

Building Community Resilience to Climate Change

Testing the Adaptation Coalition Framework in Latin America

By Maximillian Ashwill, Cornelia Flora and Jan Flora

November, 2011



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1818 H Street NW
Washington, DC 20433, USA
www.worldbank.org

Design and layout: The Word Express
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This work benefited from support from the Trust Fund for Environmentally and Socially Sustainable Development (TFESSD) made available by the governments of Finland and Norway.

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Acknowledgements

This report was authored by Maximillian Ashwill of the Social Development Unit in the Latin America and Caribbean Region of the World Bank, with Cornelia Flora and Jan Flora of Iowa State University. The five country case studies and all project related activities and products were coordinated by Maximillian Ashwill. World Bank task team leaders for this project were Estanislao Gacitua-Mario, Dorte Verner, Pilar Larreamendy and Fabio Pittaluga. Peer reviewers for this document were Niels Holm-Nielsen, Senior Disaster Risk Management Specialist (LCSUW), Willem Janssen, Lead Agriculturist (LCSAR), and Margaret Arnold, Senior Social Development Specialist (SDV, and Social Dimension of Climate Change Cluster). Additional comments were received from Lorena Trejos, Tiguist Fisseha (LCSUW) and Rachel Nadelman (LCSSO). The team would like to acknowledge the dedicated research from the five country teams including Instituto Dominicano de Desarrollo Integral in the Dominican Republic led by Juan Manuel Diaz, Instituto Desarrollo in Paraguay led by Victor Vazquez, the Consorcio para el Desarrollo Sostenible de la Ecorregión Andina (CONDESAN) in Peru led by Edith Fernández-Baca, CARE Bolivia led by Silvia Aguilar and Roxana Liendo and, last but not least, Monica Bendini, Maria Ines Garcia, Marta Palomares and Norma Steimbregger in Argentina. In-country technical support was provided by World Bank staff including Morten Blomqvist, Andrea Gallina, Raul Tolmos, and Beatriz Nussbaumer. Administrative support was provided by Maribel Cherres and Ramon Anria. Finally, the team would like to express gratitude to World Bank management for enabling this initiative, including Maninder Gill, Franz Dreez-Gross, Christina Malmberg, Ousmane Dione, Michel Kerf, Rossana Polastri, Roby Senderowitsch and Oscar Avelle. This report represents the culmination of an idea originally proposed by Estanislao Gacitua-Mario who passed away in early 2011. This paper is dedicated to his memory.

Overview

Climate change impacts involve three defining features that are not always a part of other development challenges: they are diverse, long-term and not easily predictable. Adapting to these three traits is difficult because they require making context-specific and forward-looking decisions regarding a variety of local climate impacts and vulnerabilities when the future is highly uncertain. The *2010 World Development Report: Development and Climate Change*, echoes this by stating that, “Climate change adds an additional source of unknowns for decision makers to manage” and planners must accept “uncertainty as inherent to the climate change problem.”

La Descubierta, a town near Lake Enriquillo in the Dominican Republic, has a unique mix of community characteristics, which makes climate change impacts highly particular to this area. Locals are exposed to flooding from rising water levels of the lake, stronger and more frequent hurricanes, and longer dry seasons. Because of the types of livelihoods in the area (livestock, agriculture, etc.), and other economic, environmental and social factors, La Descubierta is vulnerable to climate change in a way that is specific to them and very different from other communities, even those nearby. For this reason, it is important that responses are locally led in order to adapt to these unique local conditions.

Furthermore, the future impacts from climate change in this area are still very uncertain. Will the lake continue to rise? A new species of crab has begun populating the lake, what other surprises are in store? What other problems

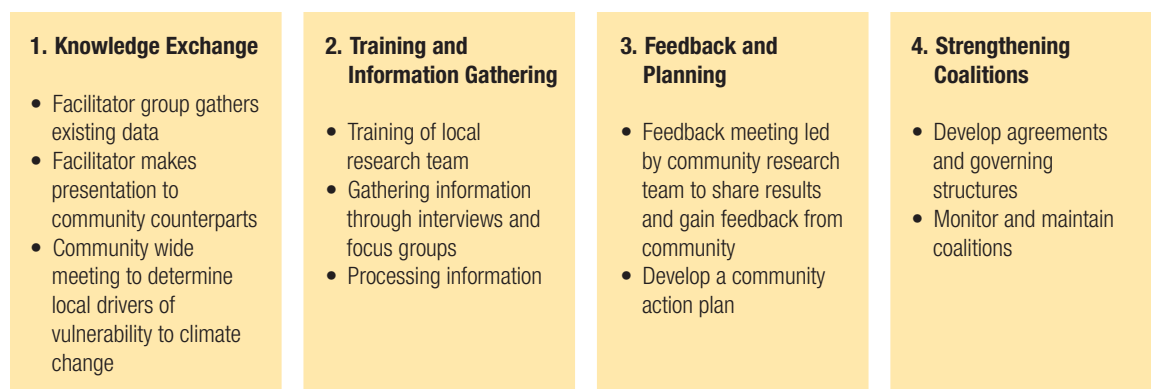
may the community be confronted by? Due to this uncertainty, it is also important that communities stay engaged with the issue of climate change over the long-term.

In response to these challenges La Descubierta formed coalitions (alliances among community groups and external actors that share a common desired future) in order to adapt to climate change. These coalitions formed an alliance with a local NGO, which was able to bring the community to the attention of their partners at USAID. The US development agency is now considering La Descubierta for a major climate change adaptation project in the region. The goals of this project

Adaptation Coalitions are community groups that come together as an internal coalition and form alliances with outside groups in order to achieve common desired futures around climate change vulnerability and impacts.

are to foster economic diversity and sustainability in the face of climate change. This would benefit local communities by providing external resources to confront a problem they have previously identified. It will also benefit USAID, which

Figure A >
The Four
Basic Steps
of the ACF as
Outlined in
The Adaptation
Coalition
Toolkit.



would garner active local participation and support for their climate change adaptation initiatives. The building of adaptation coalitions in this area has led to the mobilization of local resources, increased social cohesion and a greater collective voice around the issue of climate change. It has created a community institution with the mandate of increasing resilience to climate change over the long-term.

