local church and the *Virgen de Nuestra Señora de los Dolores* brought by a local farmer from Buenos Aires attracted residents to this village. The inhabitants mostly worked with the livestock on surrounding farms (Bing 2000). In 1799, the local priest, Dr. Redruello, received an order from the *Virreinato de Buenos Aires* to move the temple of *Virgen de Nuestra Señora de los Dolores* and the inhabitants of the village next to *El San Salvador River*, where *Dolores* is currently located. In 1801, Dr. Rodruello founded *Dolores* (Bing 2000).

Since its foundation (and even earlier), the community and its agroecosystems were described as very productive for grain. Testimonies from the explorer Sebastian Gaboto's expedition to this region in 1527-1528 described the potential of its soils for the production of wheat (Bing 2000).

> *"This land where we are now is very healthy and very rich. Fifty grains of wheat were planted and harvested 550 grains in just three months."* (Luis Ramirez 1527, in Bing 2000)

After its founding in 1801, *Dolores* became an important rural community in the region, producing cattle for beef and leather and wood shipped from its port to Buenos Aires and Montevideo. During most of the ninetieth century, the community exploited its natural resources to produce for export. During the ninetieth and twentieth centuries, immigrants came to the community directly from Italy and Spain, founding civic organizations with important role to welcome newcomers in the past, including *Sociedad Italiana de Socorros Mutuos* (in 1888) and the *Sociedad Española de Socorros Mutuos* (in 1879) (Santellan D'Andrea 2008). The community also received immigrants from Portugal, Argentina, Austria, France, Russia, Lebanon, and Switzerland (Santellan D'Andrea 2008).

In 1888, the wheat flour mill, *San Salvador*, opened and has operated continuously ever since. This flour mill transformed the community and its agroecosystems (Bing 2000). By providing a way to utilize additional wheat, it contributed to significantly increasing local wheat production. During the first half of the twentieth century, important agriculture organizations (such as *Asociación Pro-Agropecuaria* in 1937 and *Asociación Rural e Industrial de Dolores* in 1909) and businesses focused on tanning and grain buying (such as *Barraca Erro* in 1947) opened, strengthening the agriculture (especially grain production) of the community (Santellan D'Andrea 2008). Local farmers from this community grew multiple crops like grains and oilseeds, especially wheat, sorghum, barley, soybeans, and corn, but during the twentieth century the community produced primarily wheat for the flour mill. Only at the end of the twentieth century did production of soybeans increase.

In the late 1990s, Argentine farmers introduced no-till cultivation and GMO soybeans (without rotation), technological innovations rapidly adopted by local farmers and agribusinesses. During the 2000s, this community experienced a significant growth in FDI in agriculture, especially for the production of soybeans, described by the community as the "Cinderella" of crops. After the 1970s, the local port was unable to operate due to lack of maintenance of the river channel in charge of MTOP and *Administración Nacional de Puertos* (ANP). Since then, most of the agriculture production of this community has been transported to the nearby port of *Nueva Palmira* for transfer and export to other countries.

Agricultural transformations during the 2000s created multiple environmental stresses for the community, such as pollution of rivers and creeks due to the use of agrochemicals, air quality deterioration due to the emissions of gases and micro-particles, erosion and pollution of soils

with solid waste, reduction of biodiversity, and other environmental problems created by urban sprawl (Intendencia de Soriano 2010a).

Cardona

Cardona is located in the department of Soriano (see Figure 1-3), adjacent to another community, *Florencio Sanchez*. Cardona has 4,600 habitants, but the two communities together have a population of 10,800 (INE 2011).

Before 1901, *Cardona* was a stagecoach stop, due to its strategic location between the departments of Colonia and Soriano. This stagecoach stop was called "*La Lata Vieja*." In 1901, the construction of the railroad station was finished (called "*La Lata*") connecting this community with Montevideo. In 1903, it was officially founded as *Cardona* when the railroad connected Montevideo with Mercedes was completed (*Publicación Oficial del Centenario de Cardona* 2003). Before 1903, the Cardona family owned the land currently occupied by the urban area as part of its farm. The landowner, Jose Cardona, divided his farm in small parcels, which were sold to the first residents of *Cardona*. Surrounded by diverse farms since its beginnings, this community was an important crossroad for the transportation of local agricultural produce by railroad and other means of transportation. The community was surrounded by big farms (*Monzón Heber*, *Santa Elena*, and *Santa Adelaida*), but also by some 'colonies' of *Instituto Nacional de Colonización* (INC) [11] with a significant number of small producers. During the twentieth century, the economy of the community was focused on diverse agricultural enterprises, including cattle, dairying, and row crops, such as wheat, corn, sunflower, sorghum, and barley.

[11] INC (National Institute for Colonization) is a national governmental organization which owns public (state) farming land to sell in small parcels to interested families (who need to apply).

Its strategic geographic location facilitated local farmers in organizing fairs featuring livestock and cheese. During the 1970s, the community was transformed by the installation of a dairy company (*Quesería Helvetica*). This company created a demand for more milk and cream from local and nearby farmers.

Changes at the beginning of the 2000s significantly transformed the community, as dairy and the soybean production both increased. Since 2002, foreign farmers (mostly from Argentina) and agricultural companies invested heavily in land to produce soybeans. Consequently, many small farmers who had dairies and/or livestock sold or rented their farms, moving to live in the urban center of Cardona and other nearby communities. Farm size increased, and the community specialized in soybean production in addition to dairy cows and grass fed beef cattle which remain important for the local economy. In 2006, a Mexican company (*Indulacsa*) purchased the dairy factory, mostly to export cheese, again increasing the market for raw milk.

Recent agricultural transformations, mostly driven by intensification of production of soybeans, have created multiple environmental problems for the community, such as pollution of rivers and creeks due to the use of agrochemicals, air quality deterioration due to the emissions of gases and micro-particles, erosion and pollution of soils with solid waste, reduction of biodiversity, and other environmental problems created by urban sprawl (Intendencia de Soriano 2010b).

Community Capitals Framework (CCF) and Adaptation

I use the Community Capitals Framework (CCF) to analyze experienced stresses and resources mobilized for adaptation at the four selected communities. This framework facilitates the exploration and identification of changes in all the community capitals and their roles in

community adaptation. Community adaptation is the mobilization of resources (community capitals) to reduce and/or adjust to environmental stresses and associated risks (Adger 2000; Wilson 2012).

The CCF includes seven types of capital: natural, social (*bonding* and *bridging*), political, cultural, human, financial, and built (Flora and Flora 2013), and all of them together constitute the structure of communities. Community capitals can either enhance or detract from one another, and resources can be transformed from one form of capital to another (Flora and Flora 2013).

Natural capital includes soil quality, air quality, water quantity and quality, natural and cultivated biodiversity, and landscapes.

Social capital is comprised of networks of more or less institutionalized relationships and dynamic social ties within and outside communities (*bonding* and *bridging*, respectively) (Putnam 1993; Portes 1998; Putnam 2000; Putnam and Feldstein 2003).

Political capital is the ability of communities to use norms and values to influence the standards of the market, state, or civil society, including the codification of those standards in rules, regulations and laws and their enforcements. Political capital includes community's voices and decision making capabilities.

Cultural capital consists of values and worldviews (Flora and Flora 2013). Cultural capital is the way people regard the world surrounding them, with material and non-material implications.

Human capital is the community's skills, abilities, and knowledge, including both formal and informal education of people (Flora and Flora 2013). It is reflected in the characteristics of jobs and the health of the community and its habitants.

Financial capital includes a variety of investments to create additional monetary value and develop the local economy. This includes financial assets not only of market actors but also civil society and local government.

Built capital is composed of community infrastructure, including streets, sewers, public spaces and buildings, as well as the technology available in the community.

Influence of Community Cultural Capital (CCC) on Community Adaptation

Community cultural capital (CCC) is a collective community characteristic that influences how a community perceives and responds to environmental stress. It includes local worldviews and what is locally valued with material and non-material implications (Flora and Flora 2013). Anthropological (Milton 1997;Taddei 2005) and community adaptation (Ensor and Berger 2009; Wilson 2012) studies have found that culture influences how local people interact with their ecological contexts, influencing community responses to environmental stresses, such as severe weather events. Valued and recalled previous community experiences with environmental stresses are important, because they play important roles in mediating responses to environmental stresses (Ensor and Berger 2009; Heyd and Brooks 2009; Wilson 2012). Appreciated and recalled past experiences and responses to environmental stresses reflect community learning and influence community adaptations (Wilson 2012). Local appreciation of CCC recognizes the best local assets, while valuing and honoring past experiences (Hall and Hamond 1998; Cooperrider and Whitney 2005; Hammond 2013). Cultural capital not only influences local responses to environmental stresses, but also how communities are socially organized and make decisions to complete their adaptive responses (Adger, Lorenzoni, and O'Brien 2009; Wilson 2012). However, little is known about other dimensions of cultural capital

locally valued (different in each community) that influence how the community adapt to environmental stresses created by both anthropogenic and natural phenomena. The first hypothesis of this study explores how CCC influenced social and political capitals and local adaptive responses in *NP*, *NH*, *Dolores, and Cardona* (see Literature and Diagram of Hypothesis 1 in Table 1-1 and Figure 1-4, respectively).

Hypothesis 1: Governance (*social* and *political capitals*) can be influenced by cultural capital in developing local adaptive responses. Cultural capital can strengthen social and political capitals to develop responses rooted in the local culture/s. Local appreciation of CCC mobilized for adaptation in the past can represent a tool for increasing community sustainability.

Changes of Community Capitals and Mobilization of Collective Agency for Adaptation

Literature of the commons (Armitage 2008), natural resource co-management and governance (Folke et al. 2005), natural disasters (Aldrich 2010), resilience and climate change adaptation (Adger 2003; Tompkins and Adger 2004; Ensor and Berger 2009; Bendini et al. 2010; Ashwill et al. 2011a, 2011b; Bardsley and Rogers 2011; World Bank 2013) highlights the importance of mobilizing collective agency in dealing with environmental stresses (See Table 1-2). Community collective agency includes both *social* and *political capitals*, being the capacity to mobilize or use resources through the actions of a group (Flora and Flora 2013). Collective agency and social capital and its dynamic social ties can provide access to resources (Putnam 1993; Portes 1998; Putnam 2000; Putnam and Feldstein 2003) for community adaptation to environmental stresses. Therefore, it is important to explore the causes of mobilization of

collective agency at local level and ask: what are the changes in community capitals that facilitate collective mobilization for adaptation to environmental stresses at local level?

Climate change and resilience (Adger 2003; Tompkins and Adger 2004; Ensor and Berger 2009) and natural disasters literature (Aldrich 2010;Wright and Boudet 2012) highlight that a community's perception of its own vulnerability and associated changes such as sudden stresses motivates collective agency able to facilitate access to resources for adaptation at the local level. When all the community capitals experience significant stresses, the community enters into cycles of social reorganization, which can include collective mobilization to adapt to environmental and other stresses. Resilience literature (Walker and Salt 2006) calls this cycle of social reorganization 'back loop', when collective agency may occur. According to Walter and Salt (2006) reorganization occurs after the community has experienced significant stresses that produced disruptions in all of the community capitals. Thus, community experiences of negative changes (stresses), such as sudden environmental crises or natural disasters, can either discourage a community from taking any collective action or facilitate collective agency for adaptation or restoration (Aldrich 2010; Stofferahn 2012; World Bank 2013). This study explores causes for collective agency mobilization to adapt to environmental stresses from natural and anthropogenic disturbances. The second hypothesis of this study explores whether collective mobilization or collective agency for adaptation occurs when multiple stresses in all the community capitals undermine community well-being by comparing *Nueva Palmira* and *Dolores* (see Literature and Diagram of Hypothesis 2 in Table 1-2 and Figure 1-5, respectively).

Hypothesis 2: Collective agency at the local level (*social* and *political capitals*) facilitates use of local resources to adapt to environmental stresses. Collective agency for

adaptation to environmental stresses can occur when multiple stresses in all of the community capitals undermine community well-being.

Decentralized Governance (Social and Political Capitals) and Community Adaptation

Governance is mostly formed by *social* and *political capitals*. It is the structures and processes by which institutions, organizations and individual stakeholders participate in decision making and implement those decisions. Decentralized governance (also referred by the literature as "network governance" or "multi-level governance") includes placing decision-making in the hands of local people. Decentralized governance includes actors from the market, civil society, and/or the state. Decision making can be State-led or led by the private sector with State support, either active or tacit, but results can run into trouble if the State becomes removed from the community and its processes. Top-down communication between governmental institutions and local communities can lead to local discontent and/or disadvantaged communities.

In many cases, decisions are top-down, without including local people from communities in decision-making processes and in the management of resources. "Top-down" decisions are implemented either from international or national institutions, treating local people from communities as passive actors. Under top-down decisions, rural communities are neither included in decision-making processes nor included in managing and/or monitoring their resources. Local participants may receive information, advice, and/or material incentives (Chambers 1983). Such limited community participation often perpetuates dependency of communities on governmental resources and provides perverse incentives to continue activities that make communities vulnerable to environmental stresses in the first place (Ashwill et al. 2011b).

Since the1990s, many governments around the world have shifted from highlighting the importance of people from rural communities as passive actors or "clients" of regional or national governments towards the importance of locality and decentralized social, economic, and political systems capable of making decisions and mobilizing local responses to environmental stresses, having local people as protagonists of change (So 1995; Rist 1997; Piñeiro 2004).

A large body of literature on natural resource management (Tompkins and Adger 2004), theory of the commons (Armitage 2008; Berkes 2008), and community resilience and adaptation theories (Adger et al. 2009; Ensor and Berger 2009) highlights how decentralized "multi-level governance" or "network governance" including local, regional, national, and international actors can facilitate local adaptations to environmental stresses. While the literature highlights local participation and shows how decentralized governance can facilitate community-based adaptation to either slow-onset or sudden environmental stresses (Adger 2003; Tompkins and Adger 2004; Armitage 2008; Adger et al. 2009; Ensor and Berger 2009; Ashwill et al. 2011a, 2011b), little is known about how governance processes take place and influence adaptations to environmental stresses at local levels.

Participation in processes of governance involves discussions or deliberations through consultation or empowerment of local actors (International Association for Public Participation (IAPP) 2007). Empowerment of communities occurs when they are able to locally analyze and mobilize resources to implement local decisions. It implies that the community (elected officials, local groups and residents), rather than departmental and/or national governmental institutions, makes decisions about their resources and implements what is locally decided (IAPP 2007). In Latin America, empowerment of communities to implement what is locally decided has been the most difficult process for actors involved in decentralized governance, because they have

historically depended on capitals coming to them from outside the community. In part, that comes from the European colonizers reserving all sub-surface and communal lands for the state (Wily 2012).

Like in other Latin-American countries, during the twentieth-first century, communities and local actors have gained an important role in public discourse and policies, as alternative localized sociopolitical powers to the traditional centralized states (Cannon and Kirby 2012). Like other Latin-American countries, in Uruguay, contemporary governance approaches to rural communities as part of a particular territory have been called "*territorialidad*," the main characteristic of what has been called "*Nueva Ruralidad*." This focus on a particular territory and its communities is a response to the historical dependency on centralized national governments and the current necessity to implement decentralization plans and policies, focusing on specific regions or territories to develop responses to regional and local problems (Piñeiro 2004; De Barbieri and Zurbriggen 2011; Berdegué et al. 2012). In 2007, as part of the new decentralization policies and programs, Uruguay created *Municipios* (City Councils in the U.S.) that focus on urban areas of communities and *Mesas de Desarrollo Rural* ((MDRs) Round Tables for Rural Development), which focus on their rural areas. These new modes of governability have been promoted by the Uruguayan government, which emphasized empowerment of communities through collaborative efforts between private and public actors.

The third guiding hypothesis of this study explores whether the decentralized governance processes implemented by MDRs and *Municipios* have facilitated multiple adaptive actions when communities were empowered in decision-making processes and the role of historic dependency on outside resources from national government actors in *NH*, *NP*, *Cardona*, and *Dolores* (see Literature and Diagram of Hypothesis 3 in Table 1-3 and Figure 1-6, respectively).

Hypothesis 3: Decentralized multi-level governance is related to multiple adaptive actions when communities are empowered in decision-making processes. Empowerment of communities (communities able to make and carry out their own collective decisions and mobilize local resources) can be limited by their historic dependency on outside resources from national government actors and lack of awareness of those resources that they themselves could mobilize at local level.

Methodology and Data

Selection of Communities

In 2011 and 2012, I collected preliminary data from Uruguayan scholars and staff of *Intendencias*, newspapers, and websites to select the four case studies (communities) of this research. Informal phone conversations, e-mails, and other preliminary data gathered previous to the field work explored how communities were impacted by environmental stresses associated with climate and/or agricultural changes, social and political capitals of communities, and how they had responded to stresses. Based on these data, I selected *Nueva Helvecia*, *Nueva Palmira*, *Cardona*, and *Dolores* to explore the main hypotheses of this study. Field work was completed in these four communities between November 2012 and February 2013, after approval of the research protocol by the institutional review board of Iowa State University.

Sample and Data Collection Methods

Staff of *Intendencias* were informed about the main objectives and hypotheses of the study. In November and December of 2012, I interviewed one employee from the *Intendencia* of Colonia and two from Soriano. These semi-structured interviews (see Appendix E) explored

whether the selected communities matched my selection criteria based on the main hypotheses and expected findings. In addition, staff of *Intendencias* provided information about stresses experienced by these communities, their responses, and their governance. I asked the staff to provide contact information of market, state, and civic actors who could contribute to this study in *NH*, *NP*, *Cardona*, and *Dolores*. I used a purposive snowball sampling procedure to deliberately select participants who could provide information about the main hypotheses of this study. I asked those I interviewed to given me other contacts who knew a great deal about communities, especially environmental (and other) stresses, adaptations, and governance at local level. All the potential participants had to be actively involved in community matters and know about the main aspects explored in this study. I tried to include actors from the market, state, and the civil society, to contemplate multiple perspectives. In total, I gathered contact information of 88 potential participants. Three potential informants could not be interviewed (one from *Dolores* and two from *NH*) because they had limited time to participate. Two potential participants (one from *Dolores* and *NH*, respectively) were contacted in-person but not interviewed because they explained me they did not know much about the main aspects explored in this study. In total, 83 participants were (in-person) interviewed and the conversations digitally recorded: 23 in *NH*, 20 in *NP*, 19 in *Cardona*, and 21 *Dolores* (see Table 1-4).

Using semi-structured questionnaires, all participants were asked what kind of environmental stresses communities had experienced, how communities dealt with environmental stresses, their local responses, and governance of communities for adaptation. In addition, I utilized participant observation to gather data about governance processes and adaptive actions to environmental stresses at public meetings of *Municipios* and *Mesas de Desarrollo Rural* (MDRs- Round Tables of Rural Development). I attended one public meeting

of the *Municipios* and the MDRs in *Cardona* and *Dolores*. [12] Data collected during the field work included minutes from 71 meetings from the four MDRs (from 2007, 2008, 2009, 2010, 2011, and 2012): 17 from MDR-NH, 44 from MDR-NP, 4 from MDR-C, and 6 from MDR-D (see Table 1-5). In addition, I collected reports and presentations completed by different local Non-Governmental Organizations (NGOs) and commissions, and new laws and regulations (about decentralization programs, agrochemicals' applications, soil and land management, and water management, among others) from *Presidencia*, *Ministerio de Ganadería, Agricultura, y Pesca* (MGAP), and *Intendencias*.

Measurement and Data Analysis for Hypothesis 1

The first hypothesis of this study was explored after the field work was finished. Grounded theory methodology allows exploring analytical questions based on observations from the field work and content of the interviews (Charmaz 2006), including "what environmental stresses are perceived by participants of communities?" and "what are the key community capitals that influenced community adaptations to environmental stresses?" After the completion of the field work, in March 2013, I used initial (open) coding while listening and transcribing all 83 interviews[13], and reading (line-by- line) transcribed interviews from the four communities. All the 83 interviews were considered to explore hypothesis 1.

Staff of *Intendencias* and local actors from *NH* highlighted that this community had not been as impacted by environmental stresses as the other three communities. This was attributed (by participants) to its community cultural capital (CCC), which influenced how the community was organized to adapt to environmental and other stresses. Initial coding of all the interviews

[12] MDR-D meeting was organized in *Mercedes*.
[13] The content of the 83 interviews directly related to the main hypotheses of this study was transcribed.

facilitated the identification of CCC as an independent variable, which influenced social and political capitals and adaptions to environmental stresses in *Nueva Helvecia* (NH). Once CCC was identified as a key aspect to explore, it was tested against existing literature of cultural capital and adaptation to environmental changes, my field notes, and the 83 interviews to confirm its importance on social and political capitals and community adaptations. The influence of CCC was not highlighted by interviewees from *NP*, *Cardona*, and *Dolores*. This preliminary analytical process served as a basis for the construction of hypothesis 1, which was shared with members of my Program of Study Committee in April 2013.

Coding in grounded theory is a pivotal link between collecting data and developing emergent theoretical foundations (Charmaz 2006). To explore environmental stresses and how CCC influenced social and political capitals and adaptations, open and focused coding were used to identify key cultural elements participants appreciated in adapting to environmental stresses. This analysis facilitated the exploration of hypothesis 1. Indicators of appreciated CCC mobilized to strengthen social and political capitals and adaptive strategies could serve as basis for future research and/or theories exploring community adaptations to environmental stresses.

Measurement and Data Analysis for Hypothesis 2

The variables of the second hypothesis (collective agency and community adaptations) of this study were identified based on literature review and preliminary data collected previous to the field work. *Dolores* and *NP* faced similar environmental stresses but had responded differently at the local level. It was anticipated that *NP* mobilized collective agency (social and political capitals) and other resources (community capitals) for adaption to environmental stresses, while *Dolores* did not.

To explore this hypothesis 43 interviews were analyzed, 23 in *Dolores*[14], and 20 in *NP*. After the field work, focused coding was used to analyze interviews from the two communities. This preliminary analysis explored described changes and adaptations by community capitals, and the role of collective agency on adaptations. Observations from the field work and preliminary analysis of interviews suggested that much could be learned by comparing their experiences and exploring why collective agency was mobilized only in one of these two communities. The semi-structured questionnaire used for interviews included closed and open-ended questions about changes communities experienced in all community capitals, especially during the past ten years (2003-2013).

The Community Capitals Framework (CCF) was employed to analyze the stresses felt and resources mobilized (used) for adaptation at the community level. This framework facilitated the exploration and identification of changes in all the community capitals and their influence on collective mobilization for adaptation to environmental stresses. After participants mentioned changes in community capitals, they were asked how these changes impacted the community; whether these changes were positive or negative for the community. The CCF allowed for categorizing changes described in positive or negative terms by interviewees, exploring collective agency and the role of political capital to mobilize resources for adaptation at the local level. Examination of data in all the community capitals gave a holistic analysis of how different changes had positively or negatively impacted the communities and their relationship with collective agency and adaptation. Participants were asked to describe whether the community experienced specific changes, how they affected them, whether communities responded to these

[14] Two participants from *Cardona* were part of the sample used for *Dolores* to explore hypothesis 2. These participants provided some information about *Dolores*, which was considered for the analysis of the second hypothesis.

changes, and whether adaptive actions were developed (see Appendixes D and E). In addition, they were asked if there were any other significant changes provoked either by humans or nature not previously mentioned in the questionnaire, how they affected the community, and whether communities responded to these changes (see Appendixes D and E). Counting the number of times informants described changes (as negative or positive) strengthened and verified the qualitative data obtained from interviews, in each of the community capitals. For counting, it was considered each time informants described changes with specific consequences (as positive or negative) for the community. Many changes (with different consequences) were repeated when participants were asked for any other changes not previously mentioned in the questionnaire.

Collective agency was explored by asking about the responses communities developed to adapt to the described changes, characteristics of actors involved in these actions (e.g., individual or collective), and the reasons behind absence or presence of collective agency at local level. Local adaptations by all the community capitals were featured in a table. Axial coding analysis of the interviews linked described changes, mobilized resources for adaptation, and the role of political capital on external relationships of communities (*bridging social capital*) as a mediator between local mobilization of resources (collective agency) and better access to outside resources such as human capital.

Measurement and Data Analysis for Hypothesis 3

To explore the third hypothesis, open and axial coding were used to analyze the 83 interviews from the four communities. Open coding was used to identify environmental stresses experienced by communities (not included in the questionnaire) and the *Municipios*' and MDRs' dependence on external resources for adaptation.

Using axial coding, transcriptions of the 83 interviews were categorized based on community, environmental stresses, characteristics of governance processes (consultation-information exchange, collective decisions, and mobilization of local/external resources) organized by *Municipios* and MDRs, and community dependency on outside resources. Axial coding analysis linked environmental stresses, characteristics of governance processes, community capitals mobilized for adaptations and dependency on external resources (capitals) for each of the *Municipios* and MDRs. In addition, content analysis of MDRs' minutes of meetings explored whether collective decisions and mobilization of local resources (*empowerment*) occurred during meetings to discuss environmental stresses, and the importance of dependency on external resources. In addition, descriptive statistical analysis was used to show quantitative descriptions of governance process at *Municipios* and MDRs. This quantitative analysis corroborated and strengthened the qualitative data obtained from interviews and minutes of MDRs' meetings to explore whether communities were empowered through these decentralized programs.

The semi-structured questionnaires used in this study included multiple (open and closed) questions to explore governance processes (see Appendixes D and E). Participants were asked about: opportunities for collective and direct participation at *Municipios* and MDRs, topics addressed in their public meetings, how often they were organized, the dynamics of participation in the meetings described, and how actors and dependence on resources from outside communities influenced local decisions and mobilization of local resources, among others (see Appendixes D and E).

Described meetings of *Municipios* and MDRs discussing environmental stresses (specific meetings that occurred) were counted from each of the interviews. To explore how often

collective decisions happened in these meetings (average number per meeting), I divided the number of times that collective decisions occurred (counted from interviewees describing meetings) by the total number of described meetings discussing environmental stresses.

To explore mobilization of local resources in the meetings described, I divided the number of times that local resources for adaptation were (described as) mobilized (in the meetings) by the total number of described meetings. To explore dependency on external resources for adaptation, I divided the number of times that external resources were mentioned as obstacles to mobilize local resources (for the meetings described) by the number of times that local resources were (described as) mobilized. Similar quantitative analysis was applied to explore minutes of the four MDRs. For this, I analyzed the71 meeting minutes of MDRs[15] (from 2007, 2008, 2009, 2010, 2011, and 2012) provided by staff of *Ministerio de Agricultura Ganadería y Pesca* (MGAP) and *Intendencia* of Soriano. I counted how many times discussions about environmental stresses were reported at the meeting minutes. To explore empowerment, I divided the number of times collective decisions occurred to mobilize locally available resources by the total number of times environmental stresses were discussed at the meetings. Results demonstrate how types of governance processes influenced adaptations, mobilized community capitals (local and outside) for adaptation, and the role of historic dependency of community on external resources and government institutions.

During the field work and data analyses to explore the third hypothesis, some limitations to measure empowerment were observed: *1)* information analyzed about public meetings of *Municipios* and MDRs relied on what informants recalled (their memory) from specific meetings; *2)* access to information (e.g., meeting agendas and minutes) of the meetings

[15] I could access to all the meeting minutes of MDR-NH and MDR-NP. I could not access to the meeting minutes of MDR-C and MDR-D. I could not access to meeting minutes of *Municipios*, which were not publically available.

organized by *Municipios* and MDRs was limited, being not publically available; *3)* financial information of *Municipio*s and MDRs was requested but access was limited because this data was not provided or publically available. These limitations might be considered by future studies about governance processes.

Impact and Justification of the Study

The Uruguayan government is increasingly mobilizing resources for adaptation to environmental stresses through the *Observatorio Ambiental Nacional, Sistema Nacional de Respuesta al Cambio Climático, Grupo Interdisciplinario de Investigación del Cambio Climático, Instituto Nacional de Investigación Agropecuaria* (INIA)*, Instituto Plan Agropecuario*, *Ministerio de Ganadería Agricultura y Pesca* (MGAP), and the *Universidad de la República* (UdelaR).

Decentralization policies claim to empower rural communities and facilitate their interactions with both departmental and national governmental institutions. Results from this study will significantly contribute to these institutional efforts, which still need structural changes and new policies to make them more effective. Under the increasing complexity and uncertainty of global anthropogenic and natural challenges, new policies and programs should focus on institutional transformations that facilitate organizational flexibility on multi-level collaborative platforms, including actors from the state, the market, and civil society from local, regional, national, and international levels (Berkes et al. 2005; Meyer and Konisky 2007; Berkes 2008; Dowsley 2008; Lockwood et al. 2010; Ashwill et al. 2011a, 2011b). Such policies could lead to long-term institutional adaptive programs and avoid the exclusive dependency generated

by regional, national, and international aid and loans from the World Bank, the United Nations, or the European Union, which mostly focus on post-events and emergency plans.

Strong decentralized governance can facilitate collaborative and flexible multi-level systems that can learn from experience and generate knowledge to enhance resilience and encourage self-organization at local levels (Folke et al. 2002; Berkes et al. 2005; Folke et al. 2005). That could potentially facilitate processes of coordination among different stakeholders to plan and achieve sustainable goals in complex contexts, as well as to build new institutions across different levels capable of dealing with the complex and uncertain risks triggered by stresses from climate change and/or globalization (Folke et al. 2002; Berkes et al. 2005; Folke et al. 2005; Berkes 2008; Dowsley 2008; Lockwood et al. 2010). Multi-level institutional involvement among different actors within and outside communities, including the market, government, and civil society, could also transform autonomous and spontaneous adaptations into long-term and decentralized (locally led) anticipatory adaptation (Smit and Pilifosova 2008; Ashwill et al. 2011b). The empowerment of institutions and deliberation of the communities with *Municipios* and *Mesas de Desarrollo Rural* could lead to community-based governance, better flow of information, and development of local innovation platforms for better locally-adapted strategies. Uruguay implemented new decentralized state structures through the new 89 *Municipios* and the creation of new intersectoral governmental institutions, such as the *Sistema Nacional de Respuesta al Cambio Climático,* and the future *Centro de Transferencia de Tecnología Para Cambio Climático y el Desarrollo Sustentable*. These are promising starts in the evolution of new institutional structures across different levels, sensitive to climate change and globalization.

Once the communities and their institutions understand their assets and processes for mobilizing them towards local adaptations, they could be able to enhance them, and perhaps, to join multi-level collaborative efforts. This study will significantly inform in this regard. This study potentially can have a broad impact on research and development projects that work in communities to help them adapt to environmental stresses from climate change and globalization. Results from this study could be informative to policy-makers, ongoing institutional programs, as well as other similar studies that focus on rural communities, governance, and adaptation to environmental problems.

Dissertation Organization

In the previous sections of this chapter, key concepts explored by the main hypotheses of this study and the socioeconomic and political contexts of recent environmental stresses in southwestern Uruguayan rural communities have been described. The potential of this research as a significant contribution to the existing literature and ongoing developmental and research endeavors is described. During the field work and the analysis of the data gathered for this study (2012-2013), multiple variables were identified as critical for adaptations to environmental stresses experienced by *NH*, *NP*, *Cardona*, and *Dolores*.

Chapter 2 is an article for publication in a peer-reviewed journal. Looking at *NH*, *NP*, *Cardona*, and *Dolores,* this article explores how local appreciation of cultural capital influenced social and political capital and community responses to environmental problems, which are key for communities' acknowledgment of possible risks and the development of preventive/anticipatory adaptive actions.

Chapter 3 is an article for publication in a peer-reviewed journal. It explores how communities' perceived changes in all of their community capitals influenced collective agency (*social* and *political capitals*) in *NP* and *Dolores*. This paper uses the Community Capitals Framework (CCF) to describe the different stresses perceived by participants of these two rural communities. This paper explores the different strategies and resources that groups of citizens mobilize to minimize environmental stresses and/or to adapt to recent socioeconomic changes.

Chapter 4 is an article for publication in a peer-reviewed journal. This article addresses how new governance (*social* and *political capitals*) in the context of decentralization influences adaptations to environmental stresses in *NH*, *NP*, *Cardona*, and *Dolores*.

Chapter 5 centers on the conclusions from this study and some recommendations for future research and outreach projects on governance and adaptation to environmental stresses created either by climate change or economic investment.

Figures and Tables

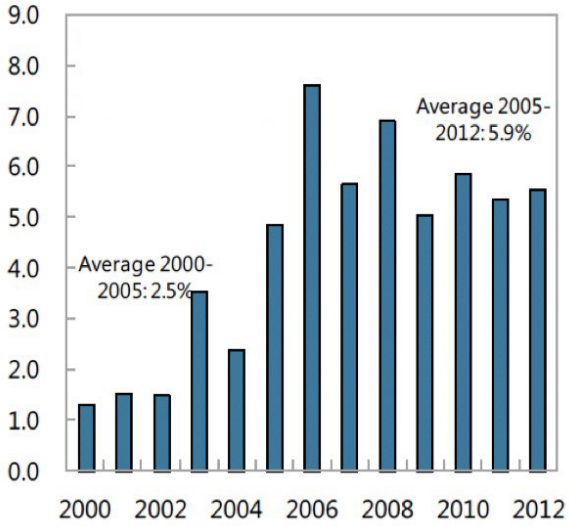

Figure 1-1: Foreign Direct Investment in Percent of GDP (Source: IMF 2014)

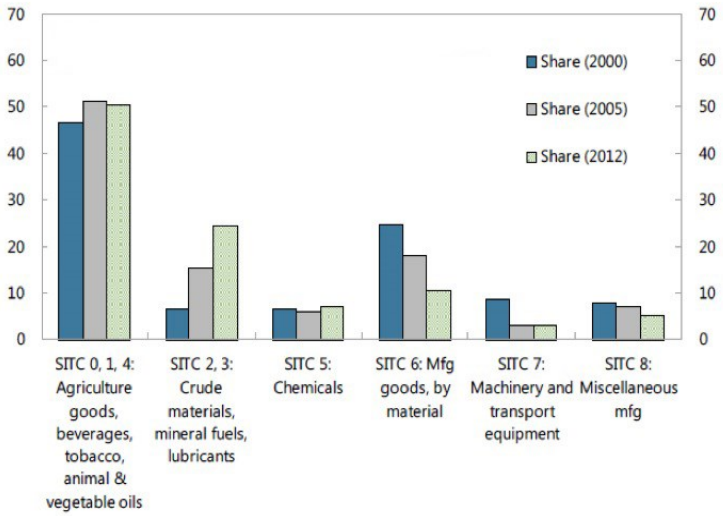

Figure 1-2: Uruguay: Sectorial Composition of Exports (Shares in Total Exports) [16] (Source: IMF 2014)

[16] This figure decomposes total merchandise exports by standard international trade classification (SITC) at three points in time (2000, 2005, and 2012), which shows the growth of agricultural products (SITC 0, 4, especially beef and rice) and raw ('crude') materials (SITC 2, 3, especially soybeans) (IMF 2014).

Figure 1-3: Selected Communities

Table 1-1: Literature used for Hypothesis 1

Literature	**Anthropological Studies**	**Community Studies**	**Resilience and Adaptation to Climate Change**	**Appreciative Inquiry**
Authors	Milton 1997; Taddei 2005	Salamon 1992; Flora and Flora 2013	Resilience Alliance 2007; Adger et al. 2009; Ensor and Berger 2009; Heyd and Brooks 2009; Wilson 2012	Hall and Hamond 1998; Cooperrider and Whitney 2005; Hammond 2013
Contributions to Community Adaptation to Environmental Stresses	Cultural values can mediate between perception of the environment and mobilization of resources.	Cultural values are composed of past shared experiences, memories, and stories.	Cultural values, traditions, and past experiences can either limit or facilitate decision-making and mobilization of resources (*community capitals*).	Identified and recognized cultural capital of what worked well in the past and solutions that already exist can facilitate local mobilization of resources.

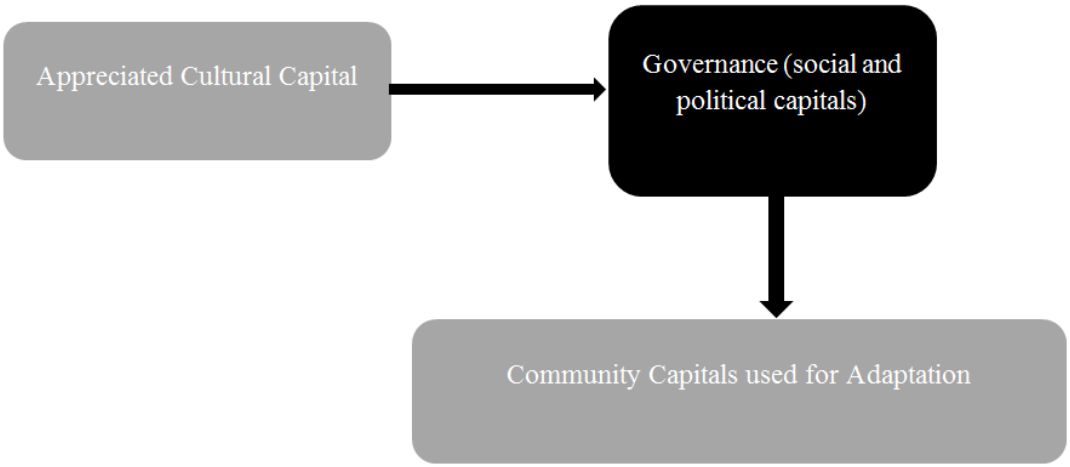

Figure 1-4: Diagram of Hypothesis 1

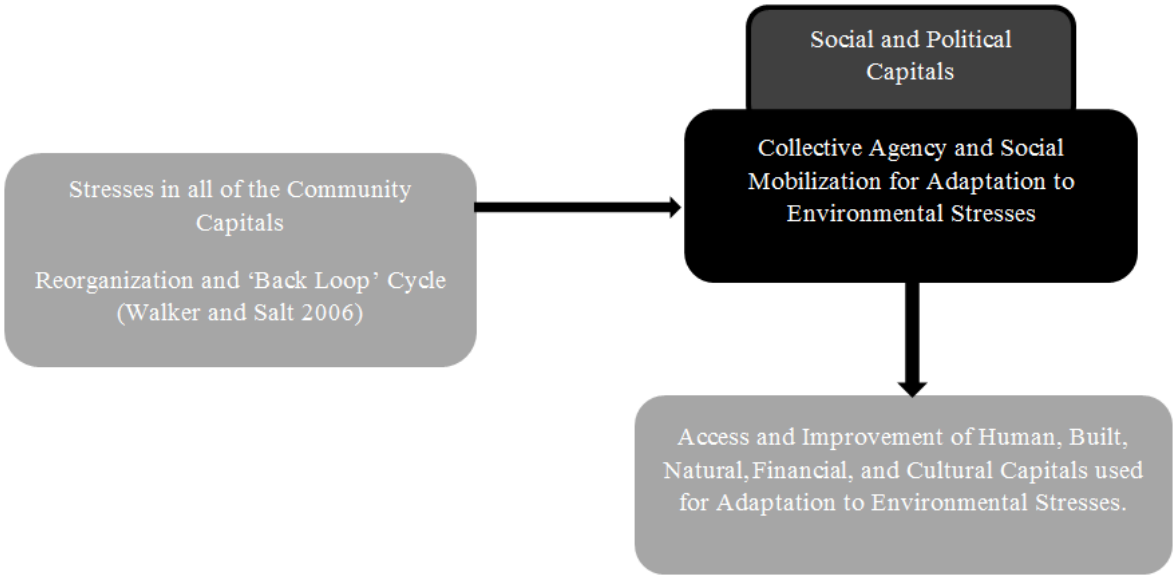

Figure 1-5: Diagram of Hypothesis 2

Table 1-2: Literature used for Hypothesis 2

Literature	**Social Capital**	**Collective Agency and Social Mobilization**	**Resilience and Adaptation to Climate Change**	**Literature of the Commons**	**Natural Resource Co-management and Governance**	**Natural Disasters**	**Resilience**
Authors	Putnam 1993; Portes 1998; Putnam 2000; Putnam and Feldstein 2003	Brecher et al. 2009; Flora and Flora 2013; Stofferahn 2012;Wright and Budet 2012	Adger 2000; 2003; Tompkins and Adger 2004; Walker and Salt 2006; Ensor and Berger 2009; Bendini et al. 2010; Ashwill et al. 2011a, 2011b; Bardsley and Rogers 2011; Wilson 2012; World Bank 2013	Armitage 2008	Folke et al.2005	Aldrich 2010;Wright and Boudet 2012	Walker and Salt 2006
Contributions to Community Adaptation to Environmental Stresses	*Social capital* can facilitate resources at local level.	Collective agency (*social* and *political capitals*) can mobilize community resources.	*Social capital* can facilitate mobilization of resources (*community capitals*).	Multi-level governance (*bonding* and *bridging social capital and political capital*) can facilitate resources.	Multi-level governance (*bonding* and *bridging social capital and political capital*) can facilitate resources.	*Social capital* that is mobilized after natural disasters are experienced and can be key to mobilize resources.	Adaptive cycles of communities: 'fore loop' and 'back loop' (when stresses have been experienced and *collective agency* takes place).

Table 1-3: Literature used for Hypothesis 3

Literature	**Resilience and Adaptation to Climate Change**	**Literature of the Commons**	**Natural Resource Co-Management**	**Community Governance**	**Decentralization in Latin America and 'Nueva Ruralidad'**	**Governance Processes**
Authors	Adger et al. 2009; Ensor and Berger 2009	Armitage 2008; Berkes 2008	Tompkins and Adger 2004	Gates 1999; Head 2007	Piñeiro 2004; Barbieri and Zurbriggen 2011; Zurbriggen 2011; Berdegué et al. 2012	International Association for Public Participation 2007; Cadman 2011
Contributions to Community Adaptation to Environmental Stresses	Decentralized "*multi-level governance*" or "*network governance*" can facilitate mobilization of resources (*community capitals*).	Decentralized "*multi-level governance*" or "*network governance*" can facilitate mobilization of resources (*community capitals*).	Decentralized "*multi-level governance*" or "*network governance*" can facilitate mobilization of resources (*community capitals*).	Local actors are important to identify local problems and resources to mobilize.	Empowerment of communities in decision making processes.	Different types of participation in decision making processes.

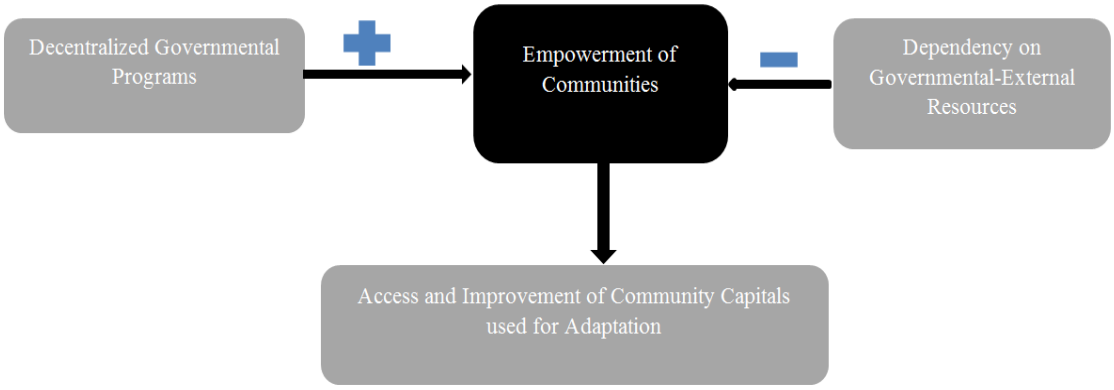

Figure 1-6: Diagram of Hypothesis 3

Table 1-4: Number of Participants from Each Community

Types of Actors	Nueva Helvecia	Nueva Palmira	Cardona	Dolores
State	5	4	8	5
Market	8	6	4	7
Civic Society	10	10	7	9
TOTAL	23	20	19	21

Table 1-5: Minutes of Meetings by MDRs and Years

Year	MDR-NH	MDR- NP	MDR- C	MDR-D
2007		1		
2008		6		3
2009		6		
2010		3		
2011		12	1	2
2012	17	16	3	1
TOTAL	17	44	4	6

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CHAPTER 2. THE INFLUENCE OF CULTURAL CAPITAL ON SOCIAL AND POLITICAL CAPITALS AND COMMUNITY RESPONSES TO ENVIRONMENTAL STRESSES: FOUR CASE STUDIES FROM SOUTHWESTERN URUGUAY

Manuscript prepared for submission to the *Agriculture, Food, and Human Values Journal*

Abstract

Uruguayan rural communities have differentially experienced and responded to environmental stresses created by climate change and increases in the production of commodities for export. Based on semi-structured interviews with key informants in four communities of southwestern Uruguay, this article explores how community cultural capital influenced community perceptions of stresses and their responses, and how cultural capital impacted social and political capitals at the local level. One of the four communities reported less impact from environmental stresses, which can be attributed to its cultural capital and its influence on local responses. An in-depth exploration of this community shows how social and political capitals are influenced by cultural capital to develop local adaptive responses. Cultural capital can strengthen social and political capitals to develop responses rooted in the local culture/s. Local appreciation of cultural assets mobilized for adaptation in the past could represent a tool for increasing community sustainability and serve as basis for future research and/or theories exploring community adaptations to environmental stresses.

Key Words: *Communities, environmental stresses, cultural capital, social capital, political capital, adaptations*.

Introduction and Literature Review

Cultural Capital's Effect on Community Experiences with Environmental Stresses[17]

Community cultural capital (CCC), a collective rather than individual characteristic, frames how a community perceives and responds to environmental stress. It includes local worldviews and what is locally valued (Flora and Flora 2013). CCC can result from and be reinforced by community actions that produce tangible as well as intangible goods and services needed for the satisfaction of needs and wants (Heyd and Brooks 2009:270). Cultural capital has been found to influence how communities interact with their ecological contexts, influencing local responses to environmental stresses, such as severe weather events (Milton 1997; Taddei 2005; Ensor and Berger 2009; Wilson 2012).

Cultural capital is composed of shared memories from the past, which are constructed, reproduced, and valued by local actors (Salamon 1992). Communities recall stories tied to their past and origins (Salamon 1992), influencing how they respond to environmental stresses. How communities value and recall previous community experiences with environmental stresses is critical (Ensor and Berger 2009; Wilson 2012), because they play important roles in mediating responses to environmental stresses (Heyd and Brooks 2009). As Heyd and Brooks (2009) point out, in a world of intensifying environmental changes, it is fundamentally important to explore the ways in which human practices are mediated by ideas about the relationships between communities and the natural environment and the processes through which adaptive (or maladaptive) cultural patterns come about.

Collective interpretation and valuation of past experiences and responses to environmental stresses reflect community learning (Wilson 2012) and influence on-going

[17] Environmental stresses are environmental influences with significant ecological changes or limit ecological development (Freedman 1995) or cycles, representing negative effects on communities and agroecosystems.

community adaptations. Cultural capital approached with an appreciative lens recognizes the best local assets, affirming strengths and successes, while valuing and honoring past experiences (Cooperrider and Whitney 2005). Communities could be even more effective in utilizing their cultural capital by amplifying an appreciative inquiry approach to cultural capital, identifying and recognizing the value of what worked well in the past and solutions that already exist (Hall and Hamond 1998; Cooperrider and Whitney 2005; Hammond 2013). Cultural capital not only influences local responses, but also affects how communities are socially organized and make decisions to complete their adaptive responses (Wilson 2012).

CCC on Social and Political Capitals

Uruguayan communities, like others around the world, have ties between local and external actors (or stakeholders) from the market, the government, and the civil society. Local appreciation of cultural ties and traditions can influence the nature of relationships within and outside communities (*bonding* and *bridging social capital*, respectively) and how communities are organized and make decisions (*political capital*). CCC influence on social and political capitals can affect the overall well-being of communities and how they deal with environmental stresses (Adger, Lorenzi, and O'Brien 2009).

Community organization and decision-making represent governance (*social* and *political capital*) determine how communities respond to possible environmental stresses (Adger et al. 2009). The way in which communities are organized to make decisions about environmental stresses is influenced by worldviews embedded in the local culture/s (Bohren 2009; Heyd and Brooks 2009). It is important to explore how CCC influences community organization and

decision-making, particularly regarding adaptations to environmental phenomena, such as climate change (Adger et al. 2009; Wilson 2012).

Both bridging and bonding social capital are influenced by local appreciation of cultural capital, which can enhance a sense of belonging at the local level, but transcend the community. CCC influences how communities see themselves and their relationships with outside actors, especially with governmental institutions, which have an important role on local access to resources used for adaptation to environmental stresses.

Key dimensions of locally appreciated CCC influencing social and political capitals on community adaptations might be different in each community. Therefore, how CCC influences how the community is organized and prepared to adapt to environmental stresses needs to be deeply explored at the community level. This study explores how CCC influences community perceptions of and responses to environmental stresses and how it shapes social and political capitals in four communities of southwestern Uruguay. By deeply examining one of these four communities, this study aims to explore dimensions of appreciated CCC mobilized to strengthen social and political capitals and adaptive strategies and the challenges for adaptation that cultural community capital represents.

Research Methods

To choose the four communities that serve as the basis for this study, in 2011 and 2012, I collected preliminary data from Uruguayan scholars and staff from *Intendencias*, newspapers, and websites. Based on these data, I selected four communities in southwestern Uruguay (see Figure 2-1) that experienced and responded differently to environmental stresses at the local

level: *Nueva Helvecia* ((*NH*) also called *Colonia Suiza (Swiss Colony)*), *Nueva Palmira* (*NP*), *Cardona*, and *Dolores*.

Field work was completed in these four communities between November 2012 and February 2013. I used a purposive snowball sampling procedure to deliberately select participants who could provide information about environmental stresses, governance, and adaptations. I asked those I interviewed to given me other contacts who knew a great deal about communities, especially environmental (and other) stresses, adaptations, and governance at local level. This method allowed selection of market, state, and civic actors who provided diverse views. In total, 83 participants were interviewed: 23 in *NH*, 20 in *NP*, 19 in *Cardona*, and 21 *Dolores.* (See Table 2-1).

Using semi-structured questionnaires[18] (see Appendixes D and E), participants were asked what kind of environmental stresses the communities had experienced. Additionally, participants were asked how communities dealt with environmental stresses and what aspects of communities had an important role in their adaptations, internal and outside social relationships, and decision-making at the local level. Grounded theory methodology was used to identify community cultural capital (CCC) as an independent variable, which influenced social and political capitals and adaptations. Coding in grounded theory is a pivotal link between collecting data and developing emergent theoretical foundations (Charmaz 2006). To explore environmental stresses and how CCC influenced social and political capitals and adaptations, open and focused coding were used to analyze the 83 interviews and identify key cultural elements participants appreciated in adapting to environmental stresses. The analysis of the 83 interviews identified the main aspects of CCC influencing social and political capitals and

[18] One questionnaire for *Intendencia* staff and another (similar) questionnaire for other actors from the market, state, and civil society involved in the communities.

adaptations. This entailed going through the data line-by-line, focusing on key themes identified from the open coding (Esterberg 2002). Secondary data include historical data and research materials provided by local historians and institutions, *Intendencias* and Non-Governmental Organizations (NGOs).

The data analyzed after the field work, in March 2013, suggested that cultural capital of *NH* had facilitated local anticipatory adaptations to environmental stresses through strong social organization and governance at the local level. Cultural capital of *NH* influenced its relationships with outside actors. Participants from the other three communities (*NP*, *Cardona*, and *Dolores*) did not highlighted CCC as a mediator between environmental stresses and community responses, which allowed comparison with *NH*, the in-depth case study analyzed here. This in-depth case study facilitated a deep examination of how CCC influenced social and political capitals and community adaptations to environmental stresses. The exploration of appreciated CCC mobilized to strengthen social and political capitals and adaptive strategies could serve as basis for future research and/or theories exploring community adaptations to environmental stresses.

Findings and Discussion

CCC and Community Experiences with Environmental Stresses

Study participants from the four communities differentially experienced environmental stresses created by both natural and anthropogenic changes. Described environmental stresses included deterioration of air quality, water quality deterioration from use or transportation of agrochemicals, climate change (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events), reduction of biodiversity, water pollution due to lack of

sewer system, soil erosion, 'general environmental problems created by land grabs,' trash from agrochemical users, increasing pests (ants, foxes, pigeons, and parrots) from monocropping of soybeans and eucalyptus, death of bee colonies due to increasing use of agro-chemicals, lack of crop rotations, deforestation, and overexploitation of natural resources because of the increasing production of GMOs (soybean and corn). (See Table 2-2).

Recalled community experiences with environmental stresses and responses varied among the four communities. In *NH*, interviewees highlighted less negative impacts from environmental stresses, attributed to anticipatory responses rooted in its CCC, which helped the community to reduce possible impacts. In *NP*, *Cardona*, and *Dolores*, interviewees highlighted more recent environmental stresses and fewer cultural references to community responses to past environmental stresses. Only 18% of the total respondents from *NP*, *Cardona*, and *Dolores* mentioned environmental stresses that critically affected these communities before 2002, when the production of soybeans (and the national economy) started to significantly grow in this region. Environmental stresses described previous to 2002 included soil erosion from tillage (*NP*, *Cardona*, and *Dolores*), air and water quality deterioration due to new agricultural industries (*Cardona*), lack of sewer system (*NP*), and the drought of 2001-2002 (*NP*, *Cardona*, and *Dolores*). The remaining environmental stresses described by participants from these three communities occurred after 2002 and were associated with climate change, combined with the intensification of agriculture driven by the expansion of soybeans (see Table 2-2). According to the interviewees from these three communities, neoliberal economic policies and Foreign Direct Investment (FDI) during the 1990s and beginning of 2000s, resulted in the financial crisis of 2001-2002. The economic recovery (facilitated by a new wave of FDI) of these communities

started in 2002-2003, driven by the growth of agriculture and the use of GMO soybeans, but critically affecting their agroecosystems.

Nueva Palmira (NP)

In *NP*, respondents described CCC at the beginning of the 20th century as being based on local resources and diversified agriculture. On the other hand, interviewees described loss of CCC due to economic shifts towards globalized networks, which included automobile manufacture between the 1960s and the 1990s, and port operations based on industrialized agriculture and mining during the late 1990s and the 2000s. A local historian described:

> *"At the beginning of the twentieth century, this community had production of flour, lots of warehouses, each family like the Italians and Piedmonteses had its winery (…). There were mostly diversified farms but large industries (like the oil factory Optimo) started in the 1930s. Later, the oil factory (Optimo) closed and Lestido, which was Volkswagen, a car assembly plant, opened in 1962 and remained until 1990. In the 1980s, we called that industry "Papá Lestido" ("Daddy Lestido") as contributing to the well-being of the community. In 1990, when Lestido fell during neoliberalism and Japanese cars entered, the unions made strikes and we experienced the impact. At that time, there was only one company in the port and it was dedicated to bringing manganese from Bolivia and Brazil, but very few people were employed (…) like now, but now everything is based on soybeans."* (*NP*- Local Historian, February 20th, 2013)

After the closure of the Volkswagen factory, the community focused on port operations, which significantly increased during the 2000s to transport soybeans, timber, and minerals from Bolivia and Brazil. According to *NP* participants, increasing port operations related to agriculture and mining during the 21st century started to negatively affect the natural environment of the community at the same time its major employer shut down. A local elected official stated:

> *"The higher level of quality of life in this community was due to Volkswagen. It offered a steady industrial job that allowed social and family planning. The port, based on minerals and soybeans, is now very unstable and destructive to the environment of the community."* (*NP*- Local Elected Official, December 20th, 2012)

In *NP*, recent environmental stresses were described 132 times. All (N=20) the respondents mentioned environmental stresses at least once. In *NP*, the stresses mentioned were deterioration of air quality (95% of the respondents), water quality deterioration from use or transportation of agrochemicals (80%), climate change (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events) (35%), general environmental problems created by land grabs (25%), reduction of biodiversity (15%), water pollution created by lack of sewer system (10%), while soil erosion, increasing pests (mussels, ants, foxes, pigeons, and parrots) from port operations and monocropping of soybeans and eucalyptus, lack of crop rotations, and overexploitation of natural resources because of the increasing production of GMOs (soybean and corn) were each mentioned by just one respondent. (See Table 2-2).

Cardona

In *Cardona*, respondents described how CCC had changed. In the past, it was based on their shared experiences with diversified small-farmer agriculture. In the 1970s a national company (*Quesería Helvetica*) built a plant to produce cheese. According to local respondents, negative environmental changes began with the industrialization of the cheese industry in the 1970s and the 1980s. These changes significantly increased during the 2000s, when a Mexican company (*Indulacsa*) purchased the cheese factory in 2006 to export cheese, the number of hog confinement operations among local farms increased, and soybean production increased. A local ecologist commented:

> *"In the past, the local people were mostly diversified small farmers, but when we celebrated 100 years of Cardona (in 2003), there were no ranchers and farmers. The main factory in Cardona was established and the local economy shifted to industrial services during the 1970s and 1980s with Quesería Helvetica, which was a cheese industry. Afterwards, there was a key point when it started to pollute the environment of the community that started with the strong odors and other problems, but the big change was when the owners shifted from Uruguayans to Mexicans (in 2006). Now, we are popularly known for having bad odors."* (Cardona- Local Ecologist, November 24th, 2012)

Respondents of *Cardona* highlighted how the community was culturally impacted by FDI directed at the production of soybeans beginning in the 2000s. This significantly affected the agro-ecosystems of the community. A local elected official said:

> *"In 2002 or 2003, the first Argentine farmers began to appear in this community, and another issue arose, which was the subject of the valuation of land. Argentines and international companies began to lease or buy land. They came with another farming culture, a very attractive offer and working methods different than we Uruguayans had (...). They started with no-till with larger planters which grabbed all the land. They were followed by more technologically-advanced harvesters and fumigators. And, fences inside the farms started to disappear. When you heard someone rented or sold, one knew they had to take all interior fences out, and we knew that if Argentines or international companies bought or leased the land, they would want to remove all fences. Knowledge and appreciation of the value and how to work with (culture) heifers, cows, and everything else disappeared in this community. Then, intensified use of glyphosate and insecticides, and certain contaminants in streams and creeks occurred (...) Water started to be polluted with insecticides and glyphosate produced by runoff from rain and that polluted the community's streams."* (*Cardona*- Local Elected Official, November 22nd, 2012)

In *Cardona*, recent environmental stresses were described 146 times by 95% of the respondents (N=19). In this community, the stresses mentioned were climate change (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events) (84% of the respondents), water quality deterioration from use or transportation of agrochemicals

(68%), deterioration of air quality (52%), reduction of biodiversity (42%), lack of crop rotation (21%), death of bee colonies due to increasing use of agro-chemicals (21%), soil erosion (21%), deforestation (15%), and overexploitation of natural resources because of the increasing production of GMOs (soybean and corn) (15%). (See Table 2-2).

Dolores

In *Dolores*, respondents highlighted that the community was proud of its long history and culture in agriculture. Interviewees emphasized the culture of this community was historically rooted in the production of row crops like grains and oilseeds, especially wheat, sorghum, barley, soybeans, and corn. This community was described by respondents as a historical place for row crop production and one of the most technologically-progressive communities in Uruguay for grain and oilseed production. A local historian stated:

> *"The first grains of wheat were planted in 1527 with Gaboto's expedition to the San Salvador River. Wheat was planted for the first time (...) and at that time there was a report saying they had planted many seeds and had given so much and believed this area was suitable and extraordinary for planting such crops."* (*Dolores*- Local Historian, December 5th, 2012)

Recent growth in agriculture, facilitated by the increasing production of soybeans, started earlier in *Dolores* than in the other three communities. Influenced by Argentine farmers who bought and leased land in the late 1990s, this was one of the first communities in Uruguay to adopt no-till[19] to produce soybeans. In this community, both local and foreign agriculture companies facilitated recent technological transformations. An agribusiness owner commented:

[19] No-till is an agricultural technique that implies that seeds are planted directly into the soil (without tillage) and that natural cover is left on the soil and weeds are controlled by chemicals, rather than by tillage.

> *"In this community there is much pride in our farming culture, we are always very open mind (...). This community has an agricultural identity which helped (...) in the adoption of new technology (...). Precision farming started in 1997 or 1998 and the GMO soybeans in 1998 or 1999 no-till to stop using the plow for weed control and planting, which created much erosion."* (*Dolores*, Agribusiness Owner, December 4th, 2012)

Interviewees from *Dolores* and the other three communities highlighted changes in the farming culture, due to the adoption of no-till to produce soybeans. This cultural and technological change was highlighted as positive for the environment as a way to avoid previous practices based on the use of plow or tillage, which, according to the respondents, created soil erosion. During the 2000s, no-till became the most important technology used in agriculture, especially for the production of soybeans. However, with the experience of these new technologies (no-till and GMO soybeans) during the late 1990s and 2000s, communities started to experience other significant changes in the environment created by these agricultural practices and associated industries, such as grain elevators installed in *NP*, *Cardona*, and *Dolores*. The technology associated with no-till was based on monocropping and associated with other consequent environmental stresses, such as reduction of biodiversity, deforestation, and deterioration of air and water quality, among others. A staff member of *Intendencia* of Soriano noted:

> *"It is hard to know where the sources of pollution are because we are in a very productive area. We have algae in rivers. People swim and then get eye infections. People here also have respiratory problems. This also involves extreme temperatures that causes algae appear. We also have problems with the emissions (of micro-particles) from silo storage, which are in an urban area where their pollution impacts more people."* (*Mercedes*, Staff of *Intendencia* of Soriano, November 20th, 2012)

In *Dolores*, recent environmental stresses were described 152 times by 90% of the respondents (N=21). In this community, the environmental stresses mentioned were water quality deterioration from use or transportation of agrochemicals (71% of the respondents), deterioration of air quality (66%), climate change (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events) (57%), soil erosion (33%), reduction of biodiversity (4%), lack of crop rotations (2%), while death of bee colonies due to increasing use of agro-chemicals, deforestation, and overexploitation of natural resources because of the increasing production of GMOs (soybean and corn) were mentioned by two respondents each. (See Table 2-2).

Nueva Helvecia (NH) (Colonia Suiza ('Swiss Colony'))

In *NH*, all respondents from this community mentioned *NH* was not significantly impacted by recent environmental stresses (especially those associated with intensification of agriculture) in the same way of other communities of this region. *NH* had the highest number of respondents (N=23) and environmental stresses were mentioned by 95% of them, but these respondents mentioned such stresses fewer times (96) than participants from the other three communities (28% less than *NP*, 35% less than *Cardona*, and 37% less than *Dolores*). In *NH*, the environmental stresses mentioned were climate change (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events) (70% of the respondents), water quality deterioration from use or transportation of agrochemicals (48%), deterioration of air quality (40%), reduction of biodiversity (22%), soil erosion (21%), water pollution created by lack of sewer system (1%), trash from agrochemical users (1%), while lack of crop rotations, general environmental problems created by land grabs, overexploitation of natural resources

because of the increasing production of GMOs (soybean and corn), and increasing pests (foxes, pigeons, and parrots) from monocropping of soybeans and eucalyptus were mentioned by just one respondent each. (See Table 2-2).

Respondents from *NH* highlighted that strengthened CCC from previous experiences with environmental stresses allowed this community to experience fewer environmental stresses than other communities, and made this community a "*place without problems*" (*Montevideo*, Staff of *Intendencia* of Colonia (#42), November 22nd, 2012). A local historian noted:

> *"We keep the memories of our ancestors, keeping in mind, the struggles they faced, how poor they were when they came (...) and how diversity of our production has helped us to mitigate multiple crises. The willingness to adapt, advance, and evolve is culturally-inherited from our ancestors."* (*NH*, Local Historian, January 25th, 2013)

Participants from this community highlighted that the impacts of recent environmental stresses created by both climate and agricultural changes have been less significant than in other communities in the same region. The experience of fewer recent environmental stresses was described as a result of the local culture, which included responses learned and worked from previous experiences with environmental stresses in the past. A local farmer commented:

> *"This community is characterized by caring for the environment when it is compared to other communities of Uruguay, but we could do better (...). It's a cultural tradition started by the first settlers who brought a culture of working and professions that made them more careful with the environment."* (*NH*, Local Farmer and Director of Local Cooperative, January 22nd, 2013)

In *NH*, anticipatory adaptive responses used over time to anticipate potential environmental stresses were described as part of the local culture. Local culture contemplated

learning aspects of how to deal with environmental crises from past environmental experiences and struggles local people faced since the first settlers arrived from Switzerland, Germany, and France in 1861. According to 68% of the interviewees from *NH*, local culture recalled environmental struggles the community experienced in the past, such as the drought of 1862 (the year after the first settlers arrived in 1861) and the local responses learned, described as part of community cultural heritage. A local farmer noted:

> *"When the first settlers came from Europe, there was a big drought, and streams and lakes dried up. Then, there have always been droughts and every fifty or eighty years they are repeated. In the drought of 2008-2009, the community was well prepared, because it did not stop producing and everything was well maintained like before."* (*NH*, Local Farmer, January 22nd, 2013)

According to respondents of *NH*, negative economic and environmental contexts like the national financial crisis of 2001-2002, and the drought and Uruguayan livestock foot-and-mouth disease in 2001-2002 did not negatively affect this community like other communities in the same region. According to respondents, this community was better prepared to deal with environmental stresses than other communities from this region of Uruguay. This was attributed to the culture of the community, which recalled environmental stresses and local responses from the past. According to a local historian,

> *"In 2001-2002 there was a big drought and (economic) crisis, but it was not catastrophic like in other communities because we had a large "cushioning" for that (...) Here, cooperatives are always thinking in advance (...) Immigrants here came with the knowhow for adapting beyond survival and keeping sustained development, knowhow that was maintained over time."* (*NH*, Local Historian, January 21st, 2013)

In *NH*, 68% of the respondents mentioned the culture of the community historically included anticipatory adaptive strategies and responses over time, learning from environmental problems the community faced previously. Interviewees emphasized that the community appreciated its culture rooted in previous experiences with environmental stresses, which consequently included the following responses: *diversification of agriculture*, "*a culture of reserves and savings*" (e.g., fodder used by dairy farmers and cheese producers, who are the majority for this community, and grain storage), and local economic diversification through *agro-tourism* and *heritage tourism*. Participants attributed the adoption of these three main community strategies as part of the cultural heritage, passed through generations, used to mitigate negative consequences from unexpected changes of the environment and/or the economy. One of the local farmers from this community stated:

> *"We are the fourth generation of my family working in the dairy and continuing the tradition. Our main goal for the family economy is to be auto-consumers. Everything we produce is for us (...) and we sell the rest (...). That tradition is from the time when the settlers came when there was nothing. So, they had to produce a little bit of everything in order to live (...), although that has been declining a bit and in some cases replaced by more and more specialization. In this community, diversity still exists among most of the farmers (...), although buying fodder and intensification lead farmers to rely more on outside resources."* (*NH*, Local Farmer, January 22nd, 2013)

Diversification of agriculture was emphasized as part of the local culture. The three main farmers' cooperatives promoted diversification, dairy and cheese products, horticulture, livestock, grains, honey production, and more recently GMO soybeans and corn. Diversification of the local agriculture maintained over time was highlighted by participants as one of the main cultural assets used to cope with unexpected environmental or economic changes like the droughts of 2008-2009. A local agronomist commented:

> *"The good thing here is the cooperatives and the diversification that exists among farmers, and that diversity has been facilitated and encouraged by the local coops. Diversity is the strength here and protects the small producers. Diversification has allowed that when crops went wrong in this community, the dairy allowed us to buy the cheapest diet, and when prices of milk went down, we diversified with crops (…) and that diversification has allowed people and producers to stay in the community."* (*NH*- Agronomist of Local Cooperative, January 18th, 2013)

Participants from this community highlighted how the community historically developed a local "*culture of reserves and savings,*" described as a 'learning outcome' of experiences from the past, as a key cultural asset of the community used to better deal with possible environmental and/or economic risks. The president of the local coop noted:

> *"In this community, people have a strong culture of reserves. This community is characterized by that; save money, pastures, etc. People here are conservative and cautious. We come from a culture of savings and reserves, which has been passed through generations because most of us come from immigrants who spent a life of hardship because they had to save because the weather was tough, and they had to save, preserve, and retain things for times of scarcity. Then fodder from pastures in this community is like the bread of every day. That is how life is here and people are prepared for risks because of that."* (*NH*- President of Local Cooperative, January 22nd, 2013)

Culture of reserves and savings was described as a cultural asset and learning outcome attributed to the cultural origins of the community influenced by the first settlers from Europe. Most of the respondents highlighted how the CCC, brought by immigrants from Switzerland and the Piedmont in northern Italy, was rooted in the struggles they faced during environmental crises, which lead to a '*culture of reserves and savings*.' Various participants stated:

> *"People from Switzerland came to this community fleeing from Europe in times of crises, and here they had to boil grass to make soup and eat. People had just a few things, and*

> *that is why we have a strong culture of reserves and savings in this community."* (*NH*, Owner of Local Radio, January 23rd, 2013)

> *"Here, there is a culture of what can be saved is saved. It is the culture of immigrants who thought (in their countries): "let's save because the snow and winter are coming or you can die in the war" (...) and they had to survive."* (*NH*, Director of Local Civic Organization, February 4th, 2013)

Respondents of *Nueva Helvecia* described how the community appreciated things learned from environmental crises of the past, while incorporating innovation and new ways to mitigate potential risks. One of the participants described how the community learned from the drought of 2008-2009:

> *"From the drought of 2008 and 2009, we learned a lot about how to produce without grass and we started producing grain-based rations for livestock (...), and we valued having varieties of products to accommodate one or the other."* (*NH*, Local Agronomist, January 21st, 2013)

Droughts and recent technological changes (and FDI) in agriculture encouraged acquisition of machines (e.g., grain mixers and hay balers) to produce fodder and rations, based on the surplus and/or waste of new crops available in the community, such as GMO soybeans and corn.