Keeping this example in mind, the Adaptation Coalition Framework (ACF) aims to train local communities in the knowledge, organizational tools and alliance forming strategies needed to identify the long-term drivers of social vulnerability to climate change and mobilize the essential internal and external resources to adapt to them. The basis of this approach is to build Bonding and Bridging Social Capital. **Bonding Social Capital** is the strengthening of internal organization and capacity to take collective action. **Bridging Social Capital** links these local groups to resources and external partners with similar goals to adapt to climate change. To do this, the ACF follows four steps. *First*, it exchanges knowledge between local and non-local actors on climate change, *second*, it trains local adaptation teams to gather information on vulnerability and external alliances, *third*, it feeds this information back to the community and helps them begin adaptation planning, and *fourth*, it builds coalitions between the community and external partners and resources which can assist in

responding over the long-term to climate change's diverse and uncertain challenges. These steps, outlined in Figure A, are described in detail in, "The Adaptation Coalition Toolkit: Building Community Resilience to Climate Change." The Toolkit is a companion piece to this report.

Task team leaders or project managers of national or sub-national projects can use this strategy as a means to foster wider local participation in their respective initiatives. This approach can be a means to raise participation levels of even the most marginalized and conflict-sensitive communities. It is a way to link top-down planned adaptation with bottom-up autonomous adaptation so that projects do not have to search for local partners, but local partners will search for them. In this way, the local and non-local are meeting halfway and building a sense of ownership over the process at multiple levels for greater outcomes.

This method was tested and refined in over twenty communities in five Latin American countries—Argentina, Bolivia, the Dominican Republic, Paraguay and Peru—with encouraging results. Short-term outcomes from this process demonstrate successes in the building of Bridging and Bonding Social Capital, mobilizing of internal resources and increasing access to external resources, including knowledge. Results include the following:

- The majority of communities were able to identify and form coalitions with the stated aim of reducing vulnerability to climate change. The formation of these groups created long-term, local champions for building climate resilience.
- In all five case study countries, communities increased their levels of communication with nonlocal actors and raised their internal awareness of climate change and its dangers.
- In all five countries, the building of coalitions led to some form of agreement between community groups and external institutions. As a result, local-nonlocal alliances were strengthened.
- In about 75% of the communities tested, local assets, or community capitals, were mobilized in order to adapt to climate change.
- In three out of five countries, communities were able to gain access to financial or material resources to adapt to climate change, despite having only a few months for the coalitions to form and strengthen. It would usually be expected that financial or material investment into local communities would be more of a long-term outcome, but evidence suggests that this support can happen quickly too.

In addition, the case studies produced many interesting and policy-relevant findings. These include the following:

- Climate change vulnerabilities and impacts are highly diverse and locally specific, long-term, and difficult to predict. The ACF has been shown to be effective in responding to these unique challenges.
- The IPCC vulnerability framework of exposure, sensitivity and adaptive capacity is practical as a general guide to identifying the problems and risks associated with climate

change. Nevertheless, it is limited in certain respects. Specifically, the definition of “exposure” is misleading to community groups, traditional definitions of “sensitivity” are incomplete and should be expanded to include social sensitivities like conflict, and the definitions of “adaptive capacity” are theoretical and vague and need to be developed further. The ACF has expanded these definitions.

- Some interventions designed to respond to impacts exacerbated by climate change can actually increase community vulnerability. This can happen when policy decisions lead to perverse incentives to continue the very activities that made people vulnerable in the first place.
- Inequitable adaptation can increase vulnerability to climate change. This was demonstrated in examples where economic diversification, usually a positive outcome, when combined with social fragmentation and inequality, led to social conflict, land degradation and decreased motivation to build resilience to climate change.
- Migration is not only a climate change impact and adaptive strategy, but also a source of vulnerability. This is because the exodus of community leaders creates a “leadership drain” and increases the workload of women and other groups who are forced to take over the responsibilities of those that emigrated.
- One of the major successes of this work was to identify the applicability of the ACF in situations of conflict. In the case study regions where communities were experiencing natural resource conflict, Tartagal in northern Argentina and the Bolivian *altiplano*, the ACF was used as a conflict mediation tool. In the latter region, the process of building coalitions broke stalemates and brought adversaries together to negotiate towards developing agreements.

Key Concepts

Definitions

Adaptation Coalition Framework: Derived from the Advocacy Coalition Framework, is a process through which local groups form coalitions or alliances with outside groups around climate change issues in order to achieve common desired futures.

Adaptive Capacity: the degree to which adjustments in practices, processes, or structures can moderate or offset the potential for damage or take advantage of opportunities created by a given change in climate (IPCC 2001).

Bonding Social Capital: the strengthening of internal organization and capacity to take collective action based on the common backgrounds and experiences of the individuals or groups involved.

Bridging Social Capital: the linking of local groups or institutions to resources and external partners with similar goals.

Capacity: the ability of individuals and organizations or organizational units to perform functions effectively, efficiently and sustainably (UNDP 1998).

Capitals: resources or assets that can be used, invested, or exchanged to create new resources.

Climate Change: a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer) (IPCC 2001).

Climate Change Adaptation: An adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC 2001).

Desired Future: A common future or end that a community or group of individuals desires and is willing to plan for.

Extreme Weather: A climatic event that registers as a disaster in the international community—e.g. hurricanes or quick on set floods—that lead to aid responses, population movements and associated fatalities (World Bank 2010d).

Exposure: the character, magnitude, and rate of climate variation to which a system is exposed (IPCC 2001).

Resilient: the ability to cope with and/or adapt to long-term, systemic and secular change while maintaining or enhancing core properties.

Sensitivity: the degree to which a system will respond to a given change in climate, including only harmful effects (adapted from IPCC 2001).

Severe Weather: climatic trends that would not register as a disaster in the international community and entail an extensive range of less dramatic impacts than disasters (World Bank 2010d).

Sustainability: the ability to cope with and recover from immediate changes, stresses and shocks (that do not necessarily threaten long term secular change), while maintaining core properties.

Vulnerability: the extent to which a natural or social system is susceptible to sustaining damage from climate change (IPCC 2001).

1. Introduction

This purpose of this paper is to present the findings from a five-country case study which tested the application of the Adaptation Coalition Framework (ACF) in Latin America and the Caribbean. The development of the ACF is based on the belief that climate change presents challenges that many climate change adaptation models and sustainable development frameworks do not completely address. As a consequence, four perspectives had to be integrated to effectively build social resilience to climate change. *First*, climate change impacts are highly diverse and context specific so planning needs to be locally driven and across sectors but also include non-local knowledge and resources, *second*, these impacts often represent long-term changes so institutions must adapt with an eye towards the same time scale, *third*, climate change impacts are difficult to predict by nature and a framework must be developed with the appropriate flexibility to evolve, and, *fourth*, adaptation must go beyond being reactive to climate impacts to focusing on precautionary measures and concentrating on the underlying drivers of vulnerability.