In addition to diversified agriculture and the local culture of reserves and savings, the community used *agro-tourism* and *heritage tourism* to diversify the local economy while maintaining local traditions. According to the interviewees from *NH*, touristic services were very important for the diversification of the local economy and part of the local culture. According to local respondents, tourism was introduced by immigrants from Switzerland in the late nineteenth century. Thus *NH* became one of the first communities of the country to promote tourism in rural

communities. This community had two historic hotels (*Hotel Suizo* and *Hotel Nirvana*), which not only were important for the community, but also for the tourism of this region and Uruguay. Recently, this community has promoted heritage tourism, based on its agricultural traditions, such as cheese production. Heritage tourism included the "*La Ruta del Queso*" ("The Route of the Cheese"), the annual festival of beers, and immigrant festivities like the Swiss national day on August 1. In 2012, the community celebrated its 150th anniversary to show its traditions based on immigrants (mostly from Switzerland), becoming an important touristic attraction for the community and the region.

The Influence of Culture on Social and Political Capitals

Nueva Palmira, Cardona, and Dolores

In *NP*, *Cardona*, and *Dolores*, participants did not mention as important the influence of CCC on how these communities were organized and made decisions in regard to the environment. Respondents from these three communities stated that the well-being of these communities was historically influenced by political and/or financial capital (among others) rather than CCC, and driven by individual public and private actors, in most cases from outside the community (see Table 2-3). In these three communities, the respondents did not mention culture's influence on community governance and responses to possible environmental stresses.

Nueva Helvecia (Colonia Suiza ('Swiss Colony'))

Respondents of *NH* presented the cultural aspects of the community influencing local and outside relationships and community responses to face possible environmental stresses over time. Local culture was linked to the way the community was organized by local actors, who prioritized locally owned farms, keeping agricultural diversity, and production of local food

rather than large economic investments from outside the community. A local historian comments:

> *"By producing local food and, since food is demanded worldwide, we face crises much better than other communities. In 2002, there was a big crisis and it was felt, but it was not catastrophic, because we had a large cushioning for that (...) In this community we work in industrialized cheese, but all the produce are genuine and local, while in communities like Rosario (nearby community) industrialization focused on making batteries and tanning fur pelts. So, they had to bring staff from Russia (...) and other places far away. Here, the production of food has been part of the culture and genuine (...) Milk production was here, and we local farmers needed to expand and develop it all together. So we created cooperatives and small family farms began to differentiate themselves."* (*NH*, Local Historian, January 21st, 2013)

In *NH*, respondents mentioned this community had strong civic organizations, which included three farmers' cooperatives (*Sofoval*, *Colaveco*, and *Sociedad de Fomento Rural de Colonia Suiza*) working with the community and commissions of multiple institutions, such as the police department, schools, the public hospital, the local library, the local theater, churches, and the fire department, among others. *Fuerzas Vivas* (FV), a non-profit organization created in 1977, coordinated the work completed by these civic organizations and commissions. The main goal of FV was to engage all local civic groups to mobilize resources for the community. A participant from the local newspaper stated:

> *"It is a very active community where people work hard and that is why there are like 30 or 40 development civic committees ('commissions') working for various local institutions and achieving what is needed (...) Incredible things and strong institutions are attained (...) Every commission works with its problems and under FV, which works for the communal needs."* (*NH*, Director of Local Newspaper, January 21st, 2013)

Participants from *NH* highlighted the role of *Movimiento de Nuevas Generaciones por la Unidad y el Progreso* ((MNGUP) New Generations Movement for Unity and Progress), founded in 1964, two years after the centenary of the community in 1962. The main goals of this civic organization were to promote the unity of the community, promote active participation among local youth, and to promote the local culture through the organization of annual events such as the annual festival of beers and the selection of the 'local queen.' MNGUP along with the three farmers' cooperatives had an important role in promoting active participation and cultural values among youth, in topics related to land ownership and family diversified farms. The president of the MNGUP stated:

> *"We try to tell them to be aware of what we have, because here there are plenty of civic organizations that have a sense of belonging, it is very important not to lose that, and we pass that from generation to generation along with that idea (about farming and institutions). We have to promote this good work and get people involved. Here you go to any elementary or high school and is in excellent conditions. Here, is instilled that need of looking after everything we have."* (*NH*, President of MNGUP, January 23rd, 2013)

Respondents from *NH* emphasized the importance of the multiple commissions in the community, which historically mobilized both internal and outside resources for the community in response to environmental and other problems. For example, in 2011 the local theater was owned privately and was going to close, but the community organized under the umbrella of FV and organized a commission (*"Comisión del Cine"*) to reopen it. Consequently, the local theater was reopened and operated by the community. Local strong relationships (*bonding social capital*) were described together with a strong local sense of democracy to collectively decide local matters (*governance*). For example, for the 150th anniversary of the community in 2012, local residents voted on the design of the community logo. For the 150th anniversary, the

community was united to organize multiple cultural events through the work of eight groups (committees) of local volunteers. Another example is the three main farmers' cooperatives organized periodic public assemblies to vote for officers and made important decisions regarding the future of the community, especially topics related to agroecosystems of the community. As a result of their community meetings, in 2012 these cooperatives and other actors from the community developed a sustainable development plan for their future (*Plan Estratégico de Desarrollo Rural del Este de Colonia*). Local participatory organizations making collective decisions (*social* and *political capital*) were attributed to the local culture as 'unique' in the country, and as one of the most important cultural assets of this community. Another local historian commented:

> *"The fact that the population always votes in local assemblies is unique in Uruguay, because they (immigrants) brought their parliamentary system from Switzerland, the Swiss law. They voted by acclamation in the assemblies."* (*NH*, Founder of Local Museum, January 22nd, 2013)

All of the participants of this community mentioned that the local culture of high participation and collective decision making capacity in the community was brought by the first immigrants from Switzerland. According to interviewees, strong local relationships historically allowed local actors to collectively organize and mobilize local resources to maintain both strong institutions and the overall well-being of the community. An informant from the local newspaper noted:

> *"The sense of democracy in this community was brought by our ancestors from Switzerland. The people who come here say they are in another world because everything is clean and cute, and that's because people work and worry. In this community, people*

> *finish work and instead of going to watch TV in the house, they go to work in the different commissions."* (*NH*, Director of Local Newspaper, January 21st, 2013)

According to respondents, strong social relationships and active participation in decision-making at the local level allowed *NH* be better prepared for possible environmental and economic risks. The three local farmers' cooperatives had a very important role in keeping *NH* organized and responsive to environmental problems through its three main strategies: (1) *diversification of agriculture*, (2) *culture of reserves and savings*, and (3) economic diversification using *agro-tourism* and *heritage tourism*. As one of the respondents stated:

> *"Our cultural strength is to be organized and the strong social ties that cushion any potential risks for the community."* (*NH*, Elected Official, January 22nd, 2013)

Some informants of *NH* highlighted that strong social ties and organizations within the community was a result of a learning process initiated many years ago. Respondents highlighted that the community was ethnically divided before its fiftieth anniversary in 1912. The solution to solve local conflicts was to strengthen CCC through stronger cultural ties with specific and selected cultural origins. A local historian noted:

> *"In this community there were many conflicts because there were people from multiple origins. This community and its current cultural ties are an enormous creation! In the fiftieth anniversary of the community, on April 25th 1912, there was a French person who wanted to hoist the French flag and he was not allowed by some people to do that because part of France's territory was under German powers at that time. That day, this person committed suicide. After that, the community started to search for a new day for its anniversary, to forget that tragic episode (...) and the community found August 1st which was the same day of the Swiss independence (...) and we found the Swiss flag to promote the community. Now, we celebrate more Swiss cultural events than those of our own country."* (*NH*, Local Historian, January 21st, 2013)

According to some participants, in the centenary of the community, in 1962, local people tried to strengthen the cultural origins of the community and the integration of new generations into cultural events. As one of the local participants described, strengthening social relationships within the community was a result of mobilized CCC:

> *"Fifty years ago people were more individualistic. There were institutions but they looked for their own individual goals. The community did not have unity that we have today. This unity started fifty years ago with the centenary of the community (in 1962). There were two groups led by local leaders who wanted to organize the celebration. That divided the community. The community had to vote who organized the celebration. We did like Switzerland, we vote everything. That was when the process of unity began."* (*NH*- Member of Local Civic Group of Cultural Traditions, January 18th, 2013)

CCC of the community strengthened the sense of belonging and relationships within the community, which promoted its cultural heritage based on diversity, reserves and savings, and agro-tourism and heritage tourism. Local actors recently realized the celebration of traditional and cultural events tied to immigrant origins could represent important touristic attractions and important economic strategies to continue the diversification of the local economy. Another participant stated:

> *"It is a very rich community culturally, because … we have to keep is our historical roots and this has led all to be closely involved in local issues (...) For example, August 1st is the feast of Swiss independence and each weekend in August we celebrate parties in different locations, both in the city and in rural areas. For Uruguay's independence, we just do only one celebration. And that has strengthened the sense of the unity of the community (...), for example, bringing people together in committees for the organization of festivities."* (*NH*- Local Elected Official, January 27th, 2013)

The way this community was collectively organized and made decisions about multiple local problems or challenges made this community stronger and better prepared to face possible environmental stresses. A local participant commented:

> *"There is a difference in this community from others in this region of the country. Here, there are many institutions and organizations, (...) because there is everything you can imagine. Here, the cooperatives of farmers were formed by immigrants a century ago with a partnership interest because they realized they could be stronger and more successful together."* (*NH*- President of Local Cooperative, January 21st, 2013)

CCC of *NH* not only enhanced strong social relationships within the community, but also facilitated better relationships with actors from outside. Social relationships with actors from outside the community were described as being influenced by CCC, which has reinforced its external reputation as a community of "*gringos*" or a Swiss Colony "*without problems*."

In *NH*, 60% of the informants highlighted the reputation of the community at regional and national levels on local organization and ability to mobilize resources to solve local problems, which was attributed to its immigrant cultural heritage, especially from Switzerland. As noted by one of the participants:

> *"This community is characterized as different from the others for the privileges we have (...) because it is known as a community of great strength (...). We move forward. From the time of arrival of settlers the people felt so disgraced, they faced droughts, famines, and plagues, but the spirit and strength of this community did prevail. We have a special feature when we go to negotiate with the departmental or national government: we have a reputation for carrying a bag of solutions, not complaints."* (*NH*- President of *Fuerzas Vivas*, January 22nd, 2013)

Interviewees revealed great pride in how the community has continued cultural traditions of collective work and solutions through the mobilization of local resources to solve multiple problems. The community's external reputation, based on its CCC, not only helped to keep local actors of the community together, but also facilitated access to resources from outside from governmental institutions at the departmental (*Intendencia*), national (ministries), and international (Swiss and German Governments) levels. For example, cultural ties between this community and the governments of Switzerland and Germany facilitated funding for local projects like the improvement of local public gardens and parks, and the improvement of the local fire station. Cultural aspects facilitated better relationships with actors from outside, who saw this community as organized and capable of developing solutions—by its own—for its challenges and problems. One elected official commented:

> *"Here, there is a culture of immigrant "gringos" and when we want something, we recognize that it not only requires the authorities, but also we provide information in the search for solutions, offering ideas or money (...) There are plenty of topics for which we have done this (...) They (departmental and national governmental institutions) always say the same thing—we bring the problems and also the solutions—and historically, this has made us able to influence in the political system at the national and departmental levels."* (*NH*, Elected Official, January 22nd, 2013)

NH's cultural roots with European immigrants, mostly from Switzerland, made this community gain national and international 'prestige' of being different than the other communities because of its capabilities to solve local problems and mitigate potential problems over time. As some of the interviewees highlighted, the community was composed of diverse ethnic and cultural groups, but identification with a particular immigrant culture facilitated better

relationships and resources from outside the community. As one of the interviewees highlighted, not all of the local residents were descendants of Swiss or German immigrants.

> *"In this community there were four flags, including the French one (...) But here, we had to nationalize, but there are still people in this scheme (of promoting specific traditions) that has given much results from the point of view of marketing the community."* (*NH*, Local Historian, January 21st, 2013)

In *NH*, local residents not only were descendants of Swiss immigrants. Local residents were decedents of immigrants from Austria, Germany, France, Italy, and native Uruguayans, among others. However, strong relationships and organizations linked to a preferred cultural background like the Swiss, were described as an strategy to keep local relationships strong and facilitate better relationships with key actors and resources from outside. One participant noted:

> *"In this community immigrants came in 1861 and 1862, mostly from Switzerland (...) but they came very poor and did not have anything to eat. They had cut all family ties and were upset with Switzerland. We, our generation, were who have been trying to find these links with our ancestors (...) because immigrants came from Switzerland really angry. In the centenary of the community (1962) there was a search for roots and integration, which was very good for the younger generations."* (*NH*- Member of Local Civic Group of Cultural Traditions, January 18th, 2013)

Since 1962, *NH* has reinforced its European cultural ties, mostly with German and Swiss traditions. These cultural and symbolic representations of the local culture not only were enhanced by the local needs of finding their origins and keeping local social relationships strong, but also to strengthen relationships with outside actors, perhaps reinforced by the cultural representation of the Nation-State rooted in the idea of Uruguay as a European country—especially as the "Switzerland of the Americas."

***Nueva Helvecia*: Challenges for Adaptation based on 'Appreciated' CCC**

The four communities were facing environmental stresses, mostly created by the expansion of intensification and new agriculture technologies such as GMO soybeans (Roundup Ready- GMO elaborated by Monsanto). *NP*, *Cardona*, and *Dolores* experienced earlier environmental consequences from changes in agriculture than *NH*. Participants from *NH* highlighted their community kept *agriculture diversity*, *reserves*, and *agro-tourism* as key adaptive responses to potential environmental and/or economic risks. Transmission of CCC to new generations was described by local respondents as an important challenge for the community.

> *"Here, many, many small diversified farms have disappeared. This is a problem because there is not support from the national government for diversified small farms and youth (…) and it is difficult to involve and retain youth because today there are too many (cultural) distractions. There are governmental programs for small farms but they are not connected with one another and are very specific, like the program to cultivate peaches, but then; where do we sell peaches? (…) We cannot compete"* (*NH*, President of MNGUP, January 23rd, 2013)

In *NH*, informants noted that influence of culture on adaptations to environmental stresses was changing, being influenced by the expansion and adoption of new technologies like GMO soybeans and Bt corn. New technologies associated with new varieties of GMO crops facilitated more availability of residual crops used to make fodder and kept the cultural traditions of *diversity* and *reserves and savings*. Local appreciation of community cultural assets, based on *diversity* and *savings and reserves,* facilitated the adoption of new GMO crops and a rapid expansion of new machines to create fodder and rations from soybeans, corn, sorghum, alfalfa, and artificial pastures, among others.

The incorporation of soybeans and the use of glyphosate into rotations of crops were seen as beneficial to continue agriculture diversity and '*clean the fields'* (with glyphosate) of weeds before planting other crops used for fodder, such as sorghum or alfalfa. Local appreciation of agricultural diversity facilitated the technological adoption of GMOs, which were significantly shaping the agroecosystems of the community with a long tradition in diversified agriculture, including other produce, such as wheat, dairy, mixed crop-livestock, honey, and citrus, among others. According to local respondents, recent droughts facilitated 'collective awareness' of some benefits that new agricultural technologies possessed. In *NH*, recent technological changes were observed later than in other communities (*"approximately since the drought of 2008-2009"*), but the community adopted these as a strategy to cope with droughts, while keeping diversity and reserves. As a local agronomist stated:

> *"Here, there have been always an important level of reserves, but what happened after that drought of 2008-2009 was that a major intensification of production started because the drought forced them to reduce costs and use more concentrates for livestock, and people realized the (financial) numbers were better than before."* (*NH*, Local Agronomist, January 21st, 2013)

The intersection between local perception of climate change and more availability of new technologies, such as GMO soybeans and corn, lead to technological intensification of the local agricultural production. In this community, most of the farmers not only started to use new technologies to have more food reserves for livestock—embedded in the local culture of savings and reserves—but also to diversify production by incorporating crops, like soybeans and corn, in lands that were previously used for natural pastures or marginal lands. As the head of the local coop commented:

> *"We make silos, storage, and reserves of all kinds, all kinds of crop residues to waste nothing used. Here, people have adapted to all types of changes and refused to leave the field. It is not like the rest of Uruguay. Here, people go looking to diversify."* (*NH*- President of Local Cooperative, January 22nd, 2013)

The expansion of new technologies, such as GMO soybeans and corn, and agricultural intensification not only were facilitated by the local culture, but also by the high prices of some commodities, like soybeans and milk, in national and international markets. The participant from the local coop continued:

> *"In the drought of 2008-2009 people discovered that concentrates and soybean meal, resulted in more milk. The drought taught us positive things, because using a couple of kilos of soybean meal in the diet of milk cows made them produce a lot of milk. Since then, the production of milk never decreased in this community. That was like reinventing the wheel, but today we are becoming like the rest of the world with corn and soybeans as the main animal feed base (...), but new technologies have facilitated more reserves of food for livestock."* (*NH*- President of Local Cooperative, January 22nd, 2013)

Availability of new technologies and the intensification of agriculture among local farmers were highlighted as a benefit for the community to continue its local culture on diversity and reserves, while at the same time showing higher productivity and efficiency. Some participants of *NH* described how diversity was still a key strategy to avoid possible environmental and economic crises. However, cultural appreciation of new technologies could lead to standardization and external dependence on seeds and other inputs. The community is facing a period of specialization and intensification, which could undermine its sustainability based on cultural assets mobilized previously. Intensification of agricultural production and related industries previously affected the natural environments of *NP*, *Cardona*, and *Dolores,*

and could also impact *NH*. Some respondents (31%) from *NH* highlighted concerns about how cultural changes in agriculture could significantly undermine historical adaptive strategies to deal with environmental stresses. A local farmer noted:

> *"We have intensified production and there is less wasted land now; we do not have confinements, yet, but there are fewer areas available for agriculture, and the few remaining areas are used for cattle. Now, there is more ration and high quality agriculture, and there are more available technologies. Now, we have a 'bonanza' that came from outside, but the subject will be when this 'boom' is over and see what remains."* (*NH*, Local Farmer and Director of Local Cooperative, January 22nd, 2013)

Availability and adoption of new technologies and recent intensification of agriculture not only were described as a way to maintain the local culture that includes diversified agriculture and reserves, but also as a concern for the overall sustainability of the community. Table 2-4 provides some of these concerns.

As a response to recent concerns to environmental stresses created by both anthropogenic and climate changes, multiple local actors from *NH*, including the three main farmers' cooperatives, the *Mesa de Desarrollo Rural Departamental*, *Fuerzas Vivas*, the *Municipio*, and local commissions and civic groups developed the local plan for sustainable development (previously mentioned). According to the actors involved in the creation of this plan, its outline included specific adaptive strategies to recent environmental stresses and the challenges they represented for the community. As one staff member commented:

> *"These plans could only be developed and promoted in this community, thanks to the local traditions in collective work and the strong tradition in strong governance and institutions embedded in their immigrant culture."* (*Colonia*, Field Notes from Interview with Staff of *Ministerio de Ganadería Agricultura y Pesca,* December 12th, 2012)

Some of these adaptive strategies included the construction of large irrigation systems (8,000 hectares), the promotion of renewable energy, and the creation of recycling programs. However, some respondents mentioned that recent intensification of agriculture and that these plans did not take the reality of small family farms into account, leading to standardization of production and more dependence on external resources. As a local ecologist and farmer noted:

> *"It has been impossible for us as small family producers to keep farming because we are now considered informal. Now, to participate in the governmental programs you have to have all the documents in order. The concept of family producers was erased in recent years by the national government and its programs. Some actors from this community say they are 'different' and 'transgressors', but they are used by the national government as a political tool of 'progress,' saying things such as: "We are developing an irrigation system." In reality, the irrigation system leads to the exclusion of small farmers who will not be able to afford irrigation because someone will charge me money to do that."* (*NH*, Local Farmer and Ecologist, February 2nd, 2013)

Conclusions

Most of the environmental stresses experienced by these four communities were consequences of the intensification of agriculture and related industries, such as grain elevators and usage of agrochemicals. Environmental stresses created by tillage until the late 1990s and FDI-facilitated the availability of new technologies based on no-till and expansion of soybean monocropping. These led to agriculture intensification and reduction of biodiversity, deforestation, and deterioration of air and water quality, among other environmental stresses.

To deeply explore how CCC influenced local responses and social and political capitals, the four communities were divided into two types. Respondents in *NH* highlighted the community experienced fewer environmental stresses, giving deeper descriptions of the local culture and its influence on anticipatory adaptive strategies (*diversification of agriculture*,

culture of reserves and savings, *agro-tourism and heritage tourism*) and social and political capitals.

In *NH*, adoption and expansion of GMO technologies, mostly based on soybeans, was later than in the other three communities. Respondents from *NH* described how the local culture, rooted in immigrant origins, facilitated *diversified agriculture*, *culture of reserves* and *savings*, and economic diversification through *agro-tourism* and *heritage tourism,* as historic adaptive strategies to avoid impacts from environmental and/or economic crises over time. CCC facilitated responses to avoid potential environmental and/or economic crises. These strategies made this community less vulnerable to crises than the other three from the same region. The use of grounded theory methodology facilitated the identification of these adaptive strategies described as part of CCC in *NH*, which could serve as indicators for future research and/or theories exploring community adaptations to environmental stresses. Results from *NH* show that collective mobilization of cultural capital to develop adaptation to environmental stresses is unique in each community. Therefore, success of adaptive actions rooted in the local culture/s of one community cannot be transferred to other communities. In *NH*, *social* (*bonding* and *bridging*) and *political capitals* were essential for the development of these adaptive responses—locally appreciated as part of the CCC.

In *NH*, CCC influenced social relationships, and the way local actors were organized by active involvement of youth, multiple institutions, and groups to make decisions. The community not only appreciates local responses to environmental stresses used in the past, but also social and political aspects of the community described as part of their CCC. Strong local organizations and the role of multiple local actors, such as the MNGUP and the main three farmers'

cooperatives, had important roles to promote local culture on diversified agriculture, reserves and savings, and economic diversification through agro-tourism and heritage tourism.

In *NH*, CCC was appreciated as a way to facilitate external relationships. Cultural ties especially with Switzerland not only strengthened bonding social capital through heritage tourism and traditional cultural events (e.g., the Swiss Independence Day on August 1), but also facilitated better relationships with actors from outside the community. Cultural ties with Switzerland were 'rediscovered' by recent generations, especially after the centenary of the community in 1962. Results from *NH* show that constructing collective identity based on a particular ethnic group (even if most of the community were not related to it) led to stronger social and political capitals, which was essential to keep the collective memory of environmental stresses experienced and adaptive actions that worked well in the past. Results from *NH* show that mobilized cultural capital can have an important role on making communities better prepared to deal with environmental stresses, making social relationships within and outside communities stronger. This community found that mobilized cultural capital could provide multiple benefits for the community. Mobilized cultural capital to improve outside relationships facilitated access to resources, such as funding for public infrastructure, and the organization of touristic cultural events. Outside relationships were reinforced by the community's external recognition or 'prestige' of being organized and mobilizing local resources, which, according to some local respondents, was 'embedded in the culture' brought by immigrants ("*gringos*"). Identification with Switzerland as the predominant origin of the local culture could be related to national cultural constructions of the Nation-State and the public discourses to describe cultural influences on social and political capitals of this country, but further research is needed in this regard.

In *NH*, the intersection of higher availability of new technologies and perception of climate change (because of recent droughts (2008-2009 and 2010)) facilitated cultural changes in agriculture through intensification and a rapid growth of GMO soybeans as a way to continue the local culture on diversity and reserves. The adoption of GMO soybeans and corn not only was motivated by the economic benefits obtained through intensification of the production and high values of commodities, but also by the community cultural capital rooted in appreciated responses from the past, such as diversification and reserves for livestock. In this sense, appreciation of CCC has a critical impact on community responses, which could either facilitate positive adaptations or undermine sustainability of the community. *NH* used an appreciative approach to its CCC, valuing what worked well in the past and amplifying solutions (e.g., diversification of agriculture and reserves and savings) that already existed (Hall and Hammond 1998; Cooperrider and Whitney 2005; Hammond 2013). However, recent adaptations (or mal-adaptations) intensifying agricultural production through the use of new technologies was facilitated by mobilizing cultural assets that worked in the past, but could undermine community sustainability and local assets, such as agricultural diversity. Appreciation of CCC considering climate changes and new technologies such as GMO soybeans as major tools to develop local adaptations is leading to standardization of local agricultural products and external dependence on agricultural inputs such large irrigation systems, which could make the community and its agroecosystems more vulnerable to future environmental stresses.

Figures and Tables

Figure 2-1: Selected Communities

Table 2-1: Number of Participants from Each Community

Types of Actors	Nueva Helvecia	Nueva Palmira	Cardona	Dolores
State	5	4	8	5
Market	8	6	4	7
Civic Society	10	10	7	9
TOTAL	23	20	19	21

Table 2-2: Percentage of Respondents that Mentioned each Environmental Stress

Environmental Stresses by Communities	Nueva Helvecia	Nueva Palmira	Cardona	Dolores
Climate change: drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events	70%	35%	84%	57%
Water quality deterioration from use or transportation of agrochemicals	48%	80%	68%	71%
Deterioration of air quality (mostly from emissions of grain elevators)	40%	95%	52%	66%
Soil erosion	21%	0.50%	21%	33%
Trash from agrochemical users	1%			
Increasing pests (foxes, pigeons, and parrots) from monocropping of soybean and eucalyptus	0.50%	0.50%		
Death of bee colonies due to increasing use of agro-chemicals			21%	1%
General environmental problems created by land grabs	0.50%	25%		
Lack of crop rotations	0.50%	0.50%	21%	2%
Overexploitation of natural resources because of the increasing production of GMOs (soybean and corn)	0.50%	0.50%	15%	1%
Reduction of biodiversity	22%	15%	42%	4%
Water pollution due to lack of sewer system	1%	10%		
Deforestation			15%	1%
Total Number of Times Mentioned	96	132	146	152
Percentage of Respondents that Mentioned Environmental Stresses	95% (N=23)	100% (N=20)	95% (N=19)	90% (N=21)

Table 2-3: Influence of Individual Private Actors on Communities

Nueva Palmira	*"We became dependent upon the industry of Volkswagen (...). Until today, there is no industry like that because it offered stable jobs and there was an industrial development that improved the community, but today the port is based on minerals and agriculture is very unstable and is destructive for us (...)"*(Local Elected Official, December 20th, 2012)
Cardona	*"This community was born and remained as a crossroad of important routes, and that is the potential it has because for the private actors, who use the community to cross in trucks with raw materials to the ports of Nueva Palmira and Fray Bentos."* (Director of Local Civic Organization, November 24th, 2012)
Dolores	*"We depend entirely on the private agricultural enterprises and when they do well we all do well like at this time."* (Organizer of the Local Recycling Program, December 13th, 2012)

Table 2-4. Concerns about CCC and the Future of the Community

"Here, the intensification of soybeans started five years ago and all that brought intensification (...) We are very clear that we do not know what will happen with fields leased by foreign people and the environment." (*NH*, Local Farmer, January 22nd, 2013)
"The negative effects of the expansion of soybeans on the environment are happening in other communities of the country. But here, there is no great evidence, yet (...) Today, it is not a problem, but it is a threat to the natural resources of the community. Recent years have favored local producers who have adopted new technologies and improved agriculture, prices have also improved (...) There is more presence of crop production and large companies that lease fields not exploited before." (*NH*, Local Farmer and Director of Local Cooperative, January 22nd, 2013)
"Recently, everything has been intensified because now everyone is trying to produce in areas that were not used for agriculture and soybeans, and local farmers have the same number of cattle in smaller areas. They plant, have silos and reserves of all kinds are made. All kinds of waste crops have reduced waste to nothing." (*NH*- President of Local Cooperative, January 22nd, 2013)

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CHAPTER 3. ENVIRONMENTAL STRESSES AND COMMUNITY MOBILIZATION FOR ADAPTATION: TWO CASE STUDIES FROM SOUTHWESTERN URUGUAY

Manuscript prepared for submission to the *Community Development Society Journal*

Abstract

The natural environment of rural communities of southwestern Uruguay has recently experienced significant transformations. Stresses on community natural environments and other community assets created by anthropogenic and natural changes can influence social mobilization at the local level. Based on semi-structured interviews with key informants and participant observation at local public meetings during 2012 and 2013 in two communities of southwestern Uruguay, this article explores community level social mobilization to adapt to environmental stresses. Collective mobilization for adaptation occurred when multiple stresses undermined community well-being. Social and political capitals facilitated local mobilization and access to resources to adapt to environmental stresses. Recommendations center on strengthening political capital as a key component for community studies and development projects involving multi-level relationships for adaptation to environmental stresses.

Key Words: *Environmental stresses, collective agency, social and political capitals, adaptations.*

Introduction and Literature Review

Rural Communities and Environmental Stresses in Southwestern Uruguay

Recent shifts in Uruguay have altered rural communities[20] and their agroecosystems, including communities in the southwestern departments of Soriano and Colonia, the most agriculturally productive departments in Uruguay with a long tradition of diverse types of agriculture. Driven by Foreign Direct Investment (FDI) in land for commodity crops such as soybeans and pulp wood, changes in agriculture has significantly impacted *Dolores* and *Nueva Palmira (NP)*, two rural communities from Soriano and Colonia, respectively. Since 2002, these two communities have faced significant environmental stresses[21], including pollution of rivers and creeks due to the use of agrochemicals, air quality deterioration due to the emissions of gasses and micro-particles, soil erosion, soil pollution by solid waste, reduction of biodiversity, and other environmental problems created by urban sprawl (Intendencia de Soriano 2010; Intendencia de Colonia 2012a, 2012b). These two southwestern Uruguay communities are approximately 45 kilometers from each other (see Figure 3-1). Located in a key geographical area due to their proximity to fluvial transportation and fertile agricultural lands, they contribute substantially to the value chains of agricultural commodities.

Dolores is located in the Department of Soriano. This community has 17,174 habitants (Instituto Nacional de Estadística (INE) 2011) and is in the center of the one of the most important areas of the country for grain, oilseeds, and eucalyptus production. *Dolores* has a tradition of grain and oil seed production, particularly wheat, barley, sorghum, sunflower, and more recently soybeans. This community is called "*el granero del país*" ("the granary of the

[20] A rural community is defined in this study as a social system in a specific geographical location, where local people meet their needs through organizations and institutions (Flora and Flora 2013). Rural communities depend upon their agroecosystems for goods and services, such as commercial crops, timber, agro-tourism, and minerals as well as water and air quality, managed by multiple actors who locally interact and share concerns, identities, economies, and institutions.

[21] Stresses are significant disruptions of communities with negative consequences or impacts at the local level.

country") because of its long history in agriculture. Like other communities in this region, *Dolores* has faced many changes due to the growth of FDI in agriculture. Multinational corporations provide the bulk of recent FDI. Local agricultural businesses (*Barraca Erro*, *Cereoil, Cadol*, *Guigou*, etc.) now associated with international companies (such as *Crop Uruguay* (*Cargill*), *Agronegocios del Plata*[22] (*ADP*), and *Don Mario*[23]) are among the most important exporters of the country with an important economic role in this community and the national agriculture.

NP has 9,857 habitants (INE 2011). *NP* has historically depended on production of the same grains as *Dolores*. Agricultural businesses located in *Dolores* use the port of *NP* to ship their goods. The strategic location of these two communities and their key economic roles and ties make them very important for the agricultural production of the country. The port of *NP* is the second largest port in Uruguay (after Montevideo). It is the main Uruguayan port for the export of agricultural commodities, such as soybeans, wheat, sunflower, maize, and pulp wood. It is a transfer point for minerals and agricultural commodities from northern Uruguay, Paraguay, Bolivia, and Brazil, which arrive in barges via the Uruguay, Paraguay, and Parana Rivers and are transferred there to transoceanic ships. These raw materials are shipped to Asia, Europe, North America, and the Middle East. Since the beginning of the twenty-first century, port operations have constantly expanded in response to the increased production of soybeans, pulp wood and minerals in Uruguay and nearby countries. For example, during January-July 2013, port operations (tons mobilized) were 43% higher than in the same period of 2012 (*Presidencia* 2013). Agrochemicals (mostly fertilizers) are transferred in this port from transoceanic ships and shipped via the Paraguay and Parana Rivers to Paraguay, Bolivia, and Brazil. The most

[22] Argentinean Company.
[23] Argentinean Company.

important businesses are related to agriculture and port operations (such as *Navios*, *Ontur*, *Botnia,* and *Cargil*[24]) with important economic ties with *Dolores*, the origin of most of the agriculture production shipped from this community. Attracted by the increasing production of commodities in this region during the last decade, regional and multinational companies installed several industrial facilities, including storage silos, grain processors, agricultural and port services in *NP* (Intendencia de Colonia 2012a, 2012b).

The impacts of local, regional, national, and global transformations on these rural communities depend on their levels of exposure and sensitivity. Exposure refers to the magnitude of stress to which a community is subjected. Sensitivity is the degree to which a community responds to environmental stress with harmful effects (Intergovernmental Panel on Climate Change (IPCC) 2001). *NP* has become more exposed than *Dolores* to impacts created by agriculture and mineral production in the region. This study explores how impacts of anthropogenic and/or natural changes on these two communities influenced their responses through collective agency.

Social Capital and Collective Agency for Adaptation to Environmental Stresses

Community collective agency is the capacity to make change at local level through the actions of a group (Flora and Flora 2013). Social capital is comprised of networks of more or less institutionalized relationships of mutual acquaintance and recognition as a member in a group that provides to each member "the collectively-owned capital" (Bourdieu 1986: 249). Social capital and its dynamic social ties can provide access to resources (Putnam 1993; Portes 1998; Putnam 2000; Putnam and Feldstein 2003) used for community adaptation. Community adaptation is the mobilization (or use) of resources (community capitals) to reduce and/or adjust

[24] All owned and/or managed by foreign shareholders.

to stresses and associated risks (Adger 2000; Wilson 2012). Mobilized resources for adaptation can be either to anticipate or to cope with environmental stresses.

Literature of the commons (Armitage 2008), natural resource co-management and governance (Folke et al. 2005), natural disasters (Aldrich 2010), resilience and climate change adaptation (Adger 2003; Tompkins and Adger 2004; Ensor and Berger 2009; Bendini et al. 2010; Ashwill, Flora, and Flora 2011a, 2011b; Bardsley and Rogers 2011; World Bank 2013) highlights the importance of mobilizing collective agency and social capital (multi-level relations) in dealing with environmental stresses. This large body of literature from social and environmental sciences shows that strong relationships within and outside communities (*bonding* and *bridging social capital*) can facilitate access to resources to reduce community vulnerability to environmental stresses and promote adaptation and sustainable development at local level (Adger 2003; Tompkins and Adger 2004; Ensor and Berger 2009; Bendini et al. 2010; Ashwill et al. 2011a; 2011b; Bardsley and Rogers 2011; World Bank 2013). Social mobilization can promote structural changes necessary for the improvements of communities. When mobilized, social capital can promote active and collective participation at the local level (Brecher, Costello and Smith 2009) and better access to resources such as scientific knowledge (human capital) used to mitigate environmental stresses. It is important to explore whether and why social mobilization exists at the community level, especially in communities that are at risk (Wright and Boudet 2012), under environmental stresses.

Climate change and resilience literature highlight that a community's perception of its own vulnerability and associated changes, such as environmental stresses, motivates mobilization of social capital and collective agency able to facilitate access to resources for adaptation at the local level (Adger 2003; Tompkins and Adger 2004; Ensor and Berger 2009).

When community structures experience significant stresses, the community enters into cycles of social reorganization, which can include collective mobilization to develop adaptation to environmental and other stresses. Walker and Salt (2006) describe four variants for adaptive cycles, rapid growth and conservation of growth ('fore loop'), and release and reorganization ('back loop') when social mobilization becomes important. Community 'fore loop' (also called 'forward' or 'front loop') is characterized by accumulation of capitals and conservation of models in place to maintain ('system') community well-being (Walker and Salt 2006). 'Back loop' is after significant stresses have been experienced, characterized by great potential for the initiation of either destructive or creative change in the community, when collective mobilization can have biggest impacts (Walker and Salt 2006). Community experiences of negative environmental changes (stresses), such as environmental crises or natural disasters, can either discourage a community from taking any collective action or facilitate mobilization of social capital for adaptation or restoration (Aldrich 2010; Stofferahn 2012; World Bank 2013). Negative consequences from environmental and other changes on community structures (composed by community capitals) can influence the mobilization of collective agency and social capital for adaptation at the local level.

Political Capital and Collective Agency

Political capital is the ability of communities to participate in decision making and make change at the local level. Wright and Boudet (2012) highlight the importance of political capital within the social movement literature as one of the main aspects to consider in studying collective social mobilization at local level. Studies are needed on community political context and capacity in local mobilization and responses to 'risks' (Wright and Boudet 2012; World

Bank 2013; Young 2013). Political capital influences social relationships within and outside communities. Political contexts of communities, especially their relationships with outside actors who regulate development and provide resources, can influence social mobilization at the local level.

In Uruguay, important regional and national government institutions with significant influence on the natural environment of communities are *Intendencias,*[25] *Dirección Nacional de Medio Ambiente* (DINAMA), *Ministerio de Ganadería Agricultura y Pesca* (MGAP), and *Ministerio de Vivienda Ordenamiento Territorial y Medio Ambiente* (MVOTMA), among others. Collective agency and local mobilization may not succeed in implementing adaptations when these actors from outside communities are not locally involved and/or do not provide enough resources (e.g., scientific knowledge (human capital)) to local initiatives. Identifying stresses and why local people collectively mobilize is not enough, because obstacles to adaptations must also be identified, prioritized, and addressed through future private and public actions (World Bank 2013).

This study explores recent changes in *Dolores* and *NP*. These two in-depth case studies from southwestern Uruguay deeply explore changes in communities and their influence on social mobilization for adaptation, especially to environmental stresses. This study explores why one community organized collective actions (*NP*), while the other community did not organize collectively (*Dolores*). This study also explores the impact of political capital on social mobilization and relationships with outside government institutions to access to resources for adaptation to environmental stresses.

[25] Departmental Government

Research Methods

In 2011 and 2012, I collected data about environmental stresses and community responses from newspapers, websites, Uruguayan scholars, and staff from the two *Intendencias* that are the administrative home of the two communities. Through interviews with those local informants, I selected *Dolores* and *NP,* as they faced similar environmental stresses but had responded differently at the local level. From preliminary and informal conversations with staff of *Intendencias*, I knew that one of the communities had mobilized collective agency (*NP*) while the other community (*Dolores*) did not organize collectively to respond to the environmental stresses. The similarity of their environmental problems and different degree of mobilization of collective agency between these communities suggested that much could be learned by comparing their experiences. Why did one community collectively mobilize as a response to environmental stresses while the other did not? I also considered the logistics and resources available for conducting this study, and my familiarity with these communities and this region.

During my field work from November of 2012 to February of 2013, staff of *Intendencias* provided contact information of local key actors, and then I used purposive snowball sampling to identify other major actors involved in local decisions at the community level. The participants I initially selected provided other contacts for key actors involved in these two communities. To include diverse viewpoints of community matters, I included market, state, and civic actors with diverse roles at local level. In total, 43 participants were interviewed; 23 in *Dolores*, and 20 in *NP* (see Table 3-1).

Using two semi-structured questionnaires[26] (see Appendixes D and E), I collected data to provide information about stresses these communities faced from increasing changes in

[26] One questionnaire for *Intendencia* staff and another (similar) questionnaire for other actors from the market, state, and civil society involved in the communities.

agriculture. For this, I asked whether communities faced overexploitation of natural resources, pollution at the community or its agroecosystems, human-induced desertification and/or erosion of soils, biodiversity depletion or reduction, technological changes that affect the community and/or its agroecosystems, changes in public infrastructure (recreational spaces, routes, streets, public buildings, etc.), changes in the population (migration, demographics, etc.), among others that respondents highlighted. I also asked whether communities faced stresses from natural phenomena like extreme cold weather events, hurricanes, tornadoes or strong winds, droughts, floods, drastic changes in temperatures and seasonality, and/or others.

I explored collective agency by looking at which actors were involved and their roles at the community, and whether they mobilized or organized collectively to develop adaptations for the stresses described. I utilized participant observation to gather similar data at one public meeting of the *Municipio* of *Dolore*s and one public meeting of the *Mesa de Desarrollo Rural* ("Round Table for Rural Development") of Soriano.[27] Secondary data included research materials, reports and presentations by non-governmental organizations (NGOs) and new laws and regulations from the *Ministerio de Ganadería, Agricultura, y Pesca* (MGAP) (about feedlots, agrochemicals' applications, and soil and land use, among others) and *Presidencia de la República*.

I used the Community Capitals Framework (CCF) to analyze the stresses felt and resources mobilized (used) for adaptation at the community level. This framework facilitates the exploration and identification of changes in all the community capitals and their influence on collective mobilization for adaptation to environmental stresses created by anthropogenic and/or natural phenomena (Ashwill et al. 2011a; 2011b). The CCF includes seven types of capital: natural, cultural, human, social, political, financial, and built (Flora and Flora 2013), and all of

[27] *Dolores* is under its jurisdiction. This meeting was organized in *Mercedes*.

them constitute the structure of communities. Community capitals can either enhance or detract from one another, and resources can be transformed from one form of capital to another (Flora and Flora 2013). The CCF allows for categorizing changes described as positive or negative by interviewees, exploring communities' social mobilization, and the role of political capital for getting better resources for adaptation (such as human and/or financial capitals) at the local level. Counting the number of times informants described changes (as negative or positive) strengthened and verified the qualitative data obtained from interviews. By examining all of the community capitals, we can understand how different changes have positively or negatively impacted the communities and their relationship with collective agency and adaptation. In addition, we can explore the role of specific capitals that could facilitate better access to resources for adaptations to environmental stresses in these two communities. Axial coding analysis of the interviews linked described changes, mobilized resources for adaptation, and the role of political capital on external relationships of communities (*bridging social capital*) as a mediator between local mobilization of resources and access to outside resources such as human capital.

Findings and Discussion

Collective Agency in *NP* and *Dolores*

In *Dolores*, past collective agency included the work done by several civic groups where residents worked together to organize and improve local events or institutions such as local schools, hospitals, the public swimming pool, and "*Fiesta de la Primavera*" (Spring Festival). In addition to these specific groups at the local level, key individual actors from the market and the state linked the community to diverse outside resources. According to informants, during recent

years (2003-2013) this community did not mobilize collectively to develop responses to environmental stresses such as water quality deterioration of the *San Salvador River*.

In *NP*, local residents mobilized collectively and created a local group called "*Grupo de Trabajo*" (GT (Work Group)), which addressed environmental stresses and other local problems. Its work started in December 2011, when community members protested against negative environmental consequences of agriculture and port projects, demanding collaboration from the departmental and national governments for many of the problems that the community faced. Since 2011, this group of local actors from the market, civil society, and the local government (*Municipio* (City Council)), organized massive protests[28] and regular assemblies, and mobilized local resources to mitigate local problems. Some of its actions included: search and data collection at local institutions about health problems from poor air and water quality, the construction of gates[29] to avoid heavy transportation and air pollution, the installation of two air filters (one in the *Municipio* and one in *Prefectura* (Navy Base)) to control air quality, and the creation of a sustainable development plan for the community.

Changes in Natural Capital and Environmental Stresses

Natural capital includes soil quality, air quality, water quantity and quality, natural and cultivated biodiversity, and landscapes. Recent changes have strongly influenced the environmental conditions of both of the communities. Various aspects of natural capital were described in negative terms (being in poor condition) by interviewees in both communities, as a consequence of recent changes mostly caused by recent investments in agriculture but also by

[28] See the protests on the news: http://www.elpais.com.uy/informacion/vecinos-cortaron-acceso-puerto-nueva.html; http://www.coloniatotal.com.uy/nueva-palmira/7959-cansados-del-polvo-y-del-ruido-los-vecinos-cortaron-el-paso-a-los-camiones

[29] Gates at the urban borders of the community were built with the collaboration of multiple actors to stop heavy transportation used for eucalyptus logs, grains, oilseeds, and machineries.

climate change. In both communities, environmental changes were mostly described as negative features (see Table 3-2). In *Dolores*, 61% of the respondents described (24 times) agricultural practices of minimum tillage and the local recycle program as positive changes. In *NP*, minimum tillage was mentioned - but only once - as a positive environmental change in recent years.

In both communities, key actors highlighted environmental stresses as the most negative changes that these communities faced in recent years. In *Dolores*, environmental stresses were mentioned 45 more times than in *NP* (177 and 132 times, respectively). The average number of times environmental stresses were described as negative per participant was eight in *Dolores* and seven in *NP*. In *Dolores*, 91% of the participants described changes of the environment as negative, while in *NP* all respondents described them in negative terms.

Respondents in both of the communities described similar negative impacts of agriculture on community agroecosystems: human-induced erosion of soils due to increased monocropping, lack of rotations, destruction of natural prairies, the accompanying reduction of biodiversity, and overexploitation of natural resources such as native flora and fauna.

> *"One of the problems we are seeing here is that the poisons used in agriculture are significantly hurting nature, especially cutting natural cycles. You see fewer and fewer birds, fewer native animals in the field, and fish have been killed with poisons that go into streams..."* (*Dolores* - Local Historian, December 5th, 2012)

In both of the communities, actors mentioned deterioration of water quality and pollution created by functional problems (*Dolores*) or lack (*NP*) of the sewer system (built capital) and the excessive use of agrochemicals and fertilizers, creating blooms of algae at the rivers and creeks. Excessive nutrient loads have been found in ground water used for drinking or irrigation in both urban and rural areas of the two communities.

> *"Today, you do not see a stream or watercourse without algae and tremendous pollution."* (*Dolores* - Local Ecologist, December 6th 2012)

In both communities, actors mentioned increased air pollution from elevators used to store grains and oilseeds. Grain and oilseed storage emits micro-particles that created health problems, particularly respiratory ones. In *Dolores*, since 2010 local private actors, the *Intendencia*, and *Dirección Nacional de Medio Ambiente* (DINAMA), worked on the installation of some filters that could mitigate part of this environmental stress. In *NP*, air quality was mentioned by all interviewees as a significant and serious problem not only created by grain and oilseed storage but also by port operations, which often involve minerals and chemicals.

> *"Here there are days that we wake up and it seems that there is fog and dust flying from the boats when they carry raw materials (...) We have micro-particulate problems in the air and multiple types of environmental pollution ."* (*NP* - Local Civic Actor, December 22nd, 2012)

In both communities, key informants described increasing climate changes (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events) and their negative consequences for the communities. In both of the communities respondents mentioned how land use changes removed native pastures and increasingly heavy rainfalls caused flooding in rivers and creeks. In *NP*, respondents mentioned how warmer weather, combined with new agricultural enterprises and increased port operations, facilitated the invasion of new exotic species of fauna (ants and mussels) that have become pests. Although both communities experienced significant and similar environmental stresses, there were significant differences in how the rest of the community capitals (making up community structures)

changed. The differences in collective agency as a response to environmental stresses in the two communities were not influenced by the similar environmental stresses they both faced, but by changes in all of their community capitals.

Other Changes in Community Capitals

In *Dolores*, negative community capitals changes were described more often than positive ones only in describing environmental stresses. Changes in other community capitals were described as positive rather than negative for the community (see Tables 3-3 and 3-4). Seventy percent of the respondents described changes in built capital both as positive and negative. Besides the significant environmental stresses that the community faced, other changes positively impacted the community capitals. Positive changes (mostly attributed to recent growth of agriculture) were described by the 96% of respondents for financial, [30] 87% for human, 74% for political, 70% for built, 65% for social, and 57 % for cultural capitals. Positive changes per participant were described an average of four times for financial capital, three times for human capital, two times for built and political capitals, one time for social capital, and less than one time (0.78) for cultural capital. Most of the recent changes in community capitals were accompanied by positive descriptions rather than by negative ones.

All of the interviewees from *NP* highlighted negative changes at the local level (see Tables 3-5 and 3-6). Similar to *Dolores*, the most significant changes were associated with natural capital but negative descriptions were attributed to changes in the other community capitals. Changes (mostly attributed to recent development of agriculture and port operations) were described as negative by all the respondents for built (100%),[31] 85% for human, 85% for

[30] Percentage of respondents that mentioned changes of the capital (as positive) one or more times (N=23).
[31] Percentage of respondents that mentioned changes of the capital (as negative) one or more times (N=20).

social, 80% for political, 75% for financial, and 35% for cultural capitals. Negative changes per participant were described an average of seven times for built capital, six times for human capital, five times for political capital, two and a half times for financial capital, two times for social capital, and less than one (0.50) time for cultural capital.

Changes in Built Capital

Built capital is composed of community infrastructure, including streets, sewers, public spaces and buildings, as well as the technology available in the community. In the two communities, most of this technology is related to agriculture and transportation.

In *Dolores*, changes in built capital were equally mentioned as both positive and negative for the community. Interviewees perceived technological changes as positive for the local production of grains and oilseeds (particularly soybeans) and the local economy. In this community, positive changes in built capital included: new technologies in agriculture (planters, harvesters, fumigators (called '*mosquitos'*), GMOs, etc.), agrochemicals, growth of the construction industry, and better order of the urban sprawl.

> *"We have grown by expanding new technologies and other material things (...) people have built more, more and better constructions, the boom is impressive because it has been more significant in recent years. The number of vehicles and machines that have been sold at the community is something fabulous, and also I think that is because all those people and employees are making more money from agriculture."* (*Dolores* - Local Historian, December 5th, 2012)

In *Dolores*, positive changes were described 48 times, an average of two times per participant. In *NP* similar changes in new agricultural technologies were described as positive only 19 times, one time per participant. In *NP*, all (100%) the interviewees described one or

more times negative changes in built capital. In this community, changes in built capital were described as negative 123 more times than positive.

In both communities, recent technological changes created significant land use changes. Local people from both of the communities mentioned that agriculture became less diverse, with more monocropping of soybeans. These new technological changes were accompanied by land use and landownership changes, increasing the size of farms.

> *"Here, foreign people come with US$ 500 dollars per year per hectare to lease and producers think about that (...) that has led to large areas in the hands of fewer people, many hectares in the hands of few people."*(*Dolores* - Local Elected Official, November 29th, 2012)

In Uruguay, the average price of land significantly increased since 2002, and millions of hectares of farm land changed hands mostly to foreign farmers and companies (Piñeiro 2014).[32] Changes in landownership and speculation (accompanied by other national and international factors) increased prices negatively affecting access to land and housing for local people.

> *"Is a real estate boom of rentals and land tenure that people who earn 12 or 15 thousand pesos cannot find homes to rent (...) this was in the last four or five years although it has become worse in recent years."* (*NP* - Local Elected Official, December 20th, 2012)

In *NP*, this problem was more complex, because some people established their homes in an informal settlement on privately held land without payment or agreement by the owners.

According to key informants in both communities, technological changes in agricultural machinery and heavy transportation have created significant deterioration in the public

[32] See also: *Farmlandgrab*.2011. "Uruguay's Farmland Price Jumped Eight Times From 2002 to 2010." (http://farmlandgrab.org/post/view/18368#sthash.l2Dsyu9Z.dpuf)

infrastructure (highways and local streets). In *NP*, these negative changes have been worse due to the increasing traffic at the port.

> *"In infrastructure we are much worse. During harvest (of soybeans) we have about a hundred trucks per hour and that creates absolute chaos not only traffic but completely breaks down the entire infrastructure."* (*NP* - Local Civic Actor-Member of GT, December 20th, 2012)

In *NP*, respondents highlighted negative consequences of recent development on the disorderly growth of the urban area due to expansion of silos and agricultural processing plants, port operations and transportation. Disorderly urban expansion or urban sprawl was more visible in *NP*, which did not have a local plan for development until 2012.

> *"The port boom caused problems because of territorial expansion by the desire of companies to advance on the city, and they (agriculture and port companies) use materials that produce toxic substances that create pollution with significant impact in the city."* (*NP* - Local Elected Official, December 20th, 2012)

Respondents were also concerned about the increasing use of chemicals for agricultural and mineral operations at the port and the lack of appropriate infrastructure to respond to possible environmental catastrophes. Developmental enterprises created significant changes in built capital in both communities and their agroecosystems, but the impacts were described more negatively in *NP*, where respondents spoke of serious and critical stresses in both urban and rural areas.

Changes in Human Capital

Human capital is the community's skills, abilities, and knowledge, including both formal and informal education (Flora and Flora 2013). It is also reflected in the characteristics of jobs and the health of the community and its habitants.

In *Dolores*, changes in human capital related to knowledge and labor were mostly described as positive (65 times positive, 34 times negative). They were described two more times as positive than negative (an average of three and one and a half, respectively) per participant. These changes included more high qualified workers and professionals in agricultural corporations and industries, less unemployment, better training of workers, more education about the environment, better knowledge about communication technologies, and better knowledge of new agricultural technologies. Most (87%) of respondents mentioned these changes as positive, while 61% mentioned them as negative. Positive changes described for human capital were attributed to benefits from recent growth of agriculture and new technologies.

> *"With the boom of agriculture and soybeans, Dolores grew up with professionals and veterinarians, agronomists, and with accountants, whom the numbers have grown because young people need to get ready and now there are local needs for that."*
> (*Dolores* - Local Historian, December 5th, 2012)

In both communities, interviewees mentioned jobs available and decreasing local unemployment rate. Negative changes in human capital related to health problems were similar to those described in *NP* as consequences of environmental stresses including water and air quality deterioration.

In *NP*, changes in human capital were described primarily negatively (112 negative, 22 positive). Changes in human capital were negatively described an average of six more times than

positive per participant. Most (85%) respondents described changes in human capital as negative, and 45% mentioned them as positive.

> *"Statistics at the local hospital showed us that bronchospasm problems and allergy problems are five times higher than some years ago. That has happened because of the microparticle in the air (...) now, almost everyone is allergic here in this community. It quintupled sales of inhalers and bronchodilators (...) There are skin problems, health problems of all kinds due to environmental pollution."* (*NP* - Local Civic Actor - Member of GT, December 20th, 2012)

Increasing health problems such as cancer, respiratory problems, and allergies, mostly attributed to consequences of recent industrial investments in agriculture at local level, were described in both communities. However, these problems were described more often in *NP*, where negative aspects of human capital were mentioned 78 more times than in *Dolores*. The director of the local hospital stated:

> *"There is a dramatic increase in bronchodilators consumption at the peak of harvests, especially corn and soybeans, and even worse in downloading minerals or fertilizers at the port. Also we have seen increasing allergic skin conditions linked to the use of pesticides with little control and technical suitability in their application. In the past year there were twelve workers affected by aluminum phosphide and one was severe and perhaps with final and permanent health consequences.*" (Report Submitted to the National Senate by the Director of the Local Hospital, April 2012)

Although lower unemployment was highlighted in both communities, in *NP* new jobs were described as seasonal (depending on farming seasons and port services) and sometimes under unhealthy environmental conditions because of the increasing use of agro-chemicals. In this community, people also highlighted negative impacts of some new labor contracts, which

included the majority of the family members, constrained ("through coercion") unions of workers from possible protests at the local level, and affected local social relationships. In addition, in *NP*, 78% of the respondents highlighted lack of scientific knowledge about local environmental problems.

In both communities, key respondents perceived that there has been a significant emigration of people from rural to urban areas and consequently fewer farmers and rural workers. The number of rural people and farms significantly decreased nationally during the last 60 years, but this trend became more important in the last 10 years (Piñeiro 2014).

Changes in Financial Capital

Financial capital includes a variety of investments to create additional monetary value and develop the local economy. This includes financial assets not only of market actors but also civil society and local government such as *Municipios*. In *Dolores* and *NP*, key informants described significant growth of foreign direct investment in land and agricultural industries for processing commodities, facilitated by multinational corporations and the expansion of local agricultural companies.

In *Dolores*, key informants described how agricultural businesses have grown during the last decade and how the overall economy of the community has improved. Changes in financial capital were much more commonly described as positive (96% of interviewees) than negative (22%). They were mentioned an average of four times as positive and less than one time (0.47) as negative per participant. Positive changes in financial capital included: more jobs and lower unemployment, better access to financial goods and services, FDI of multinational corporations in local agricultural industries, expansion of local agricultural companies, and economic benefits

from recent development in agriculture, local economic growth, and better wages in the agricultural sector.

In *NP*, 75% of informants described negative changes in financial capital one or more times. Financial capital was described an average of two and a half times as negative and one time as positive per participant. Some of the same changes that were described as positive in *Dolores*, such as the creation of more jobs, FDI of multinational corporations and industrial projects based on raw materials (minerals and grains), were described as negative. Some agricultural companies in *Dolores* were also working in this community to ship their grains and oilseeds. However, local informants argued that these projects did not provide economic benefits to the community.

> *"At the end of the month ordinary people receiving a salary do not have a way to survive in a place where projects do not provide a community multiplier effect. Here, the port and big multinational agribusinesses have work for everyone but without good wages. They are poor quality jobs because the employees work in highly contaminated sites."* (*NP* - Local Elected Official, December 20th, 2012)

Although the increasing production of grains, pulp wood, soybeans, and minerals have improved the overall economy of this region (including *Dolores*), local informants from *NP* stated that it has negatively affected the community because of the characteristics of the port operations for grains, soybeans, and minerals.

Changes in Cultural Capital

Cultural capital consists of values and worldviews (Flora and Flora 2013). Cultural capital is the way people regard the world surrounding them, with material and non-material

implications, including how people perceive development and its cultural consequences at local level.

In *Dolores*, changes in cultural capitals were mentioned as positive by 57%, compared to 25% in *NP*. Positive changes were the same in both communities: local people and companies have more consciousness about environmental problems, and that gender programs have facilitated better collective consciousness about gender equity at the communities. Negative changes in cultural capital were the same in both communities, highlighting that with recent developmental changes and increasing globalized networks facilitated by information and communications technology (ICT), there is more consumerism and individualism at the community. The perception that development and new technologies have changed cultural aspects of community dynamics was mentioned as a critical change by state, market, and civil society members in both communities.

Changes in Social Capital

In *Dolores*, positive changes in social capital or networks were described by 65% of the respondents and negatively by 39% of interviewees (see Table 3-3). Positive changes included new population from rural areas and immigrants from Argentina. On the other hand, in *NP*, most changes in social capital were described as negative. Negative changes in social capital were mentioned by 85% of respondents. These changes included new "low qualified population" (workers attracted by the growth of the port operations), and challenges for civic participation on local issues due to the new labor regimes at agro-industries and port operations (called "regime

of 8x8 hours"). [33] The arrival of newcomers attracted by jobs in the port was described as negative, increasing crimes, violence, and housing problems at the local level.

Changes in Political Capital

In *Dolores*, positive changes in political capital were mentioned 42 more times than negative ones. In this community, 74% mentioned positive political changes. These changes included the work done by the *Municipio* and the presence of diverse national state social programs focused on gender equity and poverty reduction.

In *NP*, 80% of the respondents mentioned negative changes in political capital. Political capital was described an average of five times as negative but only one time as positive per participant. Key informants highlighted the political conflicts between the *Municipio* and the *Intendencia* and the national government due to the "local opposition to recent development and lack of electoral representation and political power," and absence of governmental institutions (such as DINAMA) to regulate development at the local level. The work done by the *Municipio* and the creation of the local group "*Grupo de Trabajo*" (Work Group) were mentioned as positive changes that had a critical role in local social mobilization.

Social Capital and Collective Agency for Adaptation

Dolores

Dolores is the hub of the growth in industrial grains and soybean production, developing a strong local economy. Besides the negative changes noted in its natural capital, changes in the rest of the community capitals were perceived by the respondents as positively impacting the community. This community lacked collective mobilization to

[33] Workers have shifts of eight hours, breaks of eight hours, and return to work eight hours again.

respond to environmental stresses. Positive changes identified by market actors and state officials focused on 'catch up' with development promoted by local, national, and multinational businesses that operate at the local level, with the support of departmental and national institutions. Community adaptive actions (see Table 3-7) focused on the challenges that development had created, such as acquisition and utilization of new technologies and associated knowledge and increasing efficiency and productivity in agriculture, new technologies and local innovations, including storage improvement, improvement in markets, and improvement of local infrastructure (streets and highways). The few adaptive actions taken to reduce environmental stresses were developed through private actors. For example, individual private actors (land owners) asked the MGAP (through the Round Tables of Rural Development (*Mesas de Desarrollo Rural* (MDR)) to implement controls on agrochemical management and to implement conservation practices. Consequently, new policies were developed by the national government in 2012 to protect land owners' interests in soil conservation.

> *"Now, people here do not have motivations to make complaints about the environment because they now are economically fine. They think environmental problems happen outside the community and that they not have any 'weapons' or tools to defend their environmental situation."* (*Dolores* - Local Ecologist, December 6th, 2012)

The overall well-being of the community, especially the economic boom in agriculture, created apathy to environmental problems, decreasing social mobilization. Juana, a local ecologist, said: "*The community is still dazzled by the recent economic*

growth" (December 6th, 2012). Collective actions to mitigate environmental stresses were not developed when the community was positively impacted by changes.

> "*When things go wrong, people work together as in the (significant drought) crisis of 2001, but when they (farmers) do well like now they do not work together (…) When you are well and things could be solved collectively it does not happen because people do not get together*." (*Dolores* - Local Farmer, December 3rd, 2012)

Environmental stresses were described as the most negative change for the community, while positive changes in built, human, financial, social, cultural, and political capitals influenced the lack of collective mobilization to respond to the environmental stresses at local level.

Nueva Palmira

In *NP*, local actors mobilized collectively to adapt to environmental stresses. Bonding social capital was strengthened through civic mobilization of local actors (including state/civic/and private actors) who created the GT to facilitate spaces for deliberation to improve community well-being.

> *"On December 11 of 2011, we, the citizens of Nueva Palmira, marched together to demand quality of life. In this peaceful march over 2000 people joined us in a symbolic embrace of our city. Our record of fighting for environmental issues is now very strong through the organization of various committees and working groups which promoted social consciousness. We, together as a community, are capable to mobilize resources and the right people, with local professionals willing to work and committed to their people with the Municipio, because will be our children who will suffer tomorrow the mistakes of today."* (April 18th, 2012- Report Submitted to the National Senate)

Mobilization of collective agency not only started as a consequence of environmental stresses but also in response to the negative changes experienced in built, human, financial, social, cultural and political capitals.

> *"With all the multiple problems we have, like infrastructure, health problems, and pollution, last year the neighbors cut the highway (to the port) and we started working together instead or working as multiple commissions, and we said we are "Grupo de Trabajo" ((GT) Work Group) ..."* (*NP* - Local Civic Actor - Co-founder and Member of GT, December 20th, 2012)

Negative changes in all community capitals were key for the mobilization of collective agency at local level. Beginning in 2011, the GT and the *Municipio* organized public assemblies and protests. They organized together to get access to resources for adaptation to environmental and other stresses. Negative changes in political capital and local discontent due to conflictive relationships with governmental institutions and the collective perception of 'top-down development' noticeably influenced local mobilization of social capital.