The testing of the ACF took place in five Latin American countries including Argentina, Bolivia, the Dominican Republic, Paraguay and Peru. As a result of this fieldwork and the findings presented in this report, “The Adaptation Coalition Toolkit: Building Community Resilience to Climate Change” was developed for practitioners seeking to build community resilience to climate change. The Toolkit is a companion

piece to this document, and will be referred to throughout the report. This paper provides the analytical underpinnings for the Toolkit by offering a rationale and conceptual framework for utilizing the ACF. Further, it presents evidence from the various case studies and highlights results and lessons learned. By contrast, the Toolkit represents a practical guide to implementing the ACF in the field.

2. Background

The consequences of climate change are now well understood. The 2010 World Development Report (WB 2010b) states, “Left unmanaged, climate change will reverse development progress and compromise the well-being of current and future generations. It is certain that the earth will get warmer on average, at unprecedented speed. Impacts will be felt everywhere, but much of the damage will be in developing countries.” To greatly simplify the dynamic atmospheric processes at work, these consequences of climate change and variability can be explained as follows: increased global temperatures will lead to increased water evaporation into the atmosphere and in turn greater precipitation when the moisture falls back to the earth. This simple mechanism of the water cycle will create greater aridity in regions with already scarce water supplies and more water in areas that already receive an abundance. Furthermore, this moisture will increasingly concentrate into storm systems leading to a greater frequency of extreme weather events like torrential rains and even hurricanes.

Most of the countries in the Latin America and Caribbean region are significantly affected by the adverse consequences from climate variability and extremes. If no adaptation or mitigation takes place, estimates for damages due to warming in the region vary from 1.3 percent to seven percent of GDP by 2050 (CAIT 2008). The greatest income effects are expected in the agricultural sector followed by energy and infrastructure. However, this only tells part of the story, as the social impacts and vulnerability to climate change are largely unquantifiable. According to the World Bank (2010c), “A major challenge in vulnerability studies is that capturing factors that researchers believe will impact vulnerability and adaptive capacity are often hard to measure with discrete quantitative indicators.”

The observed changes and projections show that climate change is taking place in Latin America and is gathering pace. The effects are expected to significantly impact human health, livelihood systems and social cohesion (World Bank 2010a). Evidence from these five country case studies suggest that under certain situations this increases conflict over resources, migration, poverty, inequality and vulnerability as impacts hinder the efforts of the region’s poorest people to build a better life for themselves and their children. The main climate impacts from the four Latin American and Caribbean regions covered in this study include the following:

- **The Caribbean:** This region has been affected by the intensification of extreme events

as a result of climate change. Hurricanes, for example, have been shown to cause such disastrous social impacts as widespread migration and loss of land, property and life. In several cases, hurricanes, and the resulting costs, have exacerbated social and political tensions (Smith and Vivekananda 2007).

- **The Andean countries:** The most momentous climate impacts include major warming, changes in rainfall patterns and rapid tropical glacier retreat. These factors will significantly affect water availability for human consumption, soil revitalization, agriculture, and energy generation (IPCC 2007). This has a direct and deleterious impact on peoples' livelihoods and may lead to a greater risk of disputes, conflicts and migration.¹
- **The Amazon:** This region, of critical importance to humankind for its carbon storing

and oxygen producing qualities, is facing land-use (deforestation) and climate changes that threaten the savannization of the eastern Amazon. This would have dramatic global consequences as well as local impacts on water resources and livelihoods for communities that rely on forest resources.

- **The southern cone:** These nations have seen dramatic changes in rainfall patterns leading to increased drought and flooding. This combined with severe land degradation has led to many deleterious social impacts including involuntary changes in productive means, assets and other livelihood issues.

¹ For more on the relationship between environmental pressures and conflict see Homer-Dixon (1991) and Gleditsch et al. (2007 & 2002).

3. Rationale

The objective of this 5-country case study was to design and test a framework that would help strengthen community resilience to climate change in Latin America and the Caribbean region. The work was meant to be a direct, operational follow-up to the conclusions of the edited volume *Reducing Poverty, Protecting Livelihoods, and Building Assets in a Changing Climate: Social Implications of Climate Change for Latin America and the Caribbean* (WB 2010a).

“In particular, this volume recommends the use of community-specific social analysis focusing on improving livelihood outcomes, careful attention to building social assets within and between stakeholder groups, and strengthening resilience through asset-based adaptation at the local level.” The volume goes on to recommend a three-pronged approach to reducing social vulnerability to climate change: (1) Enhance good governance and the technical capacity of the public sector, (2) Develop social capital in local communities: voice, representation, and accountability, and (3) Build household resilience through asset-based adaptation: a “no-regrets” approach.²

The World Bank’s guiding document on climate change issues, the *2010 World Development Report (WDR): Development and Climate Change* (WB 2010b), establishes the need for such work. For example, the WDR asserts, “Climate change adds an additional source of unknowns for decision makers to manage” and that, “accepting uncertainty as inherent to the climate change problem and robustness as a decision criterion

implies changing decision-making strategies for long-lived investment and long-term planning.” Moreover, the report recommends that priority should be given to investment and policy options that provide benefits even in the absence of climate change impacts; a “no-regrets” approach. Another World Bank report (WB 2010c), based on a six-country case study, develops a checklist for good adaptation practice that recommends, among other things, pursuing interventions that create co-benefits with sustainable development, anchors decision-making mechanisms in inclusive and participatory processes and targets geographic regions where sensitivity to climate change is high.

Based on the recommendations from the work discussed above, the ACF was developed to serve as an adaptation framework that would be focused on specifically addressing social vulnerability.

² A “no regrets” approach is defined as actions that generate net social benefits under all future scenarios of climate change and impacts (Heltberg, et al. 2008).

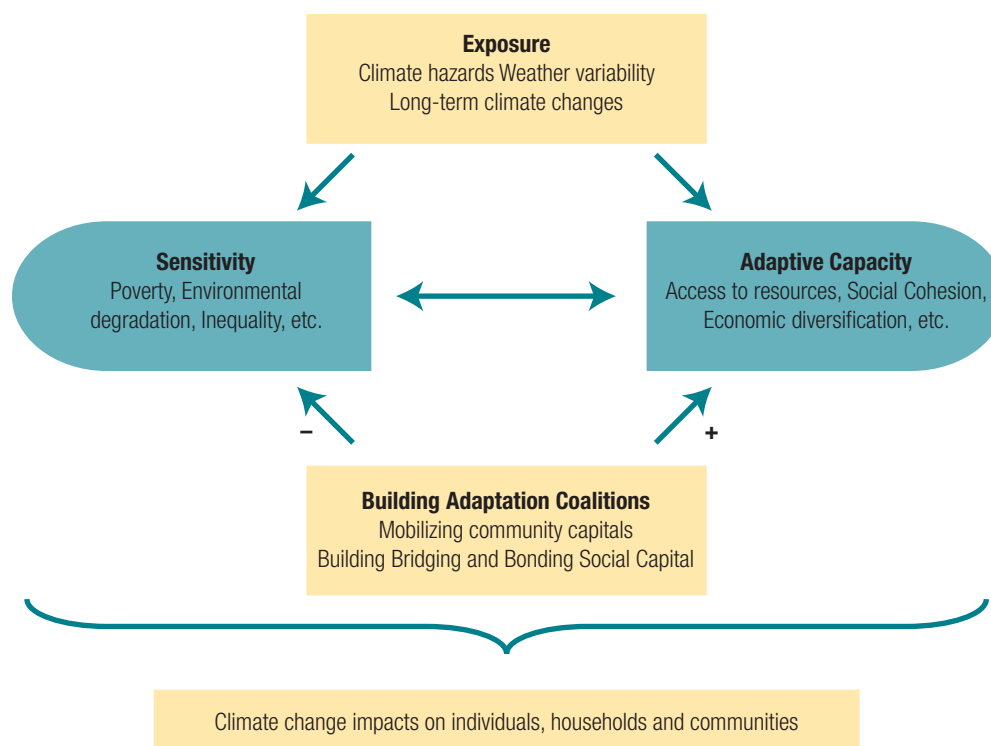
4. Conceptual Framework

The purpose of testing the ACF was to develop a methodology for building community resilience to climate change. In emphasizing this approach, the team made four assumptions: First, community members must participate in planning to optimize adaptive capacity to manage the diverse local manifestations of climate change; second, these impacts represent long-term change; third, climate change impacts are difficult to predict by nature; and fourth, the focus needs to be on the drivers of vulnerability when adapting to climate change.

The ACF was designed to strengthen local communities' long-term engagement with climate change based on the belief that to maximize results adaptation interventions must integrate local with non-local responses. In the ACF, the IPCC (2001) framework for vulnerability is used, with *vulnerability* being defined as, "a function of the *sensitivity* of a system to changes in climate, *adaptive capacity*, and the degree of *exposure* of the system to climatic hazards (author's italics)." In order to operationalize this approach, we refer to **exposure** as the exogenous drivers of vulnerability, or climate related events and changes that humans cannot directly control, such as weather variability, droughts and floods. **Sensitivity** refers to the harmful endogenous drivers of vulnerability, these include community characteristics or practices that humans can control and which contribute to vulnerability. Examples of these are deforestation or the loss of vegetative cover, livelihoods reliant on the natural environment, poverty

or a lack of resources, inequality, and other potentially harmful socio-economic and environmental factors. **Adaptive capacity** encapsulates the community characteristics or practices that contribute to building resilience and reducing vulnerability. These include economic diversification, migration, access to resources and community capitals, social cohesion, sustainable environmental practices, among others. These three components, or drivers of vulnerability, interact to produce the human impacts of climate change. Specifically, the ACF aims to reduce vulnerability, thereby lessening negative social impacts, by building adaptive capacity and reducing sensitivity. In the ACF, this is done by *identifying and mobilizing community assets* around a common desired future and by *strengthening Bridging and Bonding Social Capital* for greater organization, voice and access to external resources and knowledge. Figure 1 is a visual representation of the conceptual framework.

Figure 1 >
Conceptual
Framework



4.1. Adaptation Coalitions

The Adaptation Coalition Framework was based on the *Advocacy Coalition Framework* adapted to climate change scenarios and put into a practical model for intervention. The *Advocacy Coalition Framework* was selected to be the model for the ACF due to its application as a locally led, long-term and flexible methodology.³

The *Advocacy Coalition Framework*, as argued by Sabatier and Jenkins-Smith (1993), is how certain groups form coalitions or alliances around concrete issues in order to achieve common desired futures. This takes the form of institutional acts at various geographic scales that share: (i) certain basic beliefs that anchor common desired futures (ends); (ii) the implicit or explicit means for reaching those futures (means); and (iii) rules of evidence that allow for members of the coalition to mutually ascertain progress towards the goals.

The Floras (Flora and Flora 2008) adapted this structure to serve as a participatory development and research tool. By determining from institutions at various levels where they want to go (their declared and implicit missions) and how they will get there (the means they see as viable and effective), local groups can seek appropriate alliances for varying periods of time—adaptation coalitions—in order to work toward their desired future in light of the climate change threat.

The *Advocacy Coalition Framework* was a useful framework for incorporating social groups within a locality into a larger inter-institutional framework, and for increasing the efficacy of those groups. Forming coalitions that include marginalized social

³ The *Advocacy Coalition Framework* was originally utilized as an externally led research strategy, but later it was put into practice as a locally led and flexible development tool (Flora and Flora 2008).

groups at the local level strengthens their *Bonding Social Capital*—ties within an organization or community—and *Bridging Social Capital*—ties that link the organization or community to others. To bring about positive change, or in certain instances to maintain a resilient status quo, adaptation coalitions are formed within civil society with linkages to various state institutions and market firms.

It follows, then, that effective coalitions share common desired futures and the means to achieve them, but are also sufficiently diverse in their contacts and external linkages to garner a diversity of resources and knowledge. In other words, the most effective coalitions are those that combine Bridging and Bonding Social Capital.

In the Adaptation Coalition Framework, policy-making is contested and influenced by different sectors from different levels and is not linear (Münch et al. 2000). Furthermore, policymaking cannot be captured in a series of prescribed steps to be taken by decision makers, which if appropriately executed would almost automatically lead to optimum decisions. Such an overly rationalist element often creeps into decision-making models that take a technical rather than a socio-political approach.