> *"The common feeling among local citizens is that the national government helps agricultural and port-related businesses but not the residents of this community."* (*NP* - Member of GT and Local Historian, February 20th, 2013)

The mobilization of social capital facilitated the mobilization of local and outside resources to adapt to local problems. Through the collective development of reports which included data gathered by local residents, the community demanded outside resources from departmental and national governments. Resources demanded from departmental and national

governments included the "construction of a sewer system, the improvement of solid waste management, the improvement of drinking water quality, the improvement of the river (River Plate) water quality, to stop the construction of a new barge port for soybeans (from Paraguay) in front of the beaches of the community, and the installation of a permanent office to monitor the natural environment of the community" (*Grupo de Trabajo.* Report Submitted to the National Senate on April 18th, 2012). However, none of these community demands for outside resources from government institutions were met.

Political Capital and Collective Agency for Adaptation

Dolores

In *Dolores*, interviewees highlighted that the strong sociopolitical relationships between local individual actors with actors from outside the community such as the *Intendencia* or national institutions facilitated resources to solve stresses (e.g., the sewer system). Good relationships between the local *Municipio,* the *Intendencia*, and national institutions were critical for better access to resources from outside the community. These relationships facilitated resources to address local problems such as heavy vehicles and consequent air pollution in the urban area. In 2010, the *Intendencia* and the MVOTMA developed a territorial plan[34] which included regulations and preventive adaptation to mitigate environmental stresses as well as other negative changes. The *Municipio* also organized a local recycling program. The *Municipio* worked in synergy with departmental and national governmental institutions and local and multinational private actors. Responses to strengthen capitals depended on the local capability to decide about some community's resources. The local *Municipio* and the *Intendencia* collected some revenues from agricultural industries and companies. According to participants, that

[34] Promoted by the national law Nº 18.308: *Ordenamiento Territorial y Desarrollo Sostenible* (2008).

revenue was used for maintenance of local and public spaces, such as plazas, streets, and some roads. Schools, hospitals, and other public buildings benefited from private contributors who individually supported these institutions through '*comisiones'* (commissions) [35] and financial collaboration. In addition, *Dolores* historically developed its own local initiatives through its political leaders (most of them 'important' farmers), local entrepreneurs (some in partnership with multinational corporations), and regional, national, and international institutions. The presence of key state institutions (such as the MGAP) in this community also facilitated access to resources and the reduction of exposure and sensitivity of the community. Positive changes in all capitals (with the exception of natural capital) were facilitated by the conservation of the community well-being and anticipatory adaptation of some local key actors who collaborated with governmental institutions (such as the MGAP) to provide resources from outside the community. For example, they developed courses for new imported technologies in agriculture and some educational courses that included preventive tools for environmental pollution from agrochemicals.

> "*Local environmental problems historically have been resolved through initiatives from individuals from the community like important farmers, sometimes in collaboration with the State*." (*Dolores* - Ex- Elected Official-Local Farmer, November 29th, 2012)

Some resources for adaptation to environmental stresses were provided either by local businesses (*ADP*, *Cadol*, and *Barraca Erro*) implemented as part of their social responsibility programs or by national institutions such as the MGAP (see Table 3-7). The political power of some individual local actors and their legitimacy in the national sphere were very important to

[35] Groups of organized residents.

facilitate better access to resources that could be used to improve the overall well-being of the community.

Nueva Palmira

In *NP*, local actors (GT and the *Municipio*) mentioned that they had conflictive relationships with the *Intendencia* and national government institutions, due to their opposition to what were described as "*top-down development projects*" (Field Notes, January 16th 2013) and lack of involvement of these institutions in solving related problems. According to interviewees, the lack of community political and electoral power at the departmental and national levels was one of the main causes for multi-level conflictive relationships and subsequent social mobilization at the local level.

> *"When we listen to the national authorities on the news saying that our community is a center of regional development we get angry because this is not how people perceive it here."* (*NP* - Local Historian-Member of GT, February 20th, 2013)

Multi-level relationships had a critical role in the access to better resources for adaptation from outside the community. The GT had to improve their access to multiple resources which could legitimate their work among departmental and national government institutions such as DINAMA, *Ministerio de Transporte y Obras Publicas* (MTOP), or *Administración Nacional de Puertos* (ANP).

Human capital was strengthened by the GT through the production of local knowledge and the collection and development of information about environmental and infrastructural problems. For example, the local hospital gathered data about increasing health problems to

determine their causes and to inform national government institutions in charge of environmental control.

> *"We are analyzing the health effects found in terms of micro-particulates contaminants in the air that causes an increase in the prevalence of cases of chronic bronchitis and emphysema asthma respiratory diseases. We are in the process of quantifying these data with the addition of functional respiratory equipment. It is well known that increased in our population."* (Report Submitted to the National Senate by the Director of the Local Hospital, April 2012)

Some of the information was collected by local citizens, workers, and professionals. These data included information about health problems, agro-chemicals used at agro-industries, labor conditions (safety and characteristics of contracts) and worker rights at the port and in agro-industries, construction regulations, housing plans, and water and air pollution, among others.

The GT gathered information to support and legitimize mobilization of collective agency among departmental and national institutions. The community needed external resources to support community responses to some of its urgent problems. The mobilization of collective agency (social and political capitals) led to better access to human capital and the development of a local plan for development. In 2011 and 2012, actors from GT, the *Municipio*, and the *Intendencia* got together to develop a strategic plan[36] for local sustainable development. This plan included several meetings and assemblies with the direct participation of local, regional, national, and international actors. This strategic plan included guidelines and regulations (anticipatory adaptions) for the development of the community and its agro-ecosystems. Some adaptations to environmental stresses stated in the plan were already implemented or were still

[36] Promoted by the national law Nº 18.308: *Ordenamiento Territorial y Desarrollo Sostenible* (2008). See plan: http://www.colonia.gub.uy/web2.0/index.php?idArticulo=123140

being discussed at the *Intendencia*. According to staff of *Intendencia*, this plan was possible because of local mobilization.

However, the community respondents felt they needed better access to human capital, particularly on scientific knowledge and technology to control environmental stresses, which could be facilitated by national institutions such as *Dirección Nacional de Medio Ambiente* (DINAMA). On April 18th, 2012 the GT stated:

> *"Wes strongly urge the permanent presence of an office of environmental control according to the problems of the community and the port with suitable and committed staff and representation of the population of Nueva Palmira."* (*NP* - Report Submitted on April 18th, 2012 to the National Senate)

This information could further identify environmental stresses and generate better political legitimacy of local mobilization and actions across government institutions in charge of environmental controls.

> *"When we go to see elected officials or government institutions to address community problems we need to show them knowledge and data, otherwise, they ignore or reject us."* (*NP* - Local Civic Actor - Member of GT, December 20th, 2012)

Access to more knowledgeable human capital from outside the community was important for effective and anticipatory adaptation to environmental stresses. Dependency on human and technological resources from national agencies and programs to regulate and manage the community's natural resources could jeopardize the success of local adaptations (e.g., the installation of two machines for air quality controls at the community) in the long term.

> *"They have failed to give us explanations about it (results from air quality controls done by DINAMA): What is it? What does it mean? What are we breathing? You speak with them, and they will give you every reason in the world but nothing happens."* (*NP* - Co-founder and Member of GT, January 15th, 2013)

Political capital in multi-level relationships is critical for adaptation, because government institutions sometimes continue to operate within old paradigms of a centralized state. Governmental institutions and politicians from all the political parties had considered demands articulated by *NP*. However, the national and departmental governments lacked efficient responses at the local level in providing and implementing resources to minimize stresses faced by this community.

Conclusions and Recommendations

Environmental stresses mostly from recent economic investments were critical for the two rural communities explored in this study. Local perception of environmental stresses was not enough for the mobilization of collective agency for adaptation. Changes in the community capitals of the communities influenced local collective mobilization. *NP*'s experience showed that collective mobilization to address environmental stresses occurred when the community faced negative changes in all its community capitals. When changes were mostly perceived as positive for built, human, financial, social, cultural, and political capitals, collective actions to develop adaptation to environmental stresses were not developed. Community resilience literature helps us to better understand these causes of collective agency for adaptation to environmental and other stresses. *NP* (see Figure 3-2) was facing what Walker and Salt (2006) described as release and reorganization ('back loop'), where all the capitals experienced

significant stresses and the community responded collectively. On the other hand, *Dolores* was facing rapid growth which was reinforced by adaptations to catch-up ('conservation cycle') with development rather than to reduce environmental stresses (see Figure 3-2).

Although most interviewees highlighted serious environmental problems at the local level, the status of the other capitals did not contribute to the construction of local alliances to reduce environmental stresses. In this community, local, departmental, and national institutions focused on the improvement of the economic and developmental model in place.

Differences between *Dolores* and *NP* also show that mobilization and capability for adaptation outcomes are significantly influenced by political capital in multi-level relationships (*bridging social capital*) between local and outside actors. In *NP*, poor political relations with external governments fostered social mobilization at the local level. The political nature of external relationships can influence social mobilization and determine better access to resources such as human capital from outside the community, which are critical to better understand on going environmental stresses and to develop effective adaptations.

In *Dolores*, the sociopolitical role of local leaders and local/international companies facilitated the involvement of departmental and national institutions which privileged short-term economic benefits over (longer-term) environmental health of the community.

Results from *NP* showed that when mobilization of social capital does not successfully involve active actors from regional, national, and/or international levels, adaptive actions are undermined because of lack of resources. Collective agency may not succeed in implementing adaptations to environmental stresses when key actors from outside communities (e.g., DINAMA) are not locally involved. Consequently, the community has few resources for adaptation and minimizing risks. Political and bridging social capitals (multi-level relationships)

are critical for better access to human capital (knowledge) used to minimize environmental stresses such as water or air deterioration. Local access to human capital through knowledge of possible environmental stresses from development becomes critical but not sufficient for small communities to adapt (Young 2013).

Risks can represent an opportunity when local people are allowed to take advantage of opportunities for improvement (World Bank 2013). In *NP*, the local plan for sustainable rural/urban development was described as an important local achievement. This plan was described as a result of social mobilization. It was locally and collectively developed through knowledge exchange among local, regional, and national levels. This plan represents a tool for future development (anticipatory adaptation), but not as a current solution for some environmental and infrastructural problems that the community is facing.

To confront stresses successfully, "it is essential to shift from unplanned and ad hoc responses when crises occur to proactive, systematic, and integrated risk management" (World Bank 2013:4). The lack of efficient governmental regulation of human-induced environmental stresses at local levels showed that the departmental and national government institutions were still coping with environmental stresses through the implementation of locally demanded reactive responses. Effective adaptive responses from these institutions challenge successful implementation without local people's involvement and access to scientific knowledge about environmental stresses (e.g., results from the air quality controls in *NP*). New spaces for decision-making created at the local level, such as GT, allowed the *Municipio* to effectively cope with some immediate infrastructural and environmental problems. This new type of good governance should "balance the needs of society with the vision of government and private-sector interests" (Correl 2009:458). However, these new structures and spaces for participation

still lack legitimacy at departmental and national levels, ignoring the community's on-going risks and problems and limiting the success of community adaption. Multi-level participation and governance on development and its consequences are critical for community capitals. Such governance could facilitate decision making processes and structures to develop local access to resources for anticipatory adaptation, while considering local actors' concerns and interests. "Risk management requires shared action and responsibility at different levels of society." (World Bank 2013:4).

Governance for adaptation to environmental stresses is only effective when local actors are taken into account and have direct participation in developmental plans and the implementation of adaptations to environmental stresses and risks at local level. Future research can explore political capital of multi-level governance for adaptation to stresses created by human development or natural changes at rural communities.

Figures and Tables

Figure 3-1: Selected Communities

Table 3-1: Interviewees in each of the Communities

Types of Actors	Nueva Palmira	Dolores
State	4	7
Market	6	7
Civic Society	10	9
TOTAL	20	23

Table 3-2: Described Environmental Stresses

Natural Changes	**Dolores**	**Nueva Palmira**
Described as Negative	Deterioration of water quality: pollution created by the sewer system which was broken and located close to the city, and excessive use of agrochemicals and fertilizers (bloom of algae). Air quality deterioration due to pollution from silos. Human-induced erosion of soils due to increasing monocropping and lack of rotations with natural prairies (among other causes). Reduction of biodiversity. Overexploitation of natural resources. Climate changes (drastic changes in temperatures and seasonality, droughts, and increasingly severe weather events). Death of bee colonies due to increasing use of agro-chemicals. Deforestation.	Deterioration of water quality: pollution created by lack of sewer system, agrochemicals used by port operations, and excessive use of agrochemicals and fertilizers (bloom of algae). Air quality deterioration due to pollution from silos and port operations. Human-induced erosion of soils due to increased monocropping and lack of rotations with natural prairies (among other causes). Reduction of biodiversity. Overexploitation of natural resources. New exotic pests from port operations and climate change. Climate changes (drastic changes in temperatures and seasonality, and increasingly severe weather events).
Average of times mentioned per participant-type	State:9 Market:4 Civil Society:7	State:7 Market:4 Civil Society:8
Percentage of participants, number of times mentioned, and average of times mentioned per participant	91%- 177- 8 (N=23)	100%- 132- 7 (N=20)
Described as Positive	Minimum tillage. Local recycling program.	Minimum tillage.
Average of times mentioned per participant -type	State:0.71 Market:2 Civil Society:0.77	State:1 Market: 0 Civil Society: 0
Percentage of participants, number of times mentioned, and average of times mentioned per participant	61%- 24- 1 (N=23)	5%-1- 0.05 (N=20)

Table 3-3: Positive and Negative Changes in other Capitals in *Dolores*

Dolores	**Built**	**Human**	**Financial**	**Political**	**Social**	**Cultural**
Average of Times Mentioned as **Negative** per Participant-Type						
State	3	1	0	0.28	1	0.42
Market	2	1	0.42	0.57	0.57	0.28
Civil Society	2	2	0.88	0.66	0.88	0.44
Percentage of Respondents that Mentioned as **Negative** one or More Times, Number of Times Mentioned, and Total Average of Times Mentioned per Participant. (N=23)	70%- 52- 2	61%- 34- 1.50	22%- 11- 0.47	39%- 11- 0.47	39%- 18- 0.78	22%- 8- 0.34
Average of Times Mentioned as **Positive** per Participant-Type						
State	2	3	2	3	1	0.42
Market	3	4	5	2	2	1
Civil Society	2	3	4	2	1	0.78
Percentage of Respondents that Mentioned as **Positive** one or More Times, Number of Times Mentioned, and Total Average of Times Mentioned per Participant. (N=23)	70%- 48- 2	87%- 65- 3	96%- 81- 4	74%- 53- 2	65%- 29- 1	57%- 18- 0.78

Table 3-4: Described as Positive and Negative Changes in other Capitals in *Dolores*

Dolores	Built	Human	Financial	Political	Social	Cultural
Described as Negative Changes	Deterioration of the public infrastructure (routes and streets)./ Monocroping- mostly soybeans crops./ Bigger farms and land owned by foreign investors./ Increasing prices of housing and land.	Increasing health problems.	Increasing FDI in land./ Market speculation.	Discontent of local actors from the market with national governmental institutions because of the lack of state responses to local demands for innovations.	Emigration from rural to urban areas (fewer farmers and rural workers).	"New culture of increasing consumerism."
Described as Positive Changes	New technologies for agriculture./ Growth of the construction industry./ Better urban development.	High qualified workers and professionals in agricultural corporations and industries./ More qualified jobs and less unemployment./ Training of workers./ More education about the environment./ Better communication technologies./ Better "knowhow" and knowledge of new agricultural technologies.	More jobs and less unemployment./ "Better access to financial goods and services."/ FDI of multinational corporations./ Expansion of local agricultural companies./ Benefits for actors from the market operating in agriculture./ "Local economic growth."/ "Better wages in the agricultural sector."	Creation of the *Municipio*./ Local presence of new and diverse governmental social programs.	New population: people from rural areas and immigrants from Argentina.	"Local people and companies have more consciousness about environmental problems."/ "Gender programs facilitated more awareness about gender equity."

Table 3-5: Positive and Negative Changes in other Capitals in *Nueva Palmira*

Nueva Palmira	**Built**	**Human**	**Financial**	**Political**	**Social**	**Cultural**
Average of Times Mentioned as **Negative** per Participant-Type						
State	7	5	3	5	3	0.50
Market	7	4.50	2	3	2.50	0.33
Civil Society	7	7	3	6	2	0.60
Percentage of Respondents that Mentioned as **Negative** one or More Times, Number of Times Mentioned, and Total Average of Times Mentioned per Participant. (N=20)	100%- 142-7	85%- 112- 6	75%- 51- 2.50	80%-94- 5	85%- 42- 2	35%- 10- 0.50
Average of Times Mentioned as **Positive** per Participant-Type						
State	1.50	0.75	0.50	3	3	0.50
Market	0	0.66	2	0.33	1.50	0.16
Civil Society	0.90	1.50	1	0.40	1.50	0.40
Percentage of Respondents that Mentioned as **Positive** one or More Times, Number of Times Mentioned, and Total Average of Times Mentioned per Participant. (N=20)	50%- 19- 1	45%- 22- 1	60%- 24- 1	50%- 19- 1	70%- 36- 2	25%- 7- 0.35

3-6: Described as Positive and Negative Changes in other Capitals in *Nueva Palmira*

Nueva Palmira	Built	Human	Financial	Political	Social	Cultural
Described as Negative Changes	New technologies for agriculture./ Deterioration of the public infrastructure./ Monocroping of soybeans./ Bigger farms and land owned by foreign investors./ Disorderly expansion of the urban and port areas./ Increasing prices of housing and land./ Lack of enough housing./ Deterioration of infrastructure for public health and educational services.	Increasing health problems./ Lower qualified, less stable (seasonal), and unhealthy labor./ New modes of labor contracts (regime of "8x8 hours").	Increasing FDI in land./ Investment of multinational corporations./Developmental projects based on raw materials (minerals and grains) "do not benefit the community."/ "More jobs but lower wages in the port."	Political conflicts between local actors and *Intendencia* and national government "due to local opposition to recent FDI, and the lack of electoral representation."/ Lack of environmental and infrastructural controls from departmental and national institutions.	New "low qualified" population (workers attracted by the growth of the port operations)./ Less civic participation on local issues due to the new labor regimes at agro-industries and port operations.	"New culture of increasing consumerism."
Described as Positive Changes	New technologies and infrastructure in the port operations./ Growth of the construction industry.	More jobs and less unemployment.	More jobs and less unemployment./ "Better access to financial goods and services."	Creation of the *Municipio*./ Creation of the "*Grupo de Trabajo*" (Work Group)	Collective mobilization for developing responses and adaptive actions to environmental stresses.	"Companies have more consciousness about environmental problems."/ Gender programs facilitated more awareness about gender equity.

Table 3-7: Political and Social Capitals on Responses by all the Community Capitals

	Dolores	**Nueva Palmira**
Social	The *Intendencia* and other national and international institutions created the project "Route 21" to stimulate diversified agriculture among small farmers and retain rural population.	Local citizens and the *Municipio* created the "Work Group" ("*Grupo de Trabajo*" GT) and organized periodic meetings and new local networks to promote public discussions and civic participation./ A local cooperative of farmers (COPAGRAN) rented land from small farmers to avoid rural emigration and promote diversified agriculture.
Political	National governmental institutions, the *Intendencia*, and the *Municipio* promoted soybeans production.	The GT and the *Municipio* involved active participation of local actors from the civic, state, and market sectors.
Cultural	None	GT and the *Municipio* tried to change the local culture of public participation.
Human	National governmental institutions, the *Intendencia*, the *Municipio*, and local/foreign companies offered courses about new imported technologies in agriculture and the construction of the pulp mill *Montes del Plata*.	GT and the *Municipio* collected and developed their own information and scientific knowledge (to present at government institutions) about environmental stresses, air and water quality deterioration, health problems, construction regulations, housing, transportation, port operations, and labor conditions and rights, among others.
Natural	The *Municipio* organized a local recycling program./ Local private actors asked the MGAP to implement controls on agrochemicals' management and conservation practices./ Individual citizens complained in the *Municipio* about air quality./ Actors from the market and the national government developed a private irrigation system (for about 6,000 hectares) to mitigate consequences from droughts. /The *Municipio* responded with the Departmental Emergency Committee to droughts and severe weather events./ Recycling program of agrochemicals'containers developed by Cadol, ADP, and other institutions.	GT and the *Municipio* stopped locally called "top-down projects" that were considered as generating environmental stresses (e.g. new port for barges, new industry for soybeans oil (Ceroil), etc.)./ GT and the *Municipio* required national institutions (DINAMA and MGAP) to apply existing environmental regulations (about air and water quality) in port and agriculture industries (grain elevators).
Built	The *Intendencia* developed a local urban plan with new regulations for construction and transportation; a new route for heavy transportation was developed to avoid deterioration of local infrastructure./ The *Intendencia* and the *Municipio* reported to DINAMA the use of inadequate technologies in grain elevators to avoid air pollution./ Air filters were installed in some grain elevators./Agriculture companies, MGAP, and *Intendencia*, organized events and courses to promote new imported agricultural technologies./ Local landowners reported concerns to MGAP about recent changes in land use and ownership./ The *Municipio* accessed to machinery used after storms and/or tornadoes.	GT and the *Municipio* mobilized to stop development projects and heavy transportation within the urban area./ GT and the *Municipio* mobilized and created a local sustainable developmental plan with the *Intendencia*, which included new regulations for construction and transportation./ GT and the *Municipio* acquired land for the construction of new and "affordable" housing./ GT and the *Municipio* improved the local hospital and educational institutions./ A local cooperative of farmers (COPAGRAN) rented land from small farmers to avoid "land grabbing."/ Two filters to control air quality were installed at the community.
Financial	The *Intendencia*, *Municipio*, and local/foreign companies worked together to facilitate, stimulate, and/or promote more investment in soybeans production.	The GT stopped "top-down investment projects" approved by departmental and national governments (e.g., new port for barges, new industry for soy oil (Ceroil), etc.)./ GT and the *Municipio* required local economic benefits (canons) from the port operators and agriculture companies working at the community.

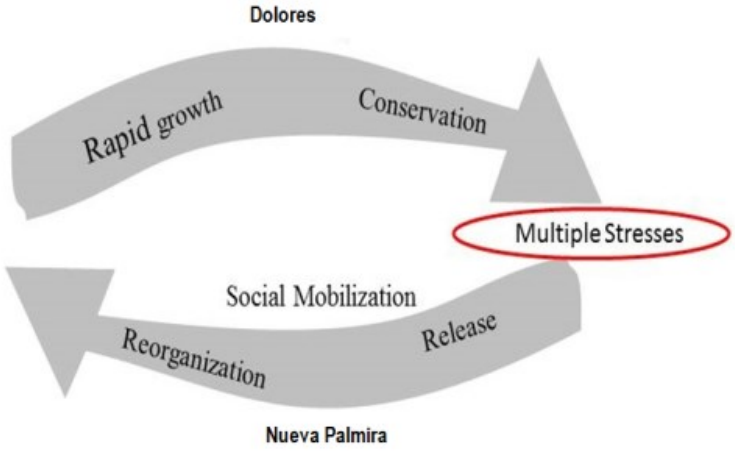

Figure 3-2: Adaptive Cycles (Modified from Walker and Salt 2006)

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CHAPTER 4. GOVERNANCE AND ITS ROLE IN COMMUNITY ADAPTATIONS TO ENVIRONMENTAL STRESSES UNDER DECENTRALIZATION PROGRAMS IN SOUTHWESTERN URUGUAY

Manuscript prepared for submission to the *Local Environment: The International Journal of Justice and Sustainability*

Abstract

Since the turn of the 21st century, climate change and globalization had substantial environmental impacts on the southwestern region of Uruguay. Community responses to environmental stresses have been influenced by recent political decentralization governments and programs. This study explores how community governance processes under decentralization influenced adaptive actions to environmental stresses in four communities of southwestern Uruguay. Research methods include semi-structured interviews conducted in 2012-2013 with key informants from market, state, and civil society and participant observation and minutes from local public meetings and assemblies in four communities of this region. Consultation facilitated adaptive actions by the national government to make national governmental programs and institutions more responsive to local needs. Community empowerment for adaptive actions at the local level was minimal, due to the limited resources that have been devolved, reinforcing historic and current dependency on regional and national governmental institutions for those resources.

Key Words: *Environmental stresses, governance, decentralization, adaptation*.

Introduction and Literature Review

Environmental Changes in Southwestern Uruguay

Southwestern Uruguay accounts for great part of Uruguay's total agricultural production (World Bank (WB) 2009). Climate observations from the last century show how climate variability and severe weather events have increased in this region (Giménez et al. 2009). Severe climate events include droughts in 2000-2001, 2008-2009, and 2010-2011, hydric deficits in some parts of this region, and severe storms such as tornadoes, critically affecting rural communities[37] in this region.

Affected by Southern Cone financial crisis of 2001-2002 and Uruguayan livestock foot-and-mouth disease in 2001-2002, this region faced one of the most difficult economic periods in the country's history. Economic recovery began in 2003, facilitated by Foreign Direct Investments (FDI) in land and machinery in industrial agricultural commodity crops such as soybeans, wheat, sorghum, sunflower, maize, and wood pulp. Since 2003, southwestern Uruguay has been the national epicenter of increase in agricultural exports and its associated environmental transformations, such as displacement of agricultural systems based on natural pastures (Arbeletche, Ernst, and Hoffman 2011; Pérez Bidegain et al. 2011). Changes in agriculture have increased environmental stresses[38] such as overexploitation of natural resources, erosion of productive soils, decreasing air and water quality, and increasing deforestation, among others. In addition, climate change has increased environmental stresses, including drastic changes in temperatures and seasonality, droughts, and increasing severe weather events such as tornadoes and severe storms.

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[37] A community is defined in this study as a social system in a specific geographical location, where local people meet their needs through organizations and institutions (Flora and Flora 2013).

[38] Environmental stresses are environmental influences with significant ecological changes or that limit ecological development (Freedman 1995) or cycles, representing negative effects on communities and agroecosystems.

Decentralization Programs in Uruguayan Rural Communities

Beginning in 2007, Uruguayan governments shifted from treating local people as passive actors directed by the centralized government towards involving localities in partially decentralized administrative, territorial, and political systems (Piñeiro 2004; De Barbieri and Zurbriggen 2011; Zurbriggen 2011). Decentralized programs approach communities as critical social units of change in specific territories (Piñeiro 2004). Decentralization of governments and programs aims to actively involve communities in territorial and regional planning (De Barbieri and Zurbriggen 2011; Berdegué et al. 2012) in order to have better decisions that are more effectively implemented. Decentralization includes placing decision-making in the hands of local people, who must implement and live with the decisions made. However, previously highly centralized systems often retain veto power and the power of the purse for implementation. Empowered communities are able to locally analyze and mobilize their own resources. Empowerment implies that the community (elected officials, local groups and residents), rather than departmental or national governmental institutions, makes decisions about their resources and implements what is locally decided (International Association for Public Participation (IAPP) 2007).

Municipios and *Mesas de Desarrollo Rural* (MDRs (Round Tables of Rural Development)) are part of the recently created decentralization governments and programs. [39] They have been assigned major new roles in both urban and rural areas of communities in their adaptation to environmental stresses. Community adaptation is the mobilization of resources through actions to reduce and/or adjust to environmental stresses at the local level.

[39] Other decentralization programs implemented after 2005 include: *Servicios de Orientación*, *Consulta y Articulación Territorial (SOCAT) del Programa Infancia*, *Adolescencia y Familia (Infamilia) del Ministerio de Desarrollo Social*; *Consejos Sociales de la Dirección Nacional de Desarrollo Ciudadano del Ministerio de Desarrollo Social*; *Grupos de Trabajo locales del Programa ART PNUD Uruguay*; and *Centros MEC del Ministerio de Educación y Cultura* (Rado and Zurbriggen 2010).

Municipios

Uruguay is geographically divided by 19 departments (states in the U.S). Each department has an *Intendencia Departamental* (departmental elected government). Departments' *Intendencias* are the second level of government after the National government and *Intendencias* are the governing structure. The third levels of government, and the smallest units of administrative and elected governments, are *Municipios. Municipios* governments are composed by four elected officials[40] (*Consejales*) and one *Alcalde* (Mayor), who is the elected official with the highest number of votes within the party with more votes. The elections are partisan, in that each person running identifies their party affiliation. In 2010, the geographic jurisdiction of these elected governments was politically designated by the *Intendencias* and the *Juntas Departamentales* in each department, usually covering urban areas of communities and ten kilometers encircling the community at its perimeter.[41] In 2009, *Municipios* were created by the national law, "*Descentralización Política y Participación Ciudadana*" (Nº 18.567)[42], for communities with more than 5,000 habitants. After the elections of 2010, *Juntas Locales* (JL) of these communities were transformed into the governing body of *Municipios*. The general responsibilities of *Municipios* are to 1) implement regional and national plans at the local level when required by *Intendencias* or the National government, 2) apply departmental and national laws at the local level, and 3) cooperate and work with other *Municipios* and other local, regional, and national actors to discuss and/or implement local plans (*Presidencia* 2011). *Municipios* have an important role in creating mechanisms for deliberation and action on topics

[40] They represent the main political parties: *Frente Amplio*, *Partido Nacional*, *Partido Colorado,* and *Partido Independiente*.

[41] It is the *Intendencia* and the *Juntas Departamentales*, who determine the geographical boundaries for each of these governments. The jurisdiction of *Municipios* varies from community to community. People and land in rural areas, outside the ten kilometers, fall under the jurisdiction of *Intendencias* and the work done by MDRs.

[42] Modified in 2010 by the law Nº 18.644.

such as environmental stresses at the local level, especially in the urban areas of communities, but the National and departmental governments still play a part, as *Municipios* have no rule-making or revenue raising power. They receive a limited annual budget from the National government, and they must apply separately for a wide range of programs designed at the departmental and national level.

Mesas de Desarrollo Rural (MDRs)

In 2007-2008 the *Ministerio de Ganadería Agricultura y Pesca* (MGAP) created the *Dirección General de Desarrollo Rural*, charged with implementing multiple programs to decentralize the implementation of rural policies.[43] Consequently, the MDRs were created along with other decentralization territories to complement decentralization policies[44] for rural development. MDRs are institutionalized spaces for participation that focus on such social issues as eradication of poverty, inclusion of disadvantaged farmers, and environmental problems involving rural communities and their agroecosystems. MDRs depend on *Consejos Agropecuarios Departamentales*[45], created by the MGAP in 2007, to articulate local decisions with regional and/or national policies and programs from *Intendencias* and MGAP, among other institutions. Focusing on rural areas of communities, MDRs complement the work done by *Municipios*, which mostly focus on urban areas of communities. MDRs attempt to decentralize implementation of top-down national programs, seeking to involve rural communities more fully and connect those communities with departmental, regional, and national governmental programs. Like the *Municipios*, they have no rule-making or revenue raising authority.

[43] Law Nº 18.126 (2007).
[44] Law Nº 18. 187 of *Colonización de Tierras* (2007), Nº 18.308 of *Ordenamiento Territorial y Desarrollo Sostenible* (2008), and ministerial resolution on *Productor/a Agropecuario Familiar* (2009), among others.
[45] Members of *Consejos Agropecuarios Departamentales* are appointed by the MGAP, including staff of *Intendencias*, ministries, and other regional and national governmental institutions that work in rural development.

Governance of Adaptation to Environmental Stresses

Governance consists of the structures and processes by which institutions, organizations and individual stakeholders participate in decision making and implement those decisions (Cadman 2011). Structures of governance (as opposed to government) include actors from the market, civil society, and/or the state (Cadman 2011). Governance processes are how multiple actors participate in decision-making, key for community adaptations to environmental stresses. Processes of governance involve discussions or deliberations through consultation (of different actors) and/or empowerment of local people (IAPP 2007). Consultation means that communities are informed or consulted (information exchange) by governmental institutions to obtain public feedback on analysis, alternatives and/or decisions (IAPP 2007). Consultation or information exchange can be achieved by centralized governments and governmental programs when they engage actors from the market and/or civil society to discuss local problems.

Under centralized governance, governmental institutions usually use consultation through planning and/or implementing national programs or policies for adaptation to environmental stresses. This governance process including the market and civil society can involve collective decisions about local matters to facilitate flow of outside resources such as environmental regulations, laws, and public programs from the departmental or National government. Local actors and multiple points of view are needed to identify local problems and resources to develop solutions (Gates 1999; Head 2007).

Empowerment of communities to implement what is locally decided is the most difficult process for actors involved in decentralized governance, because they have historically depended on resources coming to them from outside the community, especially from departmental (*Intendencias*) and national governments, and have no authority to raise revenue or set rules.

Governmental institutions are hesitant to delegate authority to communities, as they are not sure that these communities properly account for the public resources they receive (Head 2007).

A large body of literature on natural resource management (Tompkins and Adger 2004; Bardsley and Rogers 2011), theory of the commons (Armitage 2008; Berkes 2008), and community resilience and adaptation theories (Adger, Lorenzoni, and O'Brien 2009; Ensor and Berger 2009) highlights how decentralized "multi-level governance" or "network governance" including local, regional, national, and international actors, can facilitate local adaptations to environmental stresses. Community adaptations to environmental stresses are successful when they include participation through local decision making to mobilize local resources and satisfy local priorities, while considering both the local context and extra-local linkages (Adger 2003; Adger et al. 2009; Ensor and Berger 2009; Ashwill, Flora, and Flora 2011). While the literature highlights local participation and shows how decentralized governance can facilitate community-based adaptation to either slow-onset or sudden environmental stresses (Adger 2003; Tompkins and Adger 2004; Armitage 2008; Adger et al. 2009; Ensor and Berger 2009; Ashwill et al. 2011), little is known about how governance processes take place and influence adaptations to environmental stresses at local levels, especially under new governmental efforts to decentralize responsibility.