4.2. Identifying and Mobilizing Local Assets

The ACF utilizes the concept of “community capitals” as a framework for identifying and mobilizing local resources to enhance adaptive capacity. Typically we associate the term *capital* with business and financial investments. But capital can come in many forms. The most fundamental definition of capital is a resource or asset that can be used, invested, or exchanged to create new resources and, therefore, it can refer to much more than only financial resources. After over thirty years of applying community capitals in the field,

a number of scholars have found that the communities that were most successful in supporting healthy, sustainable community and economic development were considering seven types of capital, which they designated as *natural, cultural, human, social, political, financial* and *built* (Flora and Flora 2008). These seven capitals have been organized into the Community Capitals Framework (CCF),⁴ which provides a tool for analyzing how communities work. Based on this framework, a number of researchers and field-based specialists developed a workbook to assist communities in planning, strategizing and monitoring community development projects. Mary Emery, Susan Fey, and Cornelia Flora (2006) presented the benefits in utilizing this process in “Using Community Capitals to Develop Assets for Positive Community Change.” These benefits include the following:

- The concept of community capitals provides a useful framework for identifying the diverse resources and activities that make up a local economy, social system, and ecosystem. This provides a systematic framework for identifying asset flows and opportunities to recombine resources in the face of change.
- Through understanding and using the CCF, resources can be mobilized within the community to address a variety of issues and to expand options for responding to climate change.
- The plurality of capitals can be conceived as a variety of accounts offered by a bank, including capacities to store strengths, skills, opportunities, and other kinds of resources. Such a bank might offer seven types of capital accounts, making the assets in each available to the community. These assets can be wisely invested, combined, and exchanged to create more community resources. But they

⁴ For more information on the Community Capitals Framework, refer to the Adaptation Coalition Toolkit or the aforementioned citation (Flora and Flora 2008).

can also be squandered or hoarded if the community does not use them wisely.

The CCF is useful in forming adaptation coalitions, particularly for vulnerable communities because it provides an easily understood mechanism for communities and organizations to examine the stocks and flows of their assets. Through discovery of their collective assets using this holistic framework and seeing which ones have decreased or increased over their lifetimes, communities can discover which assets to invest.

4.3. Bridging and Bonding Social Capital

Social capital can be defined as the norms and social relations embedded in the social structures of society that enable people to coordinate action and to achieve desired goals (Narayan 1999). A great deal of research on social capital examines its presence and impact on individuals, and thus tends to view community social capital as the sum of each individual's norms and social relations. However, the ACF uses social capital as a characteristic of social structures, such as communities and organizations, which can be more—or less—the sum of the stock of social capital of each individual within that community or organization.

Specifically, this framework looks to build two types of social capital: Bonding and Bridging. *Bonding Social Capital* is the strengthening of internal organization and capacity to take collective action. *Bridging Social Capital* links local groups

to resources and external partners with similar goals. The overall objective of this method is to build the adaptive capacity of local communities by identifying community capitals and organizing the community around internal asset mobilization (Bonding Social Capital) and gaining access to external resources (Bridging Social Capital). The justification is that by increasing the amount of capitals (internal and external) at a given community's disposal and organizing the use of those resources around a common desire for a future of resilience to climate change, one is increasing the adaptive capacity of these communities and reducing vulnerability. This process is represented in Figure 2.

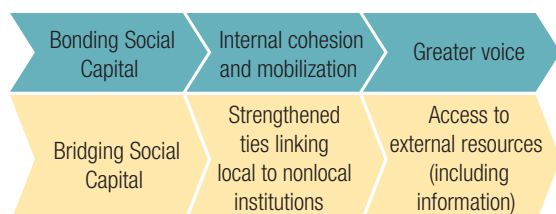
4.4. Why is the Adaptation Coalition Framework Different?

Through our case study research⁵ we found that climate change adaptation requires unique focuses and consequently different techniques than regular development. The ACF differs from many traditional development strategies in that it is characterized by four combined traits that we believe are necessary for building community resilience to climate change. These traits include being locally led, long-term, flexible and focused on the drivers of vulnerability.⁶

4.4.1. Locally led

Many adaptation strategies are not locally led; some are high level government initiatives or major

Figure 2 >
Process of Building Bonding and Bridging Social Capital



⁵ For more on these findings see section 7.1.

⁶ The ACF can be understood as a form of Community Driven Development (CDD) that focuses squarely on reducing climate vulnerability. Other approaches that share some of these core principles are the Shared Learned Dialogue (SLD), participatory scenario development and a number of others.

programs led by international financial institutions or transnational NGOs, while others, though managed by local institutions, are often still led by external development agents. By contrast, community based adaptation frameworks tend to be more local in nature and typically involve a “hand-over” step where project management is handed over to community leaders after a certain amount of time. The ACF differs from many of these frameworks because it focuses on training community members in the actual investigative and organizational skills needed to plan for themselves and lead the adaptation process from the beginning. This focus on local planning and organization differs from other adaptation frameworks that often concentrate on responding to previously identified impacts or sector-specific measures.⁷ These frameworks act as tools within the adaptation toolbox, each with a particular purpose. The purpose of the coalitions approach is to allow locals to identify what climate change impacts are most important to them and then provide them with the investigative (rather than technical) training to respond. In other words, the ACF goes beyond simply using local knowledge to inform a project’s design, but actually meshes local with non-local experiences during implementation to guarantee that adaptation is genuinely led locally.

4.4.2. Long-term

Commonly, adaptation projects are designed to respond to a current problem or impact and not to adapt to long-term scenarios, which could leave them unsustainable in the long run. While adapting to any particular problem can be a difficult task, climate change exacerbates this because changes are often both short-term and long-term (in fact, by definition “climate change” refers to thirty year averages). For example, while a given community may participate in a helpful reforestation or watershed regeneration project to protect the quality and quantity of community

water resources, the long-term problem of decreasing water supplies has not gone away. To take from an actual watershed management project in the Bolivian *altiplano*, local water resources will in fact be cleaner and more plentiful as water disbursement systems are improved and vegetation is planted. This vegetation acts as a natural cleanser and cooler of the microclimate thus preventing rapid evaporation of these resources during dry spells. However, this project, while helpful in the short-term, does not tackle the longer-term problem, which is that there is simply less and less water available and maintaining the same livelihoods may not be sustainable. Currently, in this same Andean community, locals are losing their traditional sources of water due to the melting of tropical, mountaintop glaciers. So, while watershed management initiatives will improve water access in the short-term, they will not necessarily adapt to the longer-term problem of dwindling water supplies. The adaptation coalition approach builds Bridging Social Capital so that long-term partnerships are fostered between internal (community) resources and external. It is these long-term partnerships, and the ability to make them, that goes beyond relieving short-term stresses and matches the long-term evolving nature of climate change.