This study explores the characteristics of decentralized governance and its influence on adaptation to environmental stresses in *Municipios* and MDRs in four rural communities in the departments of Soriano and Colonia in southwestern Uruguay. It explores the degree to which community dependency on external financial, human, political, and built capitals impacts governance processes and local capacity to decide and develop adaptations to environmental stresses.

Research Methods

I conducted case studies in four communities which have both *Municipios* and MDRs to see how these new governance structures and processes affect the development of adaptation to environmental stresses at the community level. These case studies allowed a deep exploration of whether decentralized multi-level governance empowered communities in decision-making processes, their role on adaptive actions, and the role of historic dependency on outside resources.

Based on the preliminary data collected during 2011 and 2012 from *Intendencias* and local key informants, I selected two communities from the department of Soriano (*Cardona* and *Dolores*) and two from the department of Colonia (*Nueva Palmira* (*NP*) and *Nueva Helvecia* (*NH*) (see Figure 4-1)), matching them on anthropogenic and climate changes that created similar environmental stresses at the local level. I analyzed the new decentralized governance structures and processes -*Municipios* and MDRs- and their adaptive actions to environmental stresses. These four communities can be considered part of a single region, due to their geographic proximity and their similar socioeconomic characteristics. They all produce agricultural goods and services, including commercial crops and timber for domestic use and export, agro-tourism, and ecosystem services such as water and air quality. The four cases were selected based on logistics and resources available for conducting the study and my familiarity with these communities and this region. By limiting the number of cases, I was able to deeply analyze how new models of decentralized governance by *Municipios* and MDRs influence adaptations to environmental stresses in urban and rural areas of communities.

Each of these communities has one *Municipio* (see Table 4-1)[46]. In Colonia, *NH* has its own MDR (referred as MDR-NH) (since 2012) [47] and *NP* is under the jurisdiction of the *Mesa de Desarrollo Rural Departamental* (referred as MDR-NP) initiated in 2007. In Soriano, *Cardona* has its own MDR (referred as MDR-C) (since 2012) [48], and *Dolores* is under the jurisdiction of *Mesa de Desarrollo Rural Departamental* (referred as MDR-D) (see Table 4-1) initiated in 2008.

The meetings of MDR-NH and MDR-C took place at *NH* and *Cardona*, respectively. The meetings of MDR-NP and MDR-D rotated the location among communities (including *NP* and *Dolores*). All of the MDRs were organized by staff of the MGAP[49], and all of the MDRs included multiple local, departmental, and national actors from government, the market, and the civil society organizations.

First, I gathered secondary data about the selected communities and utilized staff of the *Intendencias* as key informants to identify other key actors involved in *Municipios* and MDRs, as well as departmental policies that affected both governance and adaptation at local level. Staff of *Intendencias* provided information about environmental stresses experienced by these communities, their responses, and their governance. With the staff of *Intendencias* and local informants, I used a purposive snowball sampling procedure to deliberately select participants who could provide information about the main hypotheses of this study. I asked those I interviewed to given me other contacts who knew a great deal about communities, especially environmental (and other) stresses, adaptations, and governance at local level. To include diverse views, participants provided contacts for other key market, state, and/or civic actors involved at the communities.

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[46] I assigned the first letter of the name of each community to each MDR and *Municipio*.
[47] Before 2012, this community was under the jurisdiction of the *Mesa de Desarrollo Rural Departamental.*
[48] Before 2012, this community was under the jurisdiction of the *Mesa de Desarrollo Rural Departamental.*
[49] Staff of *Dirección de Desarrollo* and *Descentralización*.

I used two semi-structured questionnaires[50] for the 83 interviews from the four communities (see Table 4-2) who were (either directly or indirectly) involved in *Municipios* and MDRs, and in commissions, groups of neighbors, etc., with significance role on governance and adaptation to environmental stresses at the local level.

Interviews provided information about environmental stresses, types and roles of actors involved in the community, characteristics of public meetings, and mobilization of resources used for adaptation. I triangulated the information gathered from different stakeholders with the information obtained from the MGAP, *Intendencias*, and *Municipios* to ensure reliability of the data collected from each of the communities and about the actors involved.

I utilized participant observation to gather data about governance processes and adaptive actions to environmental stresses at public meetings. I attended one public meeting of the *Municipios* and the MDRs in *Cardona* and *Dolores*.[51] Data collected during the field work included minutes of 71 meetings from the four MDRs (from 2007, 2008, 2009, 2010, 2011, and 2012): 17 from MDR-NH, 44 from MDR-NP, 4 from MDR-C, and 6 from MDR-D (see Table 4-3). In addition, I collected reports and presentations completed by different local Non-Governmental Organizations (NGOs) and commissions, and new laws and regulations (about decentralization programs, agrochemicals' applications, soil and land management, and water management, among others) from *Presidencia*, MGAP, and *Intendencias*.[52]

Open and axial coding was used for the analysis of the 83 interviews from the four communities. Open coding was used to identify environmental stresses experienced by

[50] One questionnaire for *Intendencia* staff and another (similar) questionnaire for other actors from the market, state, and civil society involved in the communities.
[51] MDR-D meeting was organized in *Mercedes*.
[52] Neither the *Municipios* nor the MDRs have the ability to set environmental laws or regulations which are mostly developed by *Intendencias* and national legislatures and governments.

communities (not included in the questionnaire) and the *Municipios*' and MDRs' dependence on external resources for adaptation.

Using axial coding, transcriptions of the 83 interviews were categorized based on specific information about: environmental stresses, characteristics of governance processes (collective decisions, consultation-information exchange, and empowerment) organized by *Municipios* and MDRs, mobilized resources (local and external) for adaptation, and community dependency on outside resources. This analysis and the content analysis of MDRs' minutes of meetings (using the same categories) explored whether collective decisions, consultation, and/or empowerment occurred during meetings to discuss environmental stresses, and the role of community dependency on external resources.

Descriptions of meetings of *Municipios* and MDRs discussing environmental stresses (specific meetings that occurred) were counted from each of the interviews. To explore how often collective decisions happened in these meetings (average number per meeting), I divided the number of times that collective decisions occurred (counted from interviewees describing meetings) by the total number of described meetings discussing environmental stresses.

To explore mobilization of local resources in the meetings described, I divided the number of times that local resources for adaptation were described as mobilized by the total number of described meetings. To explore dependency on external resources for adaptation, I divided the number of times that external resources were mentioned as obstacles to mobilize local resources (for the meetings described) by the number of times that local resources were described as mobilized. Similar quantitative analysis was applied to explore minutes of the four MDRs. For this, I analyzed the 71 meeting minutes of MDRs[53] (from 2007, 2008, 2009, 2010,

[53] I could access to all the meeting minutes of MDR-NH and MDR-NP. I could not access to the meeting minutes of MDR-C and MDR-D. I could not access to meeting minutes of *Municipios*, which were not publically available.

2011, and 2012) provided by staff of *Ministerio de Agricultura Ganadería y Pesca* (MGAP) and *Intendencia* of Soriano. I counted how many times discussions about environmental stresses were reported at the meeting minutes. To explore empowerment, I divided the number of times collective decisions occurred to mobilize locally available resources by the total number of times environmental stresses were discussed at the meetings. Results demonstrate how types of governance processes influenced adaptations, mobilized community capitals (local and outside) for adaptation, and the role of historic dependency of community on external resources and government institutions.

Findings and Discussion

Municipios and Adaptations to Environmental Stresses

According to 87% of the 83 respondents from the four communities, *Municipios* facilitated local deliberation processes about multiple local problems (including environmental stresses) in collaboration with local civic groups. In all of the communities, respondents highlighted the collaboration between *Municipios* and local civic groups to identify and explore environmental stresses and potential solutions. Identified civic groups actively involved with the *Municipios* and the communities were *Fuerzas Vivas* (FV) in *NH*, the *Grupo de Trabajo* in *NP*, the *Pro-Desarrollo Regional* in *Cardona*, and multiple commissions (groups of local residents) in *Dolores*. They were initially formed to support diverse institutions like schools, the public hospital, and the public swimming pool, but all turned their attention to responding to environmental stresses. The *Municipio,* in collaboration with local civic groups and commissions, facilitated spaces of deliberation about environmental problems at local level.

In *NH*, the *Municipio* coordinated its work with the civic group, FV. FV was formed in 1977, during the Uruguayan dictatorship which ended in 1983. This group organized local commissions that work to improve multiple institutions (the police department, schools, the public hospital, the local library, the local theater, churches, the fire department, etc.). According to interviewees, the FV, with its long term local work, facilitated a better coordination and information exchange between the *Municipio* and local residents.

In 2011, residents of *NP* organized the group "*Grupo de Trabajo*" (GT) (Work Group), which included multiple local actors from the local government, the private sector, and the civil society. According to interviewees, this group was created to mobilize local resources and negotiate external resources for adaptations to environmental and other stresses the community faced.

In *Cardona*, the non-profit association *Pro-Desarrollo Regional* was founded in 1972 by local residents to address local problems and facilitate both internal and external resources for the community and support multiple local commissions of institutions like schools, the local hospital, and the fire department, among others. *Dolores* has no similar coordinating institution.

Municipios organized public meetings in all the communities with multiple actors in different neighborhoods to consult (*consultation*) about observed environmental stresses (among other problems) at the community. In addition, all the *Municipios* had periodic public meetings. In all four *Municipios,* all the neighborhood meetings were open to the community and attended by governmental institutions and multiple actors from the market and the civil society, who collaborated to discuss environmental stresses by sharing information and exploring possible solutions. These periodic municipal public meetings shared information about departmental

and/or national governmental programs, and local residents shared their observations and experiences with environmental stresses at local level (see Table 4-4).

In *NH* and *NP*, interviewees highlighted the water pollution created by lack of a sewer system as one of the main environmental problems addressed at the public meetings. In *NP*, *Cardona*, and *Dolores*, interviewees described how multiple local actors and groups used periodic public meetings of the *Municipios* to discuss multiple environmental problems. In these three communities, the following environmental stresses were addressed one or more times by local actors and *Municipios*: droughts and severe storms, air quality deterioration due to emissions of grain elevators, air quality deterioration due to port operations (in *NP*), air quality deterioration due to heavy traffic in urban areas, water quality deterioration due to use of agro-chemicals (mostly fertilizers), mismanagement of agro-chemicals in urban and rural areas, industrial production waste, death of bee colonies due to increasing use of agro-chemicals, reduction of biodiversity, deforestation of native flora, and lack of crop rotations in rural areas.

Municipios had an important role in making environmental stresses more visible among local residents and among departmental and national governmental institutions.[54] Consultation to discuss environmental stresses at meetings centered on information exchange between multiple actors and elected officials about environmental stresses and the exploration of possible adaptations. In the four communities *Municipios* and local civic organizations facilitated spaces for participation to discuss local demands from local residents for solutions and/or adaptive actions. However, in three of the communities (*NH*, *Cardona*, and *Dolores*), empowerment through collective decisions and mobilization of local resources was limited (see Table 4-5).

In *NH*, *Cardona*, and *Dolores*, the role of *Municipios* and local actors in developing local adaptive actions to environmental stresses was limited by lack of internal

[54] The content of these public meetings sometimes were recorded and released by the local media.

resources for adaptation, which most of the times were requested from both departmental and national governmental institutions. In these three communities, the average number of collective decisions and mobilization of local resources for adaptations to environmental stresses per meeting mentioned by the respondents was in all the cases less than one (see Table 4-5).

In *NH*, *Cardona*, and *Dolores*, average number of times external resources were mentioned as obstacles to mobilize internal resources per meetings was 1.40, 4.20, and 2, respectively. In these three communities, *Municipios* and local actors described their capacity to make collective decisions and mobilize local resources for adaptation (see Table 4-6[55]) as limited due to their dependence on external resources.

In *NP*, collective decisions occurred at almost all of the described meetings (97%). In this community, mobilization of local resources to adapt to environmental stressed occurred two times (2) per meeting where environmental stresses were discussed, with an active participation of multiple local actors organized as the GT. The *Municipio* and the GT supported each other in adapting to increasing environmental stresses (among other problems), such as significant deterioration of air and water quality due to port and agriculture industries.

In *NP*, *Cardona*, and *Dolores*, *Municipios* used consultation and information exchange at organized public meetings to identify local environmental stresses to be considered by local developmental plans ("*Planes de Ordenamiento Territorial*")[56] promoted by the *Intendencias*. The characteristics of public participation and *Municipios*' roles in these meetings varied among communities, but these developmental and urban plans (*NP*, *Cardona*, and *Dolores*) included implementing new departmental regulations

[55] See mobilized local resources for adaptation in each of the communities.
[56] Required by the national law Nº 18.308: *Ordenamiento Territorial y Desarrollo Sostenible* (2008).

(e.g., construction regulations to avoid floods, air pollution from elevators used to store grains, and water pollution from port or industrial operations) for some of the environmental stresses collectively identified.

In *NP* the *Municipio* had a key role in supporting collective mobilization of the GT to demand and develop local responses. Empowered local actors engaged with departmental and national actors, including the *Intendencia* and ministries, which facilitated the first local *Plan de Ordenamiento Territorial* of Colonia. Unlike developmental plans of *Cardona* and *Dolores* (promoted by the *Intendencia*), this plan was described as "bottom-up", demanded, promoted, and collectively developed by local actors who were supported by the local *Municipio*. In *NP*, where local actors and the local *Municipio* mobilized multiple local resources (human, financial, built, political, cultural, natural, and social capital) for adaptation and developed multi-level governance across multiple actors from different levels, adaptive actions were described as "according to local needs." However, in this community, the descriptions of relationships between local actors and external governmental institutions showed continuing dependence on outside resources for implementation.

> "*We mobilized but we still think that we do not have many achievements because we still depend on resources from the Intendencia and national governmental institutions." NP,* GT Member, January 14th, 2013

Empowerment of local actors and the *Municipio* through giving the authority and responsibility of adaptation to local civil society groups exacerbated conflicts with departmental and national governmental institutions due to the unwillingness of departmental and national

governmental institutions to cede resources and decision making power to the community.[57] Although this community had the lowest average of allusions to external resources to mobilization of internal resources, dependence on outside resources for adaptation was mentioned by 80% of the respondents. Structural dependence of the four communities and their *Municipios* on external resources from regional and/or national governmental institutions was seen as limiting their capacity to develop local adaptations to environmental stresses.

MDRs and Adaptation to Environmental Stresses

All of the MDR participants interviewed described deliberations about environmental stresses among multiple actors at the monthly meetings of the four MDRs. In these meetings, representatives of civic, private, and governmental institutions involved in rural development discussed environmental stresses that communities faced (see Table 4-7).

According to minutes of 71 meetings of the four MDRs (2007-2012), environmental stresses and/or possible solutions were addressed in 85% of their meetings. Environmental stresses were described as consequences of both recent agricultural changes and climate change. The following environmental stresses were addressed one or more times by the four MDRs: drought, weather variability, severe storms, pollution from use or transportation of agrochemicals, deterioration of water quality, deterioration of air quality, soil erosion, trash from agrochemical users, increasing pests (foxes, pigeons, and parrots) from monocropping of soybeans and eucalyptus, death of bee colonies due to increasing use of agro-chemicals, general environmental problems created by land grabs, lack of crop rotations, and overexploitation of natural resources because of the increasing production of GMOs (soybeans and corn). The process of governance to discuss these local environmental problems was mostly described by

[57] See more about *Nueva Palmira* in Chapter 3 of the Dissertation.

interviewees as consultation to inform and/or demand solutions from the MGAP, *Intendencias*, and/or other governmental national institutions (see Table 4-8 and 4-9) from outside communities. Participants' description of collective decisions at meetings of the four MDRs resulted in an average of less than one time per meeting in all of them: 0.47 in MDR-NH, 0.50 in MDR-NP, 0.69 in MDR-C, and 0.37 in MDR-D (see Table 4-8). As part of the organization of the meetings at the four MDRs, meeting minutes and resolutions were usually voted by the majority of the attendants.

However, in most of the cases these final reports focused on the demands for external resources for adaptation (mostly from the MGAP and *Intendencias* (see Table 4-9)) or informative resolutions describing local conditions rather than on mobilizing local resources (see Tables 4-6 and 4-9). Mobilization of local resources was limited in the four MDRs. The average number of times that local resources for adaptation were mobilized per meeting was less than one time per meeting in all of them: 0.76 in MDR-NH, 0.75 in MDR-NP, 0.92 in MDR-C, and 0.12 in MDR-D.

In the MDRs of Colonia important local cooperatives of farmers and national governmental rural institutions (are not located in Soriano) participated of the public meetings. Participant institutions such as *Instituto Nacional de Investigación Agropecuaria* (INIA) in *La Estanzuela*) provide information about climate change and potential environmental hazards in agriculture. In MDR-NH and MDR-NP (Colonia), the average number of times external to internal resources were mentioned was 0.38 and 0.33. Participants from the two communities in the department of Soriano were much more likely to mention dependence on external resources than communities of Colonia. In Soriano, the average number of times external resources were

mentioned as obstacles to mobilize internal resources was 1.30 (*Cardona*) and 21 (*Dolores*) (see Table 4-8).

During the droughts of 2008-2009 and 2010, MDR-D and MDR-NP facilitated information exchange between local actors and the *Ministerio de Ganadería Agricultura y Pesca* (MGAP) and *Intendencias*. That information was used to distribute resources like fodder at the local level. Empowerment of local actors to address environmental problems was seen as a major challenge by the local organizers.

> *"We need new organization with a new mentality in which we are all involved, and in which all are supervisors of what is done with the soil and land so we can regulate and bad practices can disappear, due to the collective action of organized society."* MDR-D-Meeting Report, August 15th, 2008.

The process of governance in the MDRs of the four communities was described as problematic by their actors because of limitations to mobilize local resources for adaptation. Locally mobilized human capital included training courses about new laws of soil management, mitigation of negative consequences from droughts, and agrochemicals (in all MDRs), tracking system for beneficiaries of climate emergency assistant (in MDR-NP), and the development of a sustainable rural development plan (in MDR-NH). Locally mobilized built capital included the construction of collective wells in MDR-C and recycling of agrochemicals 'containers in MDR-C and MDR-D. In 2012, local actors from *NH* mobilized political capital to create the MDR-NH (see Table 4-6).

Most of the resources mobilized at the MDRs were from national governmental institutions, which used consultation to address them at the meetings (see Table 4-9). Multi-level collaboration (through information exchange) with outside governmental institutions focused on

demands for basic external resources for adaptation, like national programs, policies, and environmental regulations from governmental institutions (see Table 4-9). During the drought of 2008-2009, participants of the MDR-D stated:

> *"The National government declared a State of Emergency in Agriculture for Climate Catastrophe in our department (…) We believe that although these are shareable conceptual approaches, it is essential to make every effort to mitigate the problem, and the State must have legal regulations that allow (multiple actors) to activate a series of actions automatically whenever the country faces situations of agricultural emergency like climate catastrophe."* MDR-D- Meeting Report, January 29th, 2009

According to the minutes of meetings of the four MDRs, the average times per meeting that adaptations included collective decisions and mobilization of local resources was 0.50 in MDR-NH, 0.31in MDR-NP, 0 in MDR-C, and 0.33 in MDR-D (see Table 4-9). Deliberation processes at the four MDRs mostly focused on the demand for and/or implementation of national governmental responses to local environmental stresses rather than community empowerment.

Minutes of the four MDRs' meetings show that 69% of the times environmental stresses were discussed consultation or information exchange was facilitated but did not empower the development of local adaptations at the MDRs. Instead, adaptations employed were mostly from the national or departmental governments (see Table 4-9). According to the minutes of meetings of the four MDRs, MDRs were empowered and able to mobilize local resources only 31% of the times when adaptations to environmental problems were addressed (see Table 4-9).

When environmental stresses were discussed in the MDRs, most of the responses were from the national government (see Table 4-9). External resources for adaptation discussed at the MDRs (2007- 2012) included national laws, regulations, and programs provided by the National government, in collaboration with governmental institutions, ministries, and *Intendencias*.

Responses from the National government included programs, plans, and laws such as *Fondo Agropecuario de Emergencias* for severe climate events (2009)[58], *Uso Responsable y Sostenible de los Suelos* (Responsible and Sustainable Soil Management) (2008)[59] implemented in 2013, irrigation and water reservoir plans like "*Fondo de Prevención de los Efectos de la Sequia*" (2006)[60] and "*Agua para la Producción Animal*" (2011) (implemented by MGAP), and new regulations about agrochemicals (2007, 2008, 2009, and 2011)[61] and feedlots (2010). [62] In addition, deliberation processes focused on external resources like subsidies and loans for water reservoirs and better livestock management (e.g., early weaning of calves), and emergency plans to provide water or fodder for small farmers through laws and programs like *Fondo Agropecuario de Emergencias* (2008)[63] and the *Comités de Emergencia Departamentales* (2009)[64] during droughts.

> *"For climate emergencies, we have made great achievements. The idea of purchasing sugar for hives (carried out by the MGAP), for the emergency of the 2008-2009 drought was developed in our MDR because beekeepers proposed it."* MDR-NH and MDR-NP-Staff of MGAP, December 12th, 2012

Collective statements and minutes of meetings elaborated by MDRs through deliberation processes about environmental stresses either provided information or included requests for resources. During emergencies like the droughts of 2008-2009 and 2010, the MDRs requested

[58] Decree Nº 405/2008. See more: http://archivo.presidencia.gub.uy/_Web/noticias/2009/01/2009010505.htm
[59] Based on the laws Nº 15.239 and Nº 18.564: *Conservación, uso y Manejo Adecuado de los Suelos y las Aguas* (Conservation, Use, and Adequate Management of Soils and Waters) (2008). See more: http://www.cebra.com.uy/renare/media/Ley18.564_SuelosYAguas_.pdf
[60] As part of "*Proyectos de Producción Responsable*" (Projects for Responsible Production) (2005) funded by the World Bank and the Global Environment Facility.
[61] Laws (*Decretos*) Nº317/007, 405/008, 482/2009, and 132/011.
[62] Law (*Decreto*) Nº178/2010.
[63] Law Nº18.362 and Nº829/2008, established during the drought of 2008-2009.
[64] Law Nº 18.621 (2009).

that governmental institutions develop new national plans and laws for adaptation and to facilitate better distribution of resources at local levels.

Dependency and Challenges for Community Empowerment and Local Adaptations

Most of the respondents from the four communities highlighted as problematic the dependency of local *Municipios* and MDRs on external resources from departmental and national governmental institutions: 86% in *NH*, 87% in *NP*, 80% in *Cardona*, and 85% in *Dolores* (see Table 4-12). According to interviewees, *Municipios* and MDRs had limited resources to develop local adaptations on their own (see Table 4-10).

Respondents from all four communities did not see dependency of *Municipios* and MDRs on financial, human, built and political capitals (see Table 4-11) as an impediment for local people to participate in meetings. However, in all four communities interviewees highlighted dependency on governmental resources as an impediment to making collective decisions and mobilizing local resources for adaptation (see Table 4-10).

In all of the communities, basic political and financial resources for adaptation to water and air pollution were requested from the DINAMA, *Intendencia*, MGAP, *Organismos Sanitarios del Estado* (OSE), and/or the *Ministerio de Transporte y Obras Públicas* (MTOP). Financial, political, human, and built capitals were described as the most important external resources on which communities depended on for the development of adaptations to environmental stresses (see Table 4-12). An example of dependency on human capital from the departmental and national governments to cope with ongoing problems were the air filters installed by DINAMA to control air quality (in *NP* and *Dolores*) and the local inaccessibility to the scientific results.

Dependency on Financial Capital

Respondents from all four communities highlighted the limitations that the *Municipios* and MDRs had in developing local adaptations due to the dependency on external funding (from *Oficina de Planeamiento y Presupuesto* (OPP), *Intendencias*, and MGAP (see Table 4-12)). In *NH*, *Cardona*, and *Dolores*, deliberation processes among multiple actors, facilitated by *Municipios* and MDRs, were limited to the identification and observation of environmental stresses. The historical financial dependency on governmental institutions from outside the community limited the development of adaptive actions at local level. *Municipios* financially depended on *Intendencias* and the National government from the *Presupuesto Nacional en el Fondo de Incentivo para la Gestión de Municipios.* [65] MDRs were funded by the MGAP, with a set amount of money and permission to implement particular national programs. Neither MDRs nor *Municipios* have the ability to collect taxes. Revenue collected from urban or rural properties in *Municipios* is sent to the *Intendencias*. *Municipios* develop annual budgets with a list of priorities and details of how financial resources were allocated, but these budgets need to be approved by *Intendencias.* Lack of financial capital and *Municipios'* dependency on the departmental government to pass rules and regulations was described in the four communities as a serious challenge for communities to mobilize local public resources.

> *"We would like to have more economic independence in order to achieve things that seem important and sometimes we have to wait longer for money and it is not because we cannot do things." NH- Alcalde*, January 17th, 2013

[65] Annually, *Municipios* receive $ 560.000 (Approximately $40,000 (Uruguayan Pesos) monthly) from the "*Fondo de Incentivo para la Gestión de los Municipios*" ("*Artículo 760 del Presupuesto Nacional*").

Most of the adaptations discussed in the MDRs relied on financial resources from national governmental institutions, such as MGAP or DINAMA. MDRs mostly focused on facilitating the local implementation of national programs to respond to environmental stresses such as droughts (see Table 4-12). Local actors mostly used MDRs to inform the National and departmental governments about observed environmental stresses and to request financial resources. These observations and demands were reported to centralized institutions in charge of implementing environmental regulations such as DINAMA or *Servicios Agrícolas* at the MGAP (see Table 4-10).

In the four communities (even in *Nueva Palmira*), after environmental stresses were identified by local actors at the periodic public meetings, *Municipios* and MDRs requested financial resources from *Intendencias* and/or governmental institutions such as DINAMA, *Ministerio de Vivienda, Ordenamiento Territorial, y Medio Ambiente* (MVOTMA), MTOP, and/or MGAP (see Table 4-12). In the four communities, the dependency on funding (and built capital) used for climate emergencies such as droughts or storms (provided by the Departmental Emergency Committee and MGAP) was described as detrimental to community empowerment. In this sense, all four *Municipios* and MDRs had important roles in coordinating multi-level collaboration between local commissions and departmental, national, and international institutions to allocate resources (e.g., financial capital) for adaptation from outside communities (see Table 4-12). Municipal collaboration with local civic groups and commissions coordinated the distribution of resources from the *Intendencias* and regional and national governmental institutions in charge of emergency plans in cases of severe weather events or climate emergencies. *Municipios* and MDRs convened local actors in multi-level collaborative

efforts for the allocation of all outside resources to cope with sudden environmental stresses such as droughts, severe storms, or tornadoes, working under the umbrella of *Comités de Emergencia Departamentales (Departamental Emergency Committees)* coordinated by *Intendencias* and multiple actors from departmental and national levels (such as *Fuerzas Armadas*, *Ministerio de Salud Pública, Ministerio del Interior*, *Rotary Club*, and *Club de Leones*).

Dependency on Human Capital

In all four communities participants highlighted the long-term dependency of communities on external human capital, which included technological and/or scientific information, and knowledge (provided by national institutions such as OSE, DINAMA, and MGAP) to monitor and control water and air quality. Lack of scientific information about observed environmental stresses at local levels made these problems difficult to prove by local actors and made it difficult to determine if existing environmental standards were met.

> *"Here, we know that the air is poor quality, but no one can prove anything because we depend on their results and they (DINAMA) did not give us anything to us or to the press." NP*- Member of GT and Local Historian, February 20th, 2013

In *NP*, *Cardona*, and *Dolores*, respondents highlighted that when technologies for air and water quality control were provided by DINAMA or OSE, it was difficult for local actors to access to their scientific results. The majority of the respondents view their community's capacity to control their natural resources as problematic, because of lack of technological and/or scientific information. Governmental institutions such as DINAMA

or MGAP relied on *Municipios* and MDRs and their members to report to these institutions (located in *Montevideo*) the state of local resources and potential environmental stresses such as pollution of water, air, and soil. However, in the four communities, interviewees highlighted the lack of incentives for reporting, including lack of feedback on information reported and its implications. Further local residents could not ascertain which cases of mismanagements resulting in pollution actually broke the law and needed to be reported. Respondents mentioned that communities needed more training courses and environmental education about environmental problems and existing standards. Community dependency on outside governmental institutions (especially *Intendencias*, DINAMA, MGAP, and OSE) and human capital was described as limiting their ability to take action and develop local adaptations that could include the enforcement of national environmental regulations and plans with active participation and role of communities.

> *"We need to introduce the concept of "water culture" in our society as a set, from urban to rural, and implement a policy of State on water management and irrigation, but with participation of rural communities."* MDR-D- Meeting Report Sent to MGAP- January 29th, 2009

In cases of violation of environmental laws, local residents had to inform (through *Municipios* or MDRs) departmental and national governmental institutions such as *Intendencias,* DINAMA, or MGAP, in charge of enforcement. According to respondents of the four communities, these institutions lacked sufficient inspectors to enforce national environmental laws at local levels.

> *"For us is very difficult to send complaints about mismanagement of glyphosate to the MGAP because we need to denounce our colleagues or neighbors." Dolores*- Director of Local Cooperative, December 6th, 2012

In the four communities, respondents mentioned that local people are many times afraid to complain because they have to provide information about their neighbors, colleagues, or friends, and do not know the procedure to report environmental problems such as mismanagement of agrochemicals to the *Intendencia*, DINAMA or MGAP.

Dependency on Built Capital

In the four communities, interviewees highlighted the lack of technology provided by OSE, MGAP, and/or DINAMA to control air and water quality. In *Cardona* and *Dolores*, interviewees highlighted their dependence on machinery and vehicles from the *Intendencia* (as part of the Departmental Emergency Committee) to respond to climate emergencies like droughts or storms.

Dependency on Political Capital and Resistance to Decentralized Governance

In *NH* and *NP*, interviewees mentioned political dependency on key institutions like OSE and MTOP to build sewer systems in these communities, which was described as a consequence of lack of political influences at national level. In *NP*, all the participants also described political dependency on national governmental institutions which "*decide the future of the community*."

In all four communities, respondents highlighted political dependency on the *Intendente* (State Governor) to decide about the availability and/or allocation of resources that can be used for adaptation at local level. A local elected official stated:

> *"(...) We always depend on external authorization (for everything)." NH- Alcalde*, January 17th, 2013

At the MDRs, interviewees highlighted the lack of political capability because of the dependency on MGAP to decide how to work with the community. Another major aspect of political dependency of communities on the central government was the lack of rules and regulations for infractions and/or new environmental stresses such as water pollution due to mismanagement of agrochemicals. In addition, MDRs, *Municipios*, and local residents lacked the ability to enforce these environmental laws or regulations at local level.

The creation of MDR-NH and MDR-C brought about a decrease in community external dependency. These two MDRs had been recently created by the initiative of local actors and staff of the MGAP. The empowerment of actors of MDR-NH and MDR-C was facilitated in both cases by the staff of the MGAP, which encouraged the actors involved to lead their own MDRs. However, local motivations for the creation of these two local MDRs were different. In MDR-C (*Cardona*), the empowerment of local actors was described as "top-down", motivated by staff of MGAP to respond to local demands of small farmers and other disadvantaged groups.

> *"I believe that decentralization is how to transfer power, which is not an easy task, but I believe that the MDRs are spaces for small farmers, fishermen, rural workers, they are for everyone (...) I think it is a space where the State attempts to transfer power to*

> *territories to know what to do and make the decision of whether or not (...) we are far from that but we have been working for that (...) A good example of that empowerment was when they (groups of local small farmers) developed the water projects for animal production and mitigation of water shortage."* MDR-C and MDR-D- Staff of MGAP, December 12th, 2012

In MDR-NH (*NH*) local actors were mainly motivated to create their own space for participation due to the "*inefficient responses from national state institutions*" (Local Market Actor, January 24th, 2013) and address adaptation according to local needs and sociocultural context.

> *"We got together to make a new path and be more efficient and competitive."* MDR-NH, Director of Local Cooperative, January 24th, 2013

Institutional organization and the goals of these governance structures were the main topics addressed by the recently created MDR-NH and MDR-C. Their goals were based on local needs (in *Cardona*) and local resources (in *NH*). In *NH*, MDR-NH developed "*Plan Estratégico de Desarrollo Rural del Este de Colonia*", a sustainable local plan for the eastern region of Colonia. This local plan included the construction of a large irrigation system (8,000 hectares) for the community to mitigate consequences of droughts, among other adaptive actions. However, it is still premature to evaluate the success of MDR-NH and MDR-C on their development of local adaptations, which mostly focused on their organizational needs such as the institutionalization of local groups of farmers in *Cardona* or the search of a MDR coordinator in *Nueva Helvecia*. Their results will depend on their ability to mobilize locally available resources that can be used for adaptation to environmental stresses, in contrast to their dependency on state actors from departmental and/or national levels. In addition, resistance to decentralization

programs and new governance structures and processes were mentioned by important actors in rural development in the four communities.