4.4.3. Flexibility—Planning with Uncertainty

Even if community development or adaptation frameworks plan for the long-term and are effective in tackling a particular development challenge that is either caused or aggravated by climate change, there is no way they can plan for the unplanable or predict the unpredictable. For example, if flooding, and the consequent loss of

⁷ For examples of other adaptation approaches please refer in the bibliography to CARE 2010a and 2010b, ICLEI 2008 and World Bank 2009.

crop productivity, is currently affecting a particular community, this may be identified as a problem and solutions such as building flood controls or diversifying crops may be adopted locally. However, what if climate variability then leads to drought? What if fires become a problem or hail or frost? Empirical evidence has shown that it is difficult to predict exactly what impacts climate change will have on a particular community. So while a community may in fact have periods of water abundance, that same community may also have periods of extended water scarcity and may be unable to predict when each situation will affect them. This was the case for several communities from the case studies, which found growing seasons to be shorter and harder to predict, making planning difficult and complicating traditional practices. In some cases, communities altered their traditional planting calendars from one to two times a season with the hope that if one crop failed, maybe the other would succeed.

In addition, every community is unique with differing sensitivities to climate change and adaptive capacities. This makes the resulting vulnerability highly context specific and difficult to predict. The coalitions approach deals with this challenge of uncertainty by focusing on organization and process and by building Bonding Social Capital. It strengthens the resiliency of communities by improving their ability to respond to whatever challenge climatic changes may pose, even if these challenges are diverse, contradictory and shifting.

4.4.4. *Focusing on Vulnerability*

Many strategies for climate change adaptation have become what is known as impact-specific, i.e. identify an impact of climate change on a sector such as water or infrastructure and specifically respond to that impact (usually at the national level). While these responses have gone a long way in increasing national resilience to climate

change, they do not go far enough in targeting the underlying local drivers of vulnerability. For example, an impact-specific strategy to reduce flood risk could include measures like building levies or planting vegetation to increase the absorptive capacity of the land. Alternatively, a strategy that focuses on reducing the underlying drivers of vulnerability would include measures to reduce sensitivity and build adaptive capacity. This could include efforts like the diversification of livelihoods away from those that make the community sensitive to flooding (e.g. logging, monocultures, etc.) or other crosscutting, social responses. In practice this means two things, (1) targeting interventions holistically towards climate vulnerability and not solely impacts, and (2) building the capacity of communities to adapt autonomously.

4.5. Practical Background

Prior to the testing of this framework as a response to climate change across Latin America, it was put into practice on a small-scale in isolated communities in Peru. This work began in 2006 and was part of the Sustainable Agriculture and Natural Resource Management and Collaborative Research Support Program (SANREM CRSP)⁸ at Virginia Tech University, funded by USAID. Other collaborative institutions involved in the research included CONDESAN,⁹ the Institute of Small-Scale Sustainable Production¹⁰ at the National Agrarian University of La Molina (La Molina) in Peru,¹¹ Iowa State University and the University

⁸ <<http://www.oired.vt.edu/sanremcrsp/>>

⁹ Consejo para el Desarrollo Sostenible de la Región Andina (CONDESAN) <<http://www.condesan.org/portal/>>

¹⁰ El Instituto de la Pequeña Producción Sustentable (IPPS) <<http://www.lamolina.edu.pe/institutos/ipps/default.html>>

¹¹ Universidad Nacional Agraria La Molina <<http://www.lamolina.edu.pe/portada/>>

of Missouri. However, because of the nature of the coalition approach, many other institutions were involved. It was initially discovered through this fieldwork that building coalitions could be an effective measure towards building community resilience to climate change.

There are several examples from the Peruvian experience that could demonstrate this, but we will focus on one from the indigenous Aymara-speaking community of Apopata, near Puno. In this example, a team of Aymara speakers from the National Altiplano University¹² in Peru and La Molina met with community leaders to define a general development project around sustainable agriculture and natural resource management. During the course of the community's diagnosis of its past, present, and desired future, it became clear that climate change exposure was a source of vulnerability. Weather variability was of particular concern as it caused unseasonal freezes and greatly impacted the availability of pastures for alpaca grazing, a major livelihood in Apopata. As a result, the nutritional status of the local alpaca declined and the spontaneous abortion rates of early stage alpaca fetuses were increasing.

At the same time, the government of Peru was offering a new buying scheme that rewarded the quality of alpaca fiber and not just quantity. In 2004, the technical standards for alpaca fleece fibers (*Normas Técnicas Peruanas de la Fibra de Alpaca de Vellón*) were established. Prices were henceforth differentiated based on the category

of fiber from extra fine, fine, semi-fine, and coarse with the finer the fiber meaning the higher the price. These new standards motivated the community to seek ties with scientists and NGOs engaged in breeding alpaca with fine fiber. As a result, research committees¹³ formed by community members were trained in interview techniques and visited a variety of potential allies until they found two groups whose goals coincided with their own. These goals were to improve pasture and increase the fineness of the fiber on each alpaca. With the help of external alliances, alpaca herders were able to produce higher incomes with fewer alpaca. The research committee then sought out other villages to form a cooperative collection center (*centro de acopio*) where they could gather and categorize the fiber. This also allowed them to seek other progenitors with fine fiber.

This example, though very small-scale and specific to one community, proved to be highly relevant for locals in improving livelihoods and reducing vulnerability to climate change. Obviously, duplicating the development of alpaca cooperatives would not be relevant for many communities as an adaptive strategy, yet based on this and other results from Peru, it was believed that the process of building coalitions had great potential.

¹² Universidad Nacional del Altiplano <<http://www.unap.edu.pe/>>

¹³ These community research teams have been renamed Community Adaptation Teams (CATs) in the Adaptation Coalition Framework.

5. Methodology

In order to test the effectiveness of developing the *advocacy* coalition framework into a more practical *adaptation* coalition framework, a five-country case study was designed to create knowledge by doing. The action research built adaptation coalitions in the five case study countries under various social, political and climatic conditions in an effort to help local communities build social resilience to climate change. In the process of coalition formation and case study research, information was gathered on creating best practices in order to develop an operational guide, the Adaptation Coalition Toolkit, and improve the equity of adaptation. Five research teams led the case studies in the five countries under guidance from the World Bank task team.