> *"There is some pressure from the MGAP that everything has to be done by the MDRs in order to legitimize this public space, but it is like everything; if you do things through the other ways, results are much faster because sometimes you call on the phone to the person you know and you do not need to come to the MDRs. Therefore, we cannot put rules that are obstacles."* MDR-C and MDR-D Staff of *Intendencia*, November 23rd, 2012

Some actors from the market and the State with significant influence on both causes and adaptations to environment stresses were demotivated to participate and showed some resistance to the new spaces and processes of decentralized governance, feeling that their interests were not part of the agendas.

> *"They (MDRs) are just spaces to articulate programs and policies (…) We (staff of Intendencia) have to participate and articulate (…) but you cannot go to a place and try to get larger farmers to have the same needs that have small farmers (…). Larger farmers have a different dynamic. Although they can be sensitive to the social problems of those guys (small farmers), the meeting is a waste of time for them. They sit there but topics are not of interest."* MDR-C and MDR-D Staff of *Intendencia*, November 23rd, 2012

The lack of continuity in participation among key actors made natural resources management and mitigation of environmental problems at the community level more difficult. Inconsistent participation impedes widespread local access to resources, such as information, knowledge, and technologies for adaptation to environmental stresses provided by key stakeholders from the market and/or the departmental and national governments.

Conclusions

In the four communities, *Municipios* and MDRs involved multiple actors through deliberative processes that included consultation at local government and program public meetings. Those meetings facilitated information exchange between participants about environmental problems that communities were experiencing. Identification and information about environmental stresses made these problems more visible to the community and among key governmental actors at higher levels, including *Intendencias*, DINAMA, and MGAP, who either attended or received information from these meetings. Discussions about environmental stresses in *Municipios* and MDRs facilitated mobilization of resources for adaptation, but mostly through national governmental institutions which developed new environmental laws, regulations, and programs. Most of the adaptive actions facilitated by governance processes of both *Municipios* and MDRs were developed by departmental or national level governmental institutions such as *Intendencias*, MTOP, MGAP or DINAMA. Adaptations elaborated by national governmental institutions focused on environmental regulations, laws, and emergency programs that were essential to accompany recent agricultural growth and climate change and their negative environmental consequences at local levels, but which were generalizable to the entire country.

At the community level, *Municipios* and MDRs distributed resources from regional and national governmental programs for adaptation, such as the *Fondo Agropecuario de Emergencias* or the Departmental Emergency Committees in cases of droughts, severe storms, and/or tornados.

Empowerment of rural communities (communities able to make and carry out their own collective decisions to mobilize locally available resources) was usually limited by their historic

dependency on outside resources from national government actors and lack of awareness of those resources that they themselves could mobilize at local level. By statute these local levels of government and programs are extremely limited in their ability to raise revenue, set rules and regulations, and determine their own budget priorities. In *NP*, the *Municipio* and local actors were able to collectively plan how to adapt and mobilize multiple local resources for adaptation. With the support of the *Municipio* in *NP*, active participation of multiple actors from local, departmental and national public and private entities participated in the local development of the *Plan de Ordenamiento Territorial*, which included multiple regulations to avoid environmental problems at the local level. This plan included new regulations for the rural-urban development of this community, which can be enforced by the local *Municipio* along with the *Intendencia*.

In all four communities, it was difficult for local actors to successfully develop bottom-up collective adaptive actions to environmental stresses and break their historic dependency on the Departmental and National governments to solve their problems. Consequently, dependence on external resources was negatively highlighted in the four communities by both the *Municipios* and the MDRs. Local decision making processes on adaptations were perceived by multiple actors from the four communities as limited by lack of *financial*, *human, built*, and *political capitals* at the community level. An example of communities and their critical dependency on external resources was observed during the field work when *Municipios* had to ask for external support after a tornado and severe storms on December, 6th 2012, which significantly affected *Cardona* and *Dolores.*

Development of adaptive actions through participation of local actors is limited when communities perceive that they have limited resources for adaptation, particularly limited human, built, financial and political capital. Those resources have to be requested from both

departmental and national governmental institutions. Resistance to decentralization programs and governments, mentioned by some major actors such as staff of *Intendencias* and important private actors, represents a challenge for communities, because it could undermine access to resources from outside communities.

Although the Uruguayan government has tried to develop new governance structures through decentralization programs, processes of governance of adaptations to environmental stresses still work under old paradigms of centralized government, limited to the creation of spaces for deliberation which focus on information exchange. According to Taylor (2007), despite recent rhetoric regarding decentralization in the Global South, new spaces of governance at the community level still are characterized by imbalances between participants and continuing centralization, with some of regional and national governmental institutions influencing governance at the local level. In Uruguay, new models of decentralized governance have focused on obtaining input from locations where the decisions are implemented (in communities), but the decisions have been made centrally and are universalistic rather than adjusted to local circumstances. New governance efforts by the central government have tried to facilitate regional and communal partnerships and collaborations (mostly through information exchange) at local levels, but the political power of communities still need to be strengthened to both develop and implement adaptations to environmental stresses.

Participation of multiple actors at *Municipios* and MDRs provided useful information to governmental institutions for the development of laws, policies, and regulations that could have an important role in preventing future environmental problems like soil erosion and water pollution. New laws and programs were needed to reinforce and legitimize local adaptive actions to environmental stresses. But these laws were made for the country as whole, without taking

into account the particular circumstances of heterogeneous rural communities. Implementation of new laws and regulations at community level will depend on the efficiency of the national governmental institutions (such as DINAMA or MGAP) and community involvement. *Municipios* and MDRs could have a very important role in developing and enforcing regulations and adaptations to environmental stresses at the community level. The recently created *Observatorio Ambiental Nacional*[66] could represent an opportunity for rural communities and local actors to actively participate in management of their natural resources and adaptations to environmental stresses. However, this will always depend on their access to key resources and their legitimacy among state actors from multiple levels.

[66] Law Nº 19.147 approved on November 4, 2013. See more: http://presidencia.gub.uy/comunicacion/comunicacionnoticias/ley-observatorio-ambiental-nacional

Figures and Tables

Figure 4-1: Selected Communities

Table 4-1: Selected Communities, *Municipios*, and MDRs

Nueva Helvecia (Colonia)	**Nueva Palmira** (Colonia)	**Cardona** (Soriano)	**Dolores** (Soriano)
Municipio NH MDR-NH	Municipio NP MDR- NP	Municipio C MDR- C	Municipio D MDR-D

Table 4-2: Number of Participants from each Community

Types of Actors	**Nueva Helvecia**	**Nueva Palmira**	**Cardona**	**Dolores**
State	5	4	8	5
Market	8	6	4	7
Civic Society	10	10	7	9
TOTAL	23	20	19	21

Table 4-3: Minutes of Meetings by MDRs and Years

Year	**MDR-NH**	**MDR- NP**	**MDR- C**	**MDR-D**
2007		1		
2008		6		3
2009		6		
2010		3		
2011		12	1	2
2012	17	16	3	1
TOTAL	17	44	4	6

Table 4-4: *Municipios* on Local Discussions of Environmental Stresses

Nueva Helvecia	*"We do not have a sewer system, and water is a delicate issue here. A sewer system has not been built because there is no governmental and political will for that, but the creation of Municipio has been very positive (...) Now for these mayor problems we try to communicate everything to the Alcalde."* President of *Fuerzas Vivas*, January 22nd, 2013
Nueva Palmira	"*The State does not require anything to control the environment (...) We have been able to actively involve people, to make them aware (of environmental problems) and people joined and supported us (...) People are no longer disinterested in what happen in the community." Alcalde*, January 15th, 2013
Cardona	*"Those topics (water and air pollution) are not specifically under the jurisdiction of the Municipio, but we talk about those problems with local residents (at the public meetings)." Alcalde*, November 22nd, 2012
Dolores	"*When the neighbors come and complain about pollution, we try to give them a hand in what we can*." *Alcalde*, December 5th, 2012

Table 4-5: *Municipios* and Communities on Empowerment for Adaptation

Community	Number of times that meetings discussing environmental stresses (among other problems) were identified.	Average number of collective decisions per meeting.[67]	Average number of times that local resources for adaptation were mobilized per meeting.[68]	Average number of times external resources were mentioned per mention of mobilization of internal resources.[69]
Nueva Helvecia	47	0.55	0.53	1.40
Nueva Palmira	45	0.97	2	0.76
Cardona	26	0.42	0.30	4.20
Dolores	28	0.21	0.75	2

[67] Number of described collective decisions divided by the number of described meetings related to environmental stresses.

[68] Number of times that local resources for adaptation were (described as) mobilized divided by the number of the described meetings.

[69] Number of times that external resources for adaptation were mentioned divided by the number of times that local resources were (described as) mobilized.

Table 4-6: Mobilized Local Resources for Adaptation

Communities	Municipios and MDRs	Mobilized Local Resources for Adaptation by Community Capitals
Nueva Helvecia	**Municipio**	Built Capital: Improvement of the local hospital (**B1**)[70]. Improvement of the fire station (**B2**). New swimming pool (public-private partnership)./ New roads to avoid heavy transportation in urban areas./ Recycling program (MIDES, local ecologists, and *Municipio*) (**B3**). / Improvement of recreational park "*El Retiro*."
	MDR	Human Capital: Training courses about new laws of soil management, mitigation of negative consequences from droughts, and management of agrochemicals (**H1**)./ Plan for collective irrigation project for 8,000 hectares./ "*Plan Estratégico de Desarrollo Rural del Este de Colonia*" (Sustainable Rural Development Plan which includes alternative energies, irrigation systems, and environmental education, among other adaptations) for the community. Political Capital: Creation of the MDR-NH.
Nueva Palmira	**Municipio**	Human Capital: Gathering scientific information about water and air quality, labor and environmental conditions at the port, and natural protected areas, among others./ Gathering information about development projects, sew system, housing projects and the environment, and the jurisdiction of the *Municipio* in the river. Financial Capital: Support of the collective initiatives done by the GT. Built Capital: B1./ B2./ Installation of filters for air quality controls (**B4**)./ Construction of new routes and gates at the city limits to avoid heavy transportation./ Construction of new areas for heavy transportation outside the city limits./ Political Capital: Strengthened local relationships and more participation of multiple local actors./ Collective mobilization to demand outside resources with governmental institutions./ *Plan de Ordenamiento Territorial* (POT). Cultural Capital: Promotion of information and "collective consciousness" of environmental stresses. Natural Capital: Inclusion of protected natural area "*Arroyo Higuerita*" into the POT./ GT and the *Municipio* stopped locally called "top-down projects" that were considered as generating environmental stresses (e.g. new port for barges, new industry for soybeans oil (Ceroil), etc.)./ Required national institutions (DINAMA and MGAP) to apply existing environmental regulations (about air and water quality) in port and agriculture industries (silos). Social Capital: Support to GT and social mobilization through protests, public meetings, and negotiations with external governmental institutions.
	MDR	Human Capital: H1./ Development of a tracking system for beneficiaries of climate emergency assistant for small farmers provided by the MGAP.
Cardona	**Municipio**	Financial Capital: Improvement of the fire station to assist local farmers in case of droughts. Human Capital: Training courses about agrochemicals./ Training courses about droughts. Political Capital: Development of collective reports (for DINAMA and *Intendencia*) about water and air quality controls at the local dairy industry.
	MDR	Human Capital: H1 Built Capital: Construction of collective wells./ Recycling of agrochemicals' containers (**B5**)./ Access to more public land with natural pastures for small livestock producers ("*Los Peques*").
Dolores	**Municipio**	Built Capital: B3./ B4./ B5./ Access to machinery used after storms and/or tornadoes in coordination with the Departmental Emergency Committee. Human Capital: H1
	MDR	Built Capital: B5 Human Capital: H1

[70] Abbreviations for the resources that are repeated.

Table 4-7: MDRs on Local Deliberations about Environmental Stresses

MDR- NH	*"We are worried, and we discuss the constraints that generated recent transformations in various environmental dimensions."* Market Actor, January 24th, 2013
MDR- NP	*"We get together to see and discuss issues such as: land access, problems of climate change, changes in natural resources and farms, water and soil resources, and changes in biodiversity."* Staff of MGAP, December 12th, 2012
MDR- C	*"Complaints about mismanagement of agrochemicals and the wash of their containers in creeks or rivers are super common (...) These practices are discussed in the MDRs…"* Staff of *Intendencia*, November 23rd, 2012
MDR- D	*"In the MDRs we received and listened everything regarding the application of agrochemicals or problems like pollution or contamination of water."* Local Farmer, December 3rd, 2012

Table 4-8: MDRs and Communities on Empowerment for Adaptation

Community	Number of times that meetings discussing environmental stresses (among other problems) were identified.	Average number of times that collective decisions happened per meeting.[71]	Average number of times that local resources for adaptation were mobilized per meeting.[72]	Average number of times external resources were mentioned per mention mobilization of internal resources.[73]
Nueva Helvecia	17	0.47	0.76	0.38
Nueva Palmira	4	0.50	0.75	0.33
Cardona	13	0.69	0.92	1.30
Dolores	8	0.37	0.12	21

[71] Number of described collective decisions divided by the number of described meetings related to environmental stresses.

[72] Number of times that local resources for adaptation were (described as) mobilized divided by the number of the described meetings.

[73] Number of times that external resources for adaptation were mentioned divided by the number of times that local resources were (described as) mobilized.

Table 4-9: Mobilized Resources for Adaptation and Governance Processes- According to the Minutes of Meetings of MDRs[74]

MDRs & Adaptations	Discussions about Environmental Stresses Between Local Actors and Governmental Institutions	Collective Decisions and Mobilization of Local Resources
MDR- NH 17 Meetings	Number of Times: 2	Number of Times: 1
		Average Times per Meeting: 0.50
Capitals Mobilized	Financial Capital: Subsidies and loans (from the MGAP) for small livestock producers and dairy farms to build water reservoirs and practice better livestock management.	Human Capital: Creation of "*Plan Estratégico de Desarrollo Rural del Este de Colonia.*"
MDR-NP 44 Meetings	Number of Times: 127	Number of Times: 39
		Average Times per Meeting: 0.31
Capitals Mobilized	Financial Capital: Subsidies and loans (from the MGAP (2011-2012)) for small livestock producers and dairy farms to build water reservoirs and practice better livestock management. Human Capital: Demand and/or informative resolutions (notes to or from MGAP) about: *Llamado a Fortalecimiento Institucional* (to facilitate access to resources by small farmers); management of agro-chemicals, management of soil with more rotations; water management; supplement of sugar for beekeepers in case of droughts; emergency assistant of water or fodder for small farmers (*Fondo Agropecuario de Emergencias* and *Comité de Emergencia Departamental*) during droughts; new laws and regulations (from the State (since 2010)) for soil management (*Planes de Uso y Manejo Responsable del Suelo*) and use of agrochemicals.	Human Capital: Training courses about management of agrochemicals and new pests: creation of *Sub-Mesa de Capacitación*. Built Capital: Recycling of agrochemicals' containers.
MDR-C 4 Meetings	Number of Times: 1	Number of Times: 0
		Average Times per Meeting: 0
Capitals Mobilized	Human Capital: Registration of damages in case of climate emergencies to improve the coordination for the distribution of resources from the *Municipio* and *Intendencia*.	
MDR- D 6 Meetings	Number of Times: 3	Number of Times: 1
		Average Times per Meeting: 0.33
Capitals Mobilized	Financial Capital: Subsidies and loans (from MGAP (2011-2012)) for small livestock producers and dairy farms to build water reservoirs and practice better livestock management.	Built Capital: Recycling of agrochemicals' containers.
4 MDRs- Total	Number of Times: 133	Number of Times: 41
		Average Times per Meeting: 0.31

[74] Total of 71 Meetings Analyzed (from 2007 to 2012).

Table 4-10: Described Community Dependency on External Resources: *Municipios* and MDRs

Municipio NH	*"We still lack a lot (of resources) because many of us depend on Intendencias and the national government." Alcalde*, January 17th, 2013
MDR-NH	*"The MDRs want to help small producers but not in a good way (...) we are always waiting resources to continue the agony"* Farmer, January 22nd, 2013
Municipio NP	*"From the point of view of our instruments and resources we have nothing, we are fighting with a toothpick (...) It is not clear what are our legal responsibilities and what is our powers in the decentralization process, we have a range of issues that we can review but is the Intendencia or the national government who decide. Decentralization without the ability to decide is a pipe dream." Consejal*, December 20th, 2012
MDR-NP	*"All the meeting resolutions were voted (...) The criteria for obtaining and distribute fodder (during droughts) from the MGAP could be internally negotiated."* Staff of MGAP, December 12th, 2012
Municipio C	*"In regard to the environmental problems (water pollution and odors) of the local dairy industry, we have to work with the Intendencia, sending them the local complains and demands (...) that was a great problem the community had, but today, the roles of Municipios are still uncertain." Alcalde*, November 22nd, 2012
MDR-C	*"We depend on outside resources often because small producers have no choice (...)What we have done in the MDRs is to transfer needs to the MGAP, then they see potential solutions can give us."* Farmer, November 22nd, 2012
Municipio D	*"Local problems are channeled through the Municipios (...), but the Alcalde is the executive arm of the Intendencia and still depends on the Intendente."* Staff of *Intendencia*, November 20th, 2012
MDR-D	*"We participate and process the topics, but we depend on them (MGAP) to give us the resources."* Director of Local Cooperative, December 6th, 2012

Table 4-11: Dependency and Local Participation

Nueva Helvecia	"*For the recycling plan made by the community people participated but needed the support (financial, built, and political) of the Intendencia to continue so it could no longer go on*." Local Ecologist, January 22nd, 2013
Nueva Palmira	"*People here participate but development is too centralized for decision making and for the collection (of revenues) and investment (...) decisions are made in Montevideo but here there is a total absence of the State in environmental control" Consejal*, December 20th, 2012
Cardona	"*There is participation because people go to the meetings and we discuss problems with neighbors in all neighborhoods, things are included in the budget that goes to the Intendencia, but then it is up to them to allocate resources. We sent them 13 points collected by residents in different neighborhoods but the Intendencia only took two or three of our points*." *Consejal*, December 13th, 2012
Dolores	*"People do not understand yet because they want to participate and the Intendencia still has not given us full support because we are totally dependent on the Intendencia, economically not to mention that everything is collected and send to them, and they do what we asked or they want (...) that postpones our problems, and people sometimes do not understand that."* Local Journalist, December 10th, 2012

Table 4-12: External Resources for Adaptation

	Municipios and MDRs	Described Critical Resources for Adaptation from Outside Communities by Community Capitals
Nueva Helvecia 86%[75]	**Municipio**	Financial Capital**:** Funding from OPP and *Intendencia* (**F1**) [76] (e.g., lack of support undermined the local recycling program). Political Capital: Decisions made by national governmental institutions (**P1)** (e.g., lack of sewer system). Human Capital: Technological and scientific information, and knowledge (provided by OSE, DINAMA, and MGAP) to control water and air quality (**H1**)./ Incentives and knowledge for environmental education (**H2**).
	MDR	Financial Capital: Funding used for climate emergencies like droughts or storms (provided by the Departmental Emergency Committee and MGAP) (**F2**)./ Periodic funding from the MGAP and *Intendencia* (**F3**). Political Capital: Lack of political capability (from staff of MGAP) to decide how to work with the community (**P1**). Built Capital: Technology to control air and water quality (OSE, MGAP, and DINAMA) (**B1**).
Nueva Palmira 87%	**Municipio**	Financial Capital: F1 Political Capital: Major decisions are made by the *Intendente* (**P2**). Human Capital**:** H1 Built Capital: B1
	MDR	Financial Capital: F2 Human Capital: H1
Cardona 80%	**Municipio**	Financial Capital: F1./ F2 Political Capital**:** P2 Human Capital**:** H1./ H2 Built Capital**:** B1./ Machinery used for climate emergencies like droughts or storms (mostly provided by the Departmental Emergency Committee and MGAP) (**B2**).
	MDR	Financial Capital**:** F2./ F3 Political Capital: P1 Human Capital**:** H1./ H2
Dolores 85%	**Municipio**	Financial Capital: F1 (e.g., lack of support undermined the local recycling program)./ F2 Political Capital: P2 Human Capital: H1./ H2./ Knowledge about the *Plan de Ordenamiento Territorial* (created by the *Intendencia* and MTOP). Built Capital**:** B1./B2
	MDR	Financial Capital**:** F2 Political Capital: P1 Human Capital: H1./ H2

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[75] Percentage of respondents who identified lack and dependency of external resources as critical for developing local adaptations to environmental stresses.

[76] Abbreviations for the resources that are repeated.

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CHAPTER 5. CONCLUSIONS, IMPLICATIONS, AND FUTURE RESEARCH

Conclusions

Communities around the world are increasingly experiencing environmental stresses from natural and human causes (World Bank 2013). It is important to explore how communities deal with environmental stresses at the local level and identify important factors that influence adaptation at the local level.

The four communities from southwestern Uruguay analyzed in this study experienced environmental stresses created by climate and anthropogenic changes, especially by changes in agriculture driven by FDI in this region. Impacts of environmental stresses were described as less significant in *Nueva Helvecia* (*NH*) than in the other three communities. This was attributed to the influence of *cultural capital* on how *NH* was organized (*social* and *political capitals*) to develop local anticipatory adaptive actions. Results from *NH* showed that *cultural capital* strengthened *social* and *political capitals* to develop adaptive responses rooted in the local culture/s. The construction of collective identity based on a particular ethnic group led to stronger social and political capitals, which was essential to keep the collective memory of environmental stresses experienced and adaptive actions that worked well in the past. Results from *NH* show that mobilized cultural capital can have an important role on making communities better prepared to deal with environmental stresses, making social relationships within and outside communities stronger. *NH* found that mobilized cultural capital could provide multiple benefits for the community. Local appreciation of *cultural capital* that facilitated adaptive actions to environmental stresses in the past enabled *NH* to use cultural capital as a tool to increase community sustainability and well-being. However, participants from this community

highlighted that appreciation of climate changes and new agriculture technologies could undermine positive aspects of adaptations that worked in the past. Participants highlighted that the sustainability of local adaptive practices such as agriculture diversity and local "culture of reserves" were being challenged by the adoption of new agriculture technologies, which was leading to intensification and overexploitation of local resources.

The experiences from *NH* and *Nueva Palmira* (*NP*), the two communities in Colonia, showed that mobilization of *social* and *political capitals* (collective agency) for adaptation to environmental stresses occurred after environmental and other stresses were experienced and recalled by communities. The experiences of these two communities showed that mobilization of social and political capitals led to mobilization of other resources used for adaptation to environmental stresses. The different responsive characteristics of *NP* and *Dolores* demonstrated that the experience of environmental stresses was not enough for the mobilization of collective agency for adaptation at local level. In *NP*, collective mobilization for adaptation to environmental stresses occurred when multiple stresses in all of the community capitals undermined community well-being. *NP* experienced negative changes in all of their community capitals, and local resources were mobilized collectively (high *bonding social capital*) at the local level. In *Dolores*, changes in most of the community capitals were observed as positive. Consequently, the community lacked collective agency for adaptation to environmental problems.

In *NP*, collective agency driven by the creation of *Grupo de Trabajo* (Work Group) and the involvement of local actors from the market and the state (*bonding social capital*) not only facilitated resources for adaptation to environmental stresses but also to other problems the community was experiencing. For example, the community developed the *Plan de*

Ordenamiento Territorial which included local construction regulations and plans. Results from *NP* showed that collective agency also needs to involve actors from regional, national, and/or international levels (*bridging social capital*), who could facilitate outside resources or capitals. Experiences of *NP* showed that collective agency may not succeed in implementing adaptations to environmental stresses when key actors from outside communities (e.g., DINAMA) are not locally involved. Better access to *human capital* (knowledge) used to understand and minimize environmental stresses is critical as well. Differences between *Dolores* and *NP* showed that social mobilization and capability for adaptation outcomes were influenced by *political capital* in multi-level relationships (*bridging social capital*) between local and outside actors. In *NP*, the political nature of external relationships not only fostered social mobilization at local level but also influenced lack of access to resources such as *human capital* (e.g., scientific information about air quality) from outside the community. Community experiences with risks created by environmental stresses need shared actions and responsibility at different levels of society (World Bank 2013) to facilitate flow of resources and access at the local level.

Decentralized multi-level governance could facilitate adaptive actions according to local needs when communities were empowered in decision-making processes. *NP* was able to collectively decide and mobilize community capitals together with governmental institutions from departmental and national levels. Collaboration between the community and *Intendencia* facilitated the creation of the local *Plan de Ordenamiento Territorial*.

Municipios and *Mesas de Desarrollo Rural* (MDRs ('Round Tables for Rural Development')) demonstrated how decentralized multilevel governance for adaptation to environmental stresses (involving actors from the state, the market, and the civil society) worked at local level. Results of this study demonstrated that these governments and programs facilitated

deliberation processes at public meetings to address environmental stresses in the four communities. Therefore, these meetings made environmental stresses more visible at local level. In addition, *Municipios* and MDRs facilitated access to and better distribution of key outside resources used for adaptation to environmental stresses, especially from the *Departmental Emergency Committees* and the MGAP, in case of climate emergencies such as droughts and severe storms.

Participants highlighted that *Municipios* and MDRs mostly used consultation and information exchange to address environmental stresses at their meetings. *Municipios* and MDRs facilitated information exchange, which mostly led to adaptive actions by the national government. For example, the MGAP facilitated new emergency climate programs and regulations about soil management.

Empowerment of communities was limited by their historic dependency on outside resources from national government actors and lack of awareness of those resources that they themselves could mobilize at local level. Dependence on external resources was negatively highlighted in the four communities, as an obstacle to collectively mobilize locally available resources. Community empowerment for adaptive actions at the local level was minimal, due to the limited resources that were devolved, reinforcing historic and current dependency on regional and national governmental institutions for those resources. Local decision making processes of adaptations were perceived by multiple actors from the four communities as limited by lack of *financial*, *human, built*, and *political capitals* at the community level. Therefore, development of 'bottom-up' adaptive actions through active participation of local actors is limited when communities perceive that they have limited resources for adaptation, particularly limited *financial*, *human*, *built*, and *political capital*. In the four communities, these resources were

mostly requested to both departmental and national governmental institutions such as *Intendencias* and ministries.

Policy and Practical Implications

The findings of this study have policy and practical implications for multiple types of stakeholders involved in governance and community adaptations to environmental problems. Results show that Uruguayan governmental efforts to develop new governance structures and process through decentralization programs and policies contribute to making environmental stresses more visible at the local level. The experiences of *Municipios* and MDRs at the four communities explored in this research demonstrated how decentralized governance can facilitate information exchange between different types of stakeholders from local, regional, and national levels. This study demonstrates how decentralized governments and programs facilitated important adaptive actions to environmental stresses from national governmental institutions and the State, especially funding (*financial capital*), scientific knowledge (*human capital*), and technology (*built capital*) used to mitigate environmental problems at the local level. Results from this study demonstrated that local access to these resources is very important for communities to successfully adapt to environmental stresses. However, communities need to collectively mobilize (*social capital*) and be able to decide (*political capital*) about the allocation of both local and outside resources, prioritizing local and communal needs. In addition, for communities to be able to better control and regulate their natural capital, it is important to have public policies in place and legitimacy (across multiple levels) to support their actions.

In Uruguay, the empowerment of the institutional structures and deliberation processes of the communities with *Municipios* and MDRs could lead to community-based governance, better

flow (vertical and horizontal) of capitals, and locally-adapted strategies for adaptation to environmental stresses created by both natural and anthropogenic phenomena. Recently created governmental institutions such as the *Sistema Nacional de Respuesta al Cambio Climático, Centro de Transferencia de Tecnología Para Cambio Climático y el Desarrollo Sustentable, Observatorio Ambiental Nacional, Grupo Interdisciplinario de Investigación del Cambio Climático of Universidad de la República* (UdelaR) could contribute to this. Results from this study could be valuable to these institutional efforts and similar decentralization and adaptation efforts in other regions.

Theoretical Implications and Future Research

Resilience and appreciative inquiry theories can facilitate the identification of community cultural capital that worked well for adaptations to environmental stresses in the past. However, results from this study show that locally appreciated cultural capital could also led to unsustainable practices or maladaptation, which could make communities more vulnerable to environmental and other stresses. Future research could explore how communities could re-evaluate ongoing adaptive actions rooted in their culture/s.

Literature of the commons, natural resource co-management and governance, and climate change adaptation highlight the importance of mobilizing both *bridging* and *bonding social capital* of communities dealing with environmental stresses. This study demonstrated that bonding social capital was mobilized after communities had experienced significant stresses (*NH* and *NP*) that produced disruptions in all of the community capitals. Social movement, natural disaster, and emergency management literature could significantly contribute to better

understand the processes of long-term community mobilization for adaptation to environmental stresses at the local level.

This study showed that decentralized "multi-level governance" or "network governance" (*bridging social capital*) for adaptation, including local, regional, and national stakeholders need to explore political capital. It is critical for outside stakeholders participating in community-based adaptations to environmental stresses, to facilitate flow of resources but assuring communities to mobilize and allocate resources at local level. Future research could explore different models of multi-level governance and the role of political capital in different sociopolitical contexts.

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APPENDIX A. INSTITUTIONAL REVIEW BOARD APPROVAL OF RESEARCH INVOLVING HUMANS

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 10/25/2012

To: Diego Thompson Bello
315 East Hall

CC: Dr. Cornelia Flora
317 East Hall
Maria Silvina Lopez Barrera
3917 Quebec St

From: Office for Responsible Research

Title: The influence of community governance structures and processes on adaptive actions to disturbances and increasing risks in four communities in Southwestern Uruguay.

IRB ID: 12-474

Approval Date:	10/24/2012	**Date for Continuing Review:**	10/15/2014
Submission Type:	New	**Review Type:**	Full Committee

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, **including the recruitment materials and informed consent documents that have the IRB approval stamp.**
- **Retain signed informed consent documents for 3 years after the close of the study**, when documented consent is required.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting a Modification Form for Non-Exempt Research or Amendment for Personnel Changes form, as necessary.
- **Immediately inform the IRB of** (1) **all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems involving risks** to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Please be aware that IRB approval means that you have met the requirements of federal regulations and ISU policies governing human subjects research. **Approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **IRB approval in no way implies or guarantees that permission from these other entities will be granted.**

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.

APPENDIX B. INFORMED CONSENT DOCUMENTS USED WITH PARTICIPANTS

Title of Study: "The influence of community governance structures and processes on adaptive actions to disturbances and increasing risks in four communities in Southwestern Uruguay."

Investigator: Diego Thompson

This is a research study. Please take your time in deciding if you would like to participate. Please, feel free to ask questions at any time.

The purpose of this study is to see who are the main actors from the community that make local decisions, what are the local opportunities for participation in local issues, and what are the local plans for adaptation to significant changes such as severe weather events, human mismanagement, pollution, deterioration of infrastructure, etc. You are being invited to participate in this study because you are involved in the community.

If you agree to participate, you will be asked to answer questions about what are the changes and risks from phenomena such as climate change or globalization that this community have faced, how local decisions are made, and what are the things the community has made for reducing risks or adapting to these changes. To answer the question about possible changes and what the community has made, I will read you a list with different options. Your participation will last for 1.5-2 hours for answering a questionnaire and the interviews will be audio-recorded. While participating in this study you will not experience any foreseeable risks. I will not ask you anything in regard to how you perceive political decisions or anything that could compromise your job, your public position, or your social status, or something that could represent any conflict or foreseeable risk for you.

If you decide to voluntarily participate in this study may be no direct benefit to you. It is hoped that the information gained in this study will benefit communities by informing policy makers and researchers about how local governance and local adaptations to phenomena such as climate change or globalization could be improved. You will not have any costs from participating in this study and you will not be compensated for participating in this study.

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate it will not result in any penalty or loss of benefits to which you are otherwise entitled. You can skip any questions that you do not wish to answer.

Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a

committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

Private Citizens: Your name and contact information will never be attached to your data. If the results are published, your identity will remain confidential.

Public Officials: As the communities involved in this study are small, even without using your actual names, local people could identify those who occupy the public positions and infer who they are. Therefore, true confidentiality is not possible for public officials because their names need to be used.

To ensure confidentiality to the extent permitted by law, I will ensure confidentiality by storing digital recordings and transcripts in secure files, separating them from your contact information. The computers that will be used are password-protected, securely stored, and no one else will have access to them. A locked cabinet, desk, and/or office will be used to secure the physical data. These measures apply in both the United States and Uruguay.

You are encouraged to ask questions at any time during this study. For further information about the study contact PhD student Diego Thompson or Dr. Cornelia Flora. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document, and that your questions have been satisfactorily answered. You will receive a copy of the written informed consent prior to your participation in the study.

Participant's Name (printed) _____

_____ _____

(Participant's Signature) (Date)

IN SPANISH

Título del estudio: "La influencia de las estructuras y procesos de gobernanza comunal en acciones adaptativas a cambios significativos e incremento de riesgos en cuatro comunidades del suroeste de Uruguay."

Investigador: Diego Thompson Bello

Este es un estudio de investigación de doctorado en Sociología y Agricultura Sostenible. Por favor, tome su tiempo en decidir si acepta participar. Por favor siéntase libre de hacer preguntas en cualquier momento.

El propósito de este estudio es de ver quiénes son los principales actores en la comunidad que participan en decisiones locales, cuáles son las oportunidades locales que existen para participar en decisiones que afectan a la comunidad, y cuáles son las respuestas o planes de adaptación a cambios significativos provocados por la naturaleza o por el hombre como eventos climáticos severos, crisis económicas, contaminación, etc. Usted está invitado a participar en este estudio porque está involucrado en asuntos locales de la comunidad.