While the process of building adaptation coalitions is ongoing, the implementation time for the case studies ranged from four to nine months. The reason for the large disparity in time was that in some countries, like the Dominican Republic, the research team had a long history of working with the communities in question and could begin work immediately. In other countries, like Paraguay, there was a lot of institutional red tape and other formalities, such as presenting official letters to municipal leaders soliciting their formal approval for the work, showing these letters to state authorities for their approval, and returning these approvals to the municipal level for further discussions. These discussions delayed the implementation by several months.

5.1. Field Investigations

This study looked at five country case studies—Argentina, Bolivia, the Dominican Republic, Paraguay and Peru—through the ACF. The methodology used in each country was generally the same but with some “wiggle room” to modify locally to develop best practices. Generally, information was gathered through a combination of expert interviews, institutional interviews, local workshops and focus group discussions. Final methodologies for each country were produced after in-country consultations took place during the first methodological design stage, which ensured that the proposed methodology and case study approach was validated by in-country stakeholders (including researchers,

the government, civil society organizations and community participants). Then, after preliminary results become available, in-country training was organized to develop the capacity of local researchers to apply the methodology.

5.2. Site Selection

Locations were selected using a nested research design based on country (five countries), region/department/province (two per country), municipality (at least one per department, with a total of two per country) and community/village

(one to two per municipality). Therefore, there were a total of between two and five research areas chosen in each country, selected by giving priority to areas, and the villages within, with particularly high social vulnerability to climate change as identified through existing data-bases or key informants. Measures were taken to assure variation between sites in climate change hazards, livelihood impacts, wealth, and ecology, such as altitude differences between communities/villages (which may be related to remoteness/closeness to the local administrative headquarters). See Table 1 for a list of the study sites.

Table 1 >
Case Study
Locations—
Adaptation
Coalition
Framework

Country	Region	Province	Municipality	Community
Argentina	North	Salta	Tartagal	Tartagal
				Salvador
				Mazza
				Aguaray
	Patagonia	Río Negro	Los Menucos	Los Menucos
				Sierra Colorada
				Ministro Ramos Mejía
Bolivia	Altiplano	Los Andes	Pucarani	Chunavi
				Condoriri
	La Paz - Valles Alto Andino	Murillo	Palca	Amachuma Grande
				Huancapampa
Dominican Republic	Santo Domingo Norte	Distrito Nacional	Distrito Nacional	Pueblo de Palca
				La Zurza
	Lago Enriquillo	Independencia	La Descubierta	Guachupita
				La Descubierta
Paraguay	South Western	Ñeembucú	Pilar	Bartolome
				Pilar
	Chaco	Presidente Hayes	Paso de Patria	Paso de Patria
				Paso de Patria
Peru	Amazon	Convención	Echarati	Villa Hayes
				Benjamín Aceval
	Altiplano	Huancané	Huayrapata	Benjamín Aceval
				Benjamín Aceval
Peru	Amazon	Convención	Echarati	Comunidad Nativa de Matoriato
				Comunidad Nativa de Timpia
	Altiplano	Huancané	Huayrapata	Huancané
				Huayrapata

5.3. Final Products

Once the fieldwork was completed in all five countries, reports were produced documenting the information gathered and lessons learned. These five country reports¹⁴ were used as the primary informational sources for this report and the companion Toolkit. In addition, ongoing consultations took place with the teams that developed this framework locally, to comment on and validate the integrated results from all five countries. As a consequence, the process for building adaptation coalitions can be broken down into four main steps or chronological sequences shown in Figure 3 (these are described in detail in the Adaptation Coalition Toolkit).

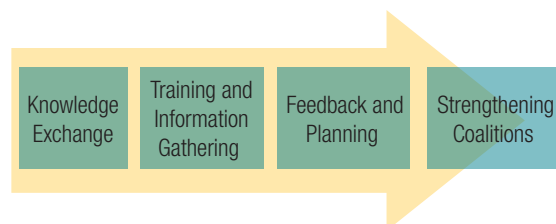


Figure 3 >
Steps for
Building
Adaptation
Coalitions*

* These are defined in detail in “The Adaptation Coalition Toolkit: Building Community Resilience to Climate Change,” an operational guide and the companion piece to this document.

¹⁴ Full titles for these reports can be found in the bibliography. They are referenced as Bendini, et al. 2010 (Argentina), CARE Bolivia 2011 (Bolivia), IDDI 2011 (Dominican Republic), Instituto Desarrollo 2011 (Paraguay) and CONDESAN 2011 (Peru).

6. Case Study Summaries¹⁵

Information from the case studies will be described at the sub-regional level as opposed to the national level. The great diversity of socio-economic factors, vulnerabilities, impacts, geographies, cultures and adaptation strategies at sub national levels makes it impossible to accurately summarize these indicators at an aggregate national level. Each summary will begin with some general information and then briefly describe the main drivers of vulnerability, impacts, some of the commonly desired futures and the relative success of these emerging coalitions (refer to Section 4 for these definitions).

It should be noted, that building and strengthening adaptation coalitions can take years. This is precisely the point; to make sure the coalition stays engaged with climate change issues over the long-term. Therefore, it should be taken into account when reading these summaries that case studies took place over the course of several months (usually between four and nine) so only short-term successes could be recorded.

has an area of 155,488 square kilometers and accounts for 4.17% of the entire national territory. The estimated population in 2009 was 1,245,573 inhabitants, which constitutes 3.1% of the national population. This area was traditionally covered in lush forest.

6.1. Argentina¹⁶

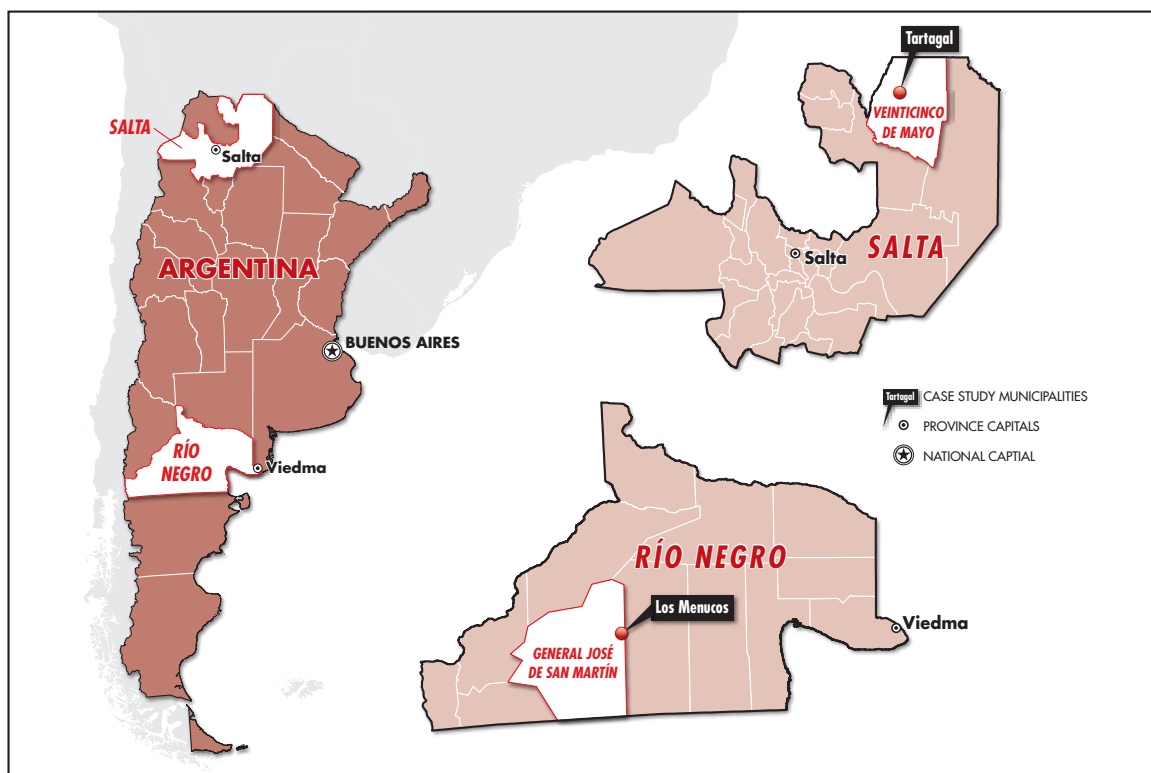
Case study communities for Argentina were located in two distinct regions of the country, the northern province of Salta and the Patagonian state of Río Negro.

6.1.1. Salta, Argentina

The province of Salta is shaped like a horseshoe and located in the northwest of Argentina. It

¹⁵ All of the information included in the case study summaries was extracted from final reports produced by research teams in each case study country and subsequently verified by them. These teams include Instituto Dominicano de Desarrollo Integral (IDDI) in the Dominican Republic led by Juan Manuel Diaz, Instituto Desarrollo in Paraguay led by Victor Vazquez, el Consorcio para el Desarrollo Sostenible de la Ecorregión Andina (CONDESAN) in Peru led by Edith Fernández-Baca, CARE Bolivia led by Silvia Aguilar and Roxana Liendo and the team of Monica Bendini, Maria Ines Garcia, Marta Palomares and Norma Steimbregger in Argentina.

¹⁶ All information pertaining to the Argentina case study is taken from Bendini, et al. (2010).



Drivers of Vulnerability

Exposure: This part of Argentina is characterized by increased rainfall, in both intensity and total amount. Community members have also complained of higher temperatures, a claim supported by climate change models, which predict a one degree Celsius increase for the whole country by 2020/2040, but particularly in the north (World Bank 2009: Argentina Country Note).

Sensitivity: Sensitivity to climate change in Salta is driven by two main factors. First, land use changes. Salta was traditionally known for forest products, sugar cane and tobacco, but the rapid expansion of the soy frontier and natural gas exploration has changed it dramatically. Thirty years ago, soy was not a major crop in the region, but today represents 30% of the region's agricultural production. In 2003, it was estimated that over half of the lands dedicated to soy production were previously forest. Natural gas production

in Salta represents 16% of the national total.

The two industries of soy and mineral extraction combined with logging have left much of the area deforested. Over the last thirty years it is estimated that 600,000 hectares have been deforested in Salta. The second major source of sensitivity in the region is the high levels of social conflict due to land disputes and forced migration. The land use changes from forestry, sugar and tobacco to soy, natural gas and oil has led to very powerful groups moving into the region and forcing indigenous populations away. This involuntary resettlement has led to major conflict between traditional groups and these powerful industries.

Adaptive Capacity: The presence of large sources of natural resource wealth means that the potential to adapt is relatively high. However, the large inequalities between the haves and have-nots means that only privileged groups have this capacity. Furthermore, the region contains many

highly organized groups that represent the gas and soy industries as well as local, community interests that oppose them. The problem is that these groups are in conflict with one another over the land, with neither side trusting the government to be an honest broker.

Impacts: These vulnerabilities have interacted to lead to the following impacts: the loss of productive lines like agriculture for others like gas exploration; landslides due to increased rainfall and decreased vegetative cover; the resettlement/expulsion of peasant and indigenous communities and extra-regional migration due to land use changes; increased levels of conflict; high levels of poverty as traditional livelihoods are reduced; increased inequality; and increased incidence of dengue and malaria due to a rise in temperatures more suitable for these diseases.

Desired Futures: The communities of this region voiced a desire for diversifying their livelihoods, increasing their access to resources and to generally graduate out of poverty. Indigenous groups additionally wished to return to their native forests, a prospect made difficult by the deforestation and loss of land from soy expansion and mineral exploration. All of the communities desired greater economic, food and physical security.

Success in Building Adaptation Coalitions:

Coalitions in this region were successful in reducing vulnerability to climate change, particularly as it relates to land use changes. Adaptation coalitions were successful in establishing links with external partners, including the Salta Land Forum (el Foro Salteño por la Tierra), and have established partnering agreements with government institutions. Coalitions were also successful in attaining external support to voice indigenous demands for greater forest access to the national justice system. The presence of established institutions and an active civil society means that adaptation coalitions have the potential for

continued success in this area despite persistent conflict and social fragmentation.

6.1.2. Río Negro, Argentina

The southern line of Río Negro (*línea sur rionegrina*) has an area of 114,000 square kilometers, representing 60% of the Río Negro Province. This area is known for its dry lands and relatively sparse population, with an average of only two persons per square kilometer.

Drivers of Vulnerability

Exposure: This region is very dry and prone to extended dry spells, drought and even desertification. The risk for drought has increased with predicted temperature increases. Although it does not rain frequently in this region, when it does it can be intense, leading to occasional flash flooding.

Sensitivity: The primary livelihood activity is to raise sheep and goat and, with the exception of mining, there are very few productive alternatives. Livestock raising is highly dependant on the natural environment and, therefore, highly sensitive to climate change. It is also largely dependant on international wool prices