Si usted decide participar, le hare preguntas sobre los cambios y riegos que la comunidad ha experimentado, provocados por el cambio climático o por el fenómeno de globalización, como las decisiones sobre la comunidad son tomadas, y cuáles son las cosas que la comunidad ha hecho para adaptarse o reducir riesgos sobre estos cambios. Para responder sobre estas preguntas sobre lo que la comunidad ha hecho, le leeré una lista con diferentes opciones. En total le llevara como 1.5-2 horas en responder este cuestionario y el audio de la entrevista será grabado. Su participación no le implicara ningún riesgo. No le preguntare nada sobre su percepción de decisiones políticas o que pueda comprometer su trabajo, su posición pública, o su status social, o algo que pueda significar un conflicto o riesgo para usted.

Si usted decide de voluntariamente participar en este estudio no podría ser directamente beneficiado pero se espera que la información recabada por este estudio pueda beneficiar a las comunidades investigadas, informando a los que intervienen en toma de decisiones y políticas para que se pueda mejorar la adaptación a fenómenos como el cambio climático o la globalización. Usted no recibirá ninguna remuneración por participar en este estudio.

Su participación es completamente voluntaria y usted puede rechazar de participar o dejar el estudio en cualquier momento. Si decide no participar en el estudio o dejar de participar, no tendrá ninguna penalidad. Usted puede saltear cualquier pregunta que no quiera responder.

Los registros utilizados para identificar participantes permanecerán confidenciales como lo dicen las leyes y regulaciones. Sin embargo el gobierno federal de EEUU puede auditar a la Universidad Estatal de Iowa, y la oficina de Institutional Review Board (un comité que revisa y aprueba todas las investigaciones que involucran seres

humanos) que puede inspeccionar y/o copiar los registros para asegurar la calidad de la información. Estos registros pueden contener información privada.

Ciudadanos privados: Ni su nombre, ni su dirección estarán enlazados con los documentos y cintas que contienen su entrevista. Si publicamos información de esta entrevista, su identidad se mantendrá en secreta.

Ciudadanos públicos: Dado que las comunidades de este estudio son pequeñas, incluso sin usar su nombre, la gente local podría identificar quienes ocupan puestos públicos e inferir quienes son. Por lo tanto confidencialidad total no es posible para figuras públicas ya que sus nombres necesitan ser usadas.

Para proteger su identidad, guardaremos los documentos y grabaciones digitales bajo llave y separados de donde este su nombre. Las computadoras que utilizare estarán protegidas conclaves y códigos de seguridad, seguramente guardadas, y nadie más tendrá accesos a las mismas. Un armario bajo 11ave, un escritorio, y una oficina serán usados para proteger la información material. Estas medidas se aplicaran tanto en Estados Unidos como en Uruguay.

Recuerde que puede hacer preguntas en cualquier momento durante este estudio. Por más información sobre este estudio puede contactar al estudiante de doctorado Diego Thompson, o Dr. Cornelia Flora. Si tiene preguntas sobre los derechos de investigaci6n sobre sujetos o sobre posibles perjuicios de la investigación, por favor contacte a la oficina de IRB (515) 294-4566, IRB@iastate.edu, o al Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Su firma indica que usted voluntariamente acepta participar en este estudio, que el estudio le ha sido explicado, que ha tendido el tiempo de leer este documento, y que sus preguntas han sido satisfactoriamente respondidas. Usted recibirá una copia de este consentimiento antes de su participaci6n en este estudio.

Nombre del Participante (escrito) _____

_____ _____

(Firma del participante) (Fecha)

APPENDIX C. PHONE/VERBAL SCRIPTS AND E/MAILS TO CONTACT POTENTIAL PARTICIPANTS

Hello,

My name is Diego Thompson and I am a doctoral student at Iowa State University, USA. I am doing my dissertation research on community governance and local adaptations to significant changes and risks in Dolores, Cardona, Nueva Palmira, and Nueva Helvecia. The purpose of this study is to see who are the main actors from the community make local decisions, what are the local opportunities for participation in local issues, and what are the local plans for adaptation to significant changes such as severe weather events, economic crisis, human mismanagement, pollution, etc. I got your contact information from a website/phone directory/or X contact list which is publically available. Other actors from the community have mentioned your name or the institution you represent as an important stakeholder involved in local issues. Therefore, you are being invited to participate in this study because you are actively involved in the community.

I would like to meet you in person for about fifteen minutes to explain you details about this research and ask you for your voluntary participation as well as an informed consent form. If you accept to participate in this study, I will conduct an interview for about one hour and a half.

When are you available? I could stop by your office or we can meet in the place you prefer. Thank you.

Diego Thompson

APPENDIX D. QUESTIONNAIRE USED WITH KEY INFORMANTS FROM THE MARKET, STATE, AND CIVIL SOCIETY

Governance and Local Adaptive Actions

Questionnaire for key informants involved in the community (Market, State, and Civil Society).

Date and locality

_____

What is your name?

_____

Which institution/organization or people do you represent or are you affiliated with?

_____

I. DISTURBANCES AND LOCAL RESPONSES

_____

_____

I am interested in which are the significant changes and/or risks Nueva Palmira, Nueva Helvecia, Dolores, and/or Cardona has/have experienced and how impacted the local dynamics and different characteristics of the community. Significant changes or disturbances are facts that occurred and/or are currently occurring that represent risks and could significantly change (either positively or negatively) and/or alter the community. They could be provoked by nature like climate change, or by humans like pollution, overexploitation of natural resources, etc. Therefore, they could be anthropogenic or natural and they could be slow or sudden. In the first part of this interview, I will ask you about these changes and local responses. Part of this study is to explore what are the actions that Nueva Palmira, Nueva Helvecia, Dolores, and/or Cardona has/have developed in regard to these disturbances and risks. In this part of the interview I will ask you for the presence or absence of specific changes, adaptive actions to natural and/or anthropogenic disturbances and associated risks, when they were adopted, and what are other actions could be adopted or resources that institutions or civic society can provide for local and better risk reduction and local adaptations.

A. HUMAN-INDUCED OR ANTHROPOGENIC CHANGES AND ADAPTATIONS

Has Nueva Palmira, Nueva Helvecia, Dolores, or Cardona experienced the following changes or disturbances and associated risks?

1. **Exploitation of natural resources**

Yes ____ No____

If "Yes"…

1.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

1.b. *Have there been responses to mitigate risks or to adapt to this at the community?*

Yes_____ No____

(If "No", answer 1g), If Yes:

1.c. *What types of actions or responses have been developed to minimize associated risks or to adapt to this?*

_____

1.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

1.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and were possible?*

_____

1.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 1b:

1.g. *What are the actions that the community could develop to mitigate risks or adapt to the exploitation of natural resources? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

2. **Pollution at the community or its agroecosystems**

Yes ____ No____

If "Yes"…

2.a. *Could you briefly describe how this has happened and how this has affected the community?*

_____

2.b. *Have there been responses to mitigate risks or to adapt to this at the community?*

Yes_____ No____

(If "No", answer 2g), If "Yes":

2.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

2.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

2.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and were possible?*

_____

2.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 2:

2.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

3. Human-induced desertification and erosion of soils of the agroecosystems

Yes ____ No____

If "Yes"…

3.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

3.b. *Have there been responses to mitigate risks or to desertification at the community?*

Yes_____ No____

(If "No", answer 3g), If "Yes":

3.c. *What types of actions or responses have been developed to minimize risks or to adapt to desertification or erosion?*

_____

3.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

3.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and were possible?*

_____

3.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 3:

3.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

4. Biodiversity depletion or reduction

Yes ____ No____

If "Yes"…

4.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

4.b. *Have there been responses to mitigate risks or to adapt to this at the community?*
Yes_____ No____

(If "No", answer 4g), If "Yes":

4.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

4.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

4.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and were possible?*

_____

4.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 4:

4.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

5. Significant technological changes that affect the community and/or its agroecosystems

Yes ____ No____

If "Yes"…

5.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

5.b. *Have there been responses to mitigate risks or to adapt to this at the community?*

Yes_____ No____

(If "No", answer 5g), If "Yes":

5.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

5.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

5.e. *Could you briefly describe when (previous or post-events, ,)why, and how these actions have been developed and how they were possible?*

_____

5.f. *Do you think these actions helped the community to reduce risks or adapt to this change?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 5:

5.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

6. Deterioration of public infrastructure (recreational spaces, routes, streets, etc.)

Yes _____ No____

If "Yes"…

6.a. *Could you briefly describe how this has happened and how this has affected the community?*

_____

6.b. *Have there been responses to mitigate risks or to adapt to this at the community?*
Yes_____ No____

(If "No", answer 6g), If "Yes":

6.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

6.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

6.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and were possible?*

_____

6.f. *Do you think these actions helped the community to reduce risks or adapt to these changes?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 6:

6.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

B. NATURAL DISTURBANCES- *Has Nueva Palmira, Nueva Helvecia, Dolores, and/or Cardona experienced the following changes or disturbances and associated risks?*

1. Drastic changes in temperatures and seasonality that have affected communities' agro-ecosystems or people's health

Yes ____ No____

If "Yes"…

1.a. *Could you briefly describe how this has happened and how this has affected the community?*

_____

1.b. *Have there been responses to mitigate risks or to adapt to this at the community?*

Yes_____ No____

(If "No", answer 1g), If "Yes":

1.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

1.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

1.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

1.f. *Do you think these actions helped the community to reduce risks or adapt to these changes?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 1:

1.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

2. Extreme cold weather events

Yes ____ No____

If "Yes"…

2.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

2.b. *Have there been responses to mitigate risks or to adapt to this at the community?*

Yes_____ No____

(If "No", answer 2g), If "Yes":

2.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

2.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

2.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

2.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 2:

2.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

3. Hurricanes or strong winds

Yes ____ No____

If Yes…

3.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

3.b. *Have there been responses to mitigate risks or to adapt to this at the community?*

Yes_____ No____

(If "No", answer 3g), If "Yes":

3.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

3.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

3.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

3.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 3:

3.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

4. Droughts

Yes ____ No____

If Yes…

4.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

4.b. *Have there been responses to mitigate risks or to adapt to this at the community?*
Yes_____ No____

(If "No", answer 4g), If "Yes":

4.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

4.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

4.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

4.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

If it was answered "No" in 4:

4.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

5. Floods

Yes ____ No____

If "Yes"…

5.a. *Could you briefly describe how this happened and how this has affected the community?*

_____

5.b. *Have there been responses to mitigate risks or to adapt to this at the community?*
Yes_____ No____

(If "No", answer 5g), If "Yes":

5.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

5.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

5.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

5.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Could you give me an example?

_____

If it was answered "No" in 5:

5.g. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

C. Others... *Are there any other significant changes or risks provoked either by humans or nature that have affected this community? If so…please, could you describe them in order or significance and describe whether or not there have been actions to mitigate associated risks or adapt to these changes?*

_____

II. OTHER ADAPTIVE ACTIONS[77]

1. *Are there any other adaptive actions that were not mentioned before and have been developed at these communities? Do you know why they were developed and who have benefited from them?*

a. Sharing information and/or plans about possible risks and/or consequences of natural or anthropogenic disturbances (e.g., widely available weather information, urban/rural planning that includes contingencies for changing conditions, mechanisms to identify new technologies, and widely available information about international markets)._____
b. Development of new technologies and local innovations (e.g., plans, educational programs, special events, and financial incentives for the adoption of new technologies, technological innovation, and new management practices)._____
c. Development of mobility plans (e.g., relocation of households affected by floods, and relocation of livestock affected by drought)._____
d. Storage improvement (e.g., water reservoirs, crops, seeds, and forest products)._____
e. Asset portfolio diversification (e.g., educational programs for value added products, new crop varieties, new livestock breeds, and skills and occupational training)._____
f. Improvement of market exchange (e.g., local incentives for new economic projects, sharing information, educational programs, and training about: market access, insurance provision, transfer payments and new product sales)._____

[77] Some of the following adaptations are based on the work done by Agrawal and Perrin (2008; 2009).
Agrawal , Arun and Nicolas Perrin. 2008. "Climate Adaptation, Local Institutions, and Rural Livelihoods." IFRI Working Paper# W081-6. Retrieved May 5, 2012 (http://sitemaker.umich.edu/ifri/files/w08i6_agrawal_perrin.pdf).
------. 2009. "Climate adaptation, local institutions, and rural livelihoods." Pp. 350-68 in *Adapting to Climate Change. Thresholds, Values, and Governance*, edited by Adger, Neil, Irene Lorenzoni, and Karen L. O'Brien. Cambridge, UK: Cambridge University Press.

g. Actions for public risk awareness (e.g., educational programs, disaster preparation, campaigns, and distributing information)._____
h. Improvement of Local infrastructure (e.g., transportation networks (fluvial, terrestrial, and areal), recreational and public spaces, water supply, and sewage)._____
i. Protection of natural resources (e.g., conservation plans, regulations of land use, etc.)._____
j. Development of Specialization (e.g., specialized skills, knowledge about potential risks or changes)._____
III. COMMUNITY GOVERNANCE

In this section of the questionnaire, I will ask you about community governance, in other words; how decisions are made in this community. I am interested in exploring how different actors from the civic society, the market, and the state, participate in local issues through collective decisions and what are the resultant actions derived from collective participation in this community.

Part of this study is to explore which are the actors involved in the community. For this, I will ask you about them which will help me to identify and recruit potential participants of this study. In addition, this information will allow me to explore which are the different types of actors (private, civil society, or market) involved at the community and map all the connections between actors within and outside the community (from regional, national, and international levels). This will allow me to explore what is sociologically called bonding and bridging social capitals of communities, which are composed by actors' relationships within and outside communities.

I may contact some of these actors. I will keep their identities confidential for private citizens. Although, I am aware that this is a small community and private actors might be identified by their types of institutions or their positions at the community, I expect that this will not be the case in this study, and I will be able to keep their identities confidential. In the case of public officials, even without using your actual names, local people could identify those who occupy the public positions and infer who they are. Therefore, true confidentiality is not possible for public officials because their names need to be used.

I will eliminate the contact information of those you may name and I may not consider them as participants of this study.

III. 1. ROBUSTNESS OF INSTITUTIONAL STRUCTURE

1. *Which are the key actors actively involved in decisions that affect this community? What type of actors are they; Market, State, or Civic Society? Are these actors involved in local, departmental, regional, national, and/or international issues?*

a. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level of Involvement:_____

b. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level/s of Involvement:_____

c. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level/s of Involvement:_____

d. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level/s of Involvement:_____

e. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level/s of Involvement:_____

f. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level/s of Involvement:_____

g. *Name: _____Type of actor (Market, State, Civic Society): _____*

Level/s of Involvement:_____

h. *Name: _____Type of actor (Market, State, Civic Society): _____*

*Level/s of Involvement:*_____

i. *Name:* _____*Type of actor (Market, State, Civic Society):* _____

*Level/s of Involvement:*_____

j. *Name:* _____*Type of actor (Market, State, Civic Society):* _____

*Level/s of Involvement:*_____

2. ***a.*** *Which are the departmental or national* ***policies*** *or regulations that affect local decisions and the adaptive actions mentioned?*

_____

b. *Do you know why or how these policies were created?*

_____

c. *Could you describe how these policies or regulations affect local decisions and/or local adaptive actions at the community level?*

_____

d. *Do these policies affect your participation in local issues? Could you give me an example of that?*

_____

3. ***a.*** *What are the* ***resources*** *that your institution or group of people can mobilize or facilitate for the community's reduction of risks or adaptation to significant changes?*

*Financial*_____
*Built*_____
*Political*_____
*Social*_____
*Human*_____
*Cultural*_____
*Natural*_____

b. *Have you facilitated these resources in the past? Under what circumstances have you mobilized these resources?*

_____

c. *How your resources could be better used by the community?*

III. 2. HIGH LEVELS OF PROCESS OR DELIBERATION

1. ***a.*** *What are the local informal or formal opportunities for collective and direct participation in local issues? These opportunities could be planned and/or regular meetings, public assemblies, forums, etc.*

---

b. *Could you describe in details these spaces for participation?*

---

c. *What are the topics usually addressed in these meetings or spaces for participation? Could you name and describe them in details?*

*Financial*_____
*Built*_____
*Political*_____
*Social*_____
*Human*_____
*Cultural*_____
*Natural*_____

d. *What are the local actions that are discussed or resolved (from those you mentioned in the previous section)?*

e. *Who do organize these meetings?*

f. *How often are they organized?*

g. *Could you explain how they have been possible to exist over time?*

i. *What is your role in these meetings?*

j. *How these spaces of participation work? Could you describe the dynamic of these meetings?*

k. *Which are the actors that have more voice or vote in making decisions?*

l*. Are there actors from outside communities that influence local decisions? How? Could you give an example of that?*

2. ***a.*** *How would you describe the coordination among the different participants?*

Low_____ Medium____ High____

b. *What types of collaborations and/or associations exist in these meetings? Could you give me an example of that?*

c. *Who do participate in these collaborative efforts? These actors are from:*

c. ii. *Local community_____*
c. iii*. The same department_____*
c. iv. *From other departments of this region_____*
c. v. *From other country_____*

d. *How is the community benefited from these collaborative efforts and participation of different actors at the local level?*

e. *What are the local benefits from the participation of actors from outside the community? What are the resources institutions from outside the community can provide?*

f. *How does the coordination among participants could be improved?*

3. *Are the participants responsible for the decisions they adopt in these meetings? Could you give an example of this?*

4. ***a.*** *Are there mechanisms for evaluating the performance of these meetings? Who are responsible for the evaluation?*

b. *What are the things that work best from these opportunities for local participation?*

c. *How these spaces for local participation could be improved?*

5. *Do you have any other ideas about how actions for reducing risks, adapting to changes, or improving the community could be planned and develop by collective participation?*

Thank you for your participation in this study.

APPENDIX E. QUESTIONNAIRE USED WITH STAFF OF INTENDENCIAS

Governance and Local Adaptive Actions

Questionnaire for staff from Intendencias

Date

_____

What is your name?

_____

What is your role at the Intendencia?

_____

I. DISTURBANCES AND LOCAL RESPONSES

_____

I am interested in which are the significant changes and/or risks that communities from this Department have experimented in the last ten years and how impacted the local dynamics and different characteristics of the community. Significant changes or disturbances are facts that occurred and/or are currently occurring that represent risks and could significantly change (either positively or negatively) and/or alter the community. They could be provoked by nature like climate change or by humans like pollution, overexploitation of natural resources, etc. Therefore, they could be anthropogenic or natural and they could be slow or sudden. In the first part of this interview, I will ask you about these changes and the local responses. Part of this study is to explore which are the communities that have experienced significant changes, what are the actions that communities have developed in regard to these disturbances and risks. In this part of the interview I will ask you for the presence or absence of specific changes, adaptive actions to natural and/or anthropogenic disturbances and associated risks, when they were adopted, and what are other actions could be adopted or resources that different institutions or civic society can provide for local and better risk reduction and local adaptations.

A. HUMAN-INDUCED OR ANTHROPOGENIC CHANGES AND ADAPTATIONS

Which are the communities from this Department that have experienced the most important natural or human-induced changes?

_____

I selected Nueva Palmira, Nueva Helvecia, Carmelo, and Dolores, as communities with Municipios, and interesting communities to study recent changes, governance, and local adaptations to these changes and associated risks. Based on the data that I have explored, it is expected that each of the communities will have different types of governance as well as adaptive actions. I expect that: Nueva Palmira will have high quality governance and many and

diverse adaptive actions, Nueva Helvecia will have high quality governance and few adaptive actions, Dolores will have many adaptive actions but low quality governance, and Cardona will have low quality governance and a few or absence of adaptive actions.

Am I right with this selection or you would like to mention any other community with Municipio that could fit into these categories (one with low adaptation and low governance, one with high adaptation and high governance, one with low adaptation and high governance, and one with high adaptation and low governance)?Is there any other community that I should consider?

_____

Which are the most significant changes that these communities from Colonia/Soriano have experienced? Has Dolores, Cardona, Nueva Helvecia, or Nueva Palmira (or other community you may mention) experienced any of the following changes or disturbances that could represent risks or negative consequences for the community?

1. **Exploitation of natural resources**

Yes ____ *No____*

If "Yes"…

1.a. *Could you briefly describe how this happened and how this has affected these communities?*

_____

1.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ *No____*

(If "No", answer 1h), If Yes:

1.c. *What types of actions or responses have been developed at the communities to minimize associated risks or to adapt to this?*

_____

1.d. *Which have been the key actors participating in these responses at the community level and which have been their roles?*

_____

1.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

1.f. *Do you think these actions helped the community/ies to reduce risks or adapt to this disturbance?*

Yes_____ *No____*

How? Who have benefited from these actions? Could you give me an example of this?

_____

1.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 1b:

1.h. *What are the actions that the community could develop to mitigate risks or adapt to the overexploitation of natural resources? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

2. Pollution at the communities or their agroecosystems

Yes ____ *No____*

If "Yes"…

2.a. *Could you briefly describe how this has happened and how this has affected these communities?*

_____

2.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ *No____*

(If "No", answer 2h), If "Yes":

2.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

2.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

2.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

2.f. *Do you think these actions helped the community/ies to reduce risks or adapt to this disturbance?*

Yes_____ *No____*

How? Who have benefited from these actions? Could you give me an example?

_____

2.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 2b:

2.h. *What are the actions that the community/ies could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

3. Human-induced desertification and/or erosion of soils of the agroecosystems

Yes ____ No____

If "Yes"…

3.a. *Could you briefly describe how this happened and how this has affected these communities?*

_____

3.b. *Have there been responses to mitigate risks or to desertification at these communities?*
Yes_____ No____

(If "No", answer 3h), If "Yes":

3.c. *What types of actions or responses have been developed to minimize risks or to adapt to desertification or erosion?*

_____

3.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

3.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

3.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

3.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 3b:

3.h. *What are the actions that the community/ies could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

4. Biodiversity depletion or reduction

Yes ____ No____

If "Yes"…

4.a. *Could you briefly describe how this happened and how this has affected the community/ies?*

_____

4.b. *Have there been responses to mitigate risks or to adapt to this at the community/ies?*
Yes_____ No____

(If "No", answer 4h), If "Yes":

4.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

4.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

4.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and possible?*

_____

4.f. *Do you think these actions helped the communities to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

4.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 4b:

4.h. *What are the actions that these communities could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

5. Significant technological changes that affect the communities and/or their agroecosystems

Yes ____ No____

If "Yes"…

5.a. *Could you briefly describe how this happened and how this has affected these communities?*

_____

5.b. *Have there been responses to mitigate risks or to adapt to this at these communities?*
Yes_____ No____

(If "No", answer 5h), If "Yes":

5.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

5.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

5.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

5.f. *Do you think these actions helped the community to reduce risks or adapt to this change?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

5.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 5b:

5.h. *What are the actions that the communities could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

6. Deterioration of public infrastructure (recreational spaces, routes, streets, etc.)

Yes _____ No____

If "Yes"…

6.a. *Could you briefly describe how this has happened and how this has affected the communities?*

_____

6.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ No____

(If "No", answer 6h), If "Yes":

6.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

6.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

6.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

6.f. *Do you think these actions helped the communities to reduce risks or adapt to these changes?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

6.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 6b:

6.h. *What are the actions that the communities could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

B. NATURAL DISTURBANCES- *Has Nueva Palmira, Nueva Helvecia, Dolores, and/or Cardona (or others) experienced the following changes or disturbances and associated risks?*

1. Drastic changes in temperatures and seasonality that have affected communities' agro-ecosystems or people's health

Yes ____ *No____*

If "Yes"…

1.a. *Could you briefly describe how this has happened and how this has affected the communities?*

_____

1.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ *No____*
(If "No", answer 1h), If "Yes":

1.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

1.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

1.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

1.f. *Do you think these actions helped the community to reduce risks or adapt to these changes?*

Yes_____ *No____*

How? Who have benefited from these actions? Could you give me an example?

_____

1.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 1b:

1.h. *What are the actions that the community could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

2. Extreme cold weather events

Yes ____ *No____*

If "Yes"…

2.a. *Could you briefly describe how this happened and how this has affected the communities?*

_____

2.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*

Yes_____ *No____*

(If "No", answer 2h), If "Yes":

2.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

2.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

2.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and were possible?*

_____

2.f. *Do you think these actions helped the communities to reduce risks or adapt to this disturbance?*

Yes_____ *No____*

How? Who have benefited from these actions? Could you give me an example?

_____

2.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 2b:

2.h. *What are the actions that the communities could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

_____

3. Hurricanes or strong winds

Yes ____ No____

If Yes…

3.a. *Could you briefly describe how this happened and how this has affected the communities?*

_____

3.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ No____

(If "No", answer 3h), If "Yes":

3.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

3.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

3.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

3.f. *Do you think these actions helped the communities to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Who have benefited from these actions? Could you give me an example?

_____

3.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 3b:

3.h. *What are the actions that the communities could develop to mitigate risks or adapt to this*

disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?

_____

4. Droughts

Yes ____ *No____*

If Yes…

4.a. *Could you briefly describe how this happened and how this has affected the communities?*

_____

4.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ *No____*

(If "No", answer 4h), If "Yes":

4.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

_____

4.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

_____

4.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

_____

4.f. *Do you think these actions helped the communities to reduce risks or adapt to this disturbance?*

Yes_____ *No____*

How? Who have benefited from these actions? Could you give me an example?

_____

4.g. *Which has been the role of the Intendencia on this?*

_____

If it was answered "No" in 4b:

4.h. *What are the actions that the communities could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

---

5. **Floods**

Yes ____ No____

If "Yes"…

5.a. *Could you briefly describe how this happened and how this has affected the communities?*

5.b. *Have there been responses to mitigate risks or to adapt to this at the communities?*
Yes_____ No____

(If "No", answer 5h), If "Yes":

5.c. *What types of actions or responses have been developed to minimize risks or to adapt to this?*

5.d. *Which have been the key actors participating in these responses at the community level? Which have been their roles?*

5.e. *Could you briefly describe when (previous or post-events), why, and how these actions have been developed and how they were possible?*

5.f. *Do you think these actions helped the community to reduce risks or adapt to this disturbance?*

Yes_____ No____

How? Could you give me an example?

5.g. *Which has been the role of the Intendencia on this?*

If it was answered "No" in 5b:

5.h. *What are the actions that the communities could develop to mitigate risks or adapt to this disturbance? Which could be the key actors involved on this? Which resources they could mobilize? Which would be their roles?*

---

6. **Others...** *Are there any other significant changes or risks provoked either by humans or*

nature that have affected these communities? If so…please, could you describe them in order of significance and describe whether or not there have been actions to mitigate associated risks or adapt to these changes?

II. OTHER ADAPTIVE ACTIONS[78]

1. Are there any other adaptive actions that were not mentioned before and have been developed at these communities? Do you know why they were developed and who have benefited from them?

a. Sharing information and/or plans about possible risks and/or consequences of natural or anthropogenic disturbances (e.g., widely available weather information, urban/rural planning that includes contingencies for changing conditions, mechanisms to identify new technologies, and widely available information about international markets)._____
b. Development of new technologies and local innovations (e.g., plans, educational programs, special events, and financial incentives for the adoption of new technologies, technological innovation, and new management practices)._____
c. Development of mobility plans (e.g., relocation of households affected by floods, and relocation of livestock affected by drought)._____
d. Storage improvement (e.g., water reservoirs, crops, seeds, and forest products)._____
e. Asset portfolio diversification (e.g., educational programs for value added products, new crop varieties, new livestock breeds, and skills and occupational training)._____
f. Improvement of market exchange (e.g., local incentives for new economic projects, sharing information, educational programs, and training about: market access, insurance provision, transfer payments and new product

[78] Some of the following adaptations are based on the work done by Agrawal and Perrin (2008; 2009).
Agrawal , Arun and Nicolas Perrin. 2008. "Climate Adaptation, Local Institutions, and Rural Livelihoods." IFRI Working Paper# W081-6. Retrieved May 5, 2012 (http://sitemaker.umich.edu/ifri/files/w08i6_agrawal_perrin.pdf).
------. 2009. "Climate adaptation, local institutions, and rural livelihoods." Pp. 350-68 in *Adapting to Climate Change. Thresholds, Values, and Governance*, edited by Adger, Neil, Irene Lorenzoni, and Karen L. O'Brien. Cambridge, UK: Cambridge University Press.

sales)._____
g. Actions for public risk awareness (e.g., educational programs, disaster preparation, campaigns, and distributing information)._____
h. Improvement of Local infrastructure (e.g., transportation networks (fluvial, terrestrial, and areal), recreational and public spaces, water supply, and sewage)._____
i. Protection of natural resources (e.g., conservation plans, regulations of land use, etc.)._____
j. Development of Specialization (e.g., specialized skills, knowledge about potential risks or changes)._____

III. COMMUNITY GOVERNANCE

In this section of the questionnaire, I will ask you about community governance, in other words; how decisions are made in these communities. I am interested in exploring how different actors from the civic society, the market, and the state, participate in local issues through collective decisions and what are the resultant actions derived from collective participation in this community.

Part of this study is to explore which are the actors involved in the community. For this, I will ask you about them, which will help me to identify and recruit potential participants of this study. In addition, this information will allow me to explore which are the different types of actors (private, civil society, or market) involved at the community and map all the connections between actors within and outside the community (from regional, national, and international levels). This will allow me to explore what is sociologically called bonding and bridging social capitals of communities, which are composed by actors' relationships within and outside communities.

I may contact some of these actors. I will keep their identities confidential for private citizens. Although, I am aware that this is a small community and private actors might be identified by their types of institutions or their positions at the community, I expect that this will not be the case in this study, and I will be able to keep their identities confidential. In the case of public officials, even without using your actual names, local people could identify those who occupy the public positions and infer who they are. Therefore, true confidentiality is not possible for public officials because their names need to be used.

I will eliminate the contact information of those you may name and I may not consider them as participants of this study.

III. 1. ROBUSTNESS OF INSTITUTIONAL STRUCTURE

1. Which are the key actors actively involved in decisions that affect these communities? What type of actors are they; Market, State, or Civic Society? Are these actors involved in local,

departmental, regional, national, and/or international issues?

a. Name: _____Type of actor (Market, State, Civic Society): _____

Level of Involvement:_____

b. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of Involvement:_____

c. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of Involvement:_____

d. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of Involvement:_____

e. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of Involvement:_____

f. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of Involvement:_____

g. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of Involvement:_____

h. Name: _____Type of actor (Market, State, Civic Society):

_____

Level/s of
Involvement:_____

i. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of
Involvement:_____

j. Name: _____Type of actor (Market, State, Civic Society): _____

Level/s of
Involvement:_____

2. a. *Which are the Intendencia's or national **policies** or regulations that affect local decisions and the adaptive actions mentioned?*

_____

b. *Do you know why or how these policies were created?*

_____

c. *Could you describe how these policies or regulations affect local decisions and/or local adaptive actions at the community level?*

_____

d. *Do these policies affect your participation in local issues? Could you give me an example of that?*

_____

3. a. *What are the **resources** that the Intendencia can mobilize or facilitate for the community's reduction of risks or adaptation to significant changes?*

Financial_____
Built_____
Political_____
Social_____
Human_____
Cultural_____
Natural_____

b. *Have you facilitated these resources in the past? Under what circumstances have you mobilized these resources?*

_____

c. *How your resources could be better used by communities?*

_____

III. 2. HIGH LEVELS OF PROCESS OR DELIBERATION.

1. **a.** *What are the local informal or formal opportunities for collective and direct participation in local issues? These opportunities could be planned and/or regular meetings, public assemblies, forums, etc.*

_____

b. *Could you describe in details these spaces for participation?*

_____

c. *What are the topics usually addressed in these meetings or spaces for participation? Could you name and describe them in details?*

_____

Financial_____
Built_____
Political_____
Social_____
Human_____
Cultural_____
Natural_____

d. *What are the local actions that are discussed or resolved (from those you mentioned in the previous section)?*

e. *Who do organize these meetings?*

f. *How often are they organized?*

g. *Could you explain how they have been possible to exist over time?*

i. *What is the role of Intendencias in these meetings?*

j. *How these spaces of participation work? Could you describe the dynamic of these meetings?*

k. *Which are the actors that have more voice or vote in making decisions?*

l. *Are there actors from outside communities that influence local decisions? How? Could you give an example of that?*

2. **a.** *How would you describe the coordination among the different participants?*

Low_____ Medium____ High____

b. *What types of collaborations and/or associations exist in these meetings? Could you give me an example of that?*

c. *Who do participate in these collaborative efforts?* These actors are from:

c. ii. Local community_____
c. iii. The same department_____
c. iv. From other departments of this region_____
c. v. From other country_____

d. *How is the community benefited from these collaborative efforts and participation of different actors at the local level?*

e. *What are the local benefits from the participation of actors from outside the community? What are the resources institutions from outside the community can provide?*

f. *How does the coordination among participants could be improved?*

3. *Are the participants responsible for the decisions they adopt in these meetings? Could you give an example of this?*

4. **a.** *Are there mechanisms for evaluating the performance of these meetings? Who are responsible for the evaluation?*

b. *What are the things that work best from these opportunities for local participation?*

c. *How these spaces for local participation could be improved?*

5. *Do you have any other ideas about how actions for reducing risks, adapting to changes, or improving the community could be planned and develop by collective participation?*

Thank you for your time and participation in this study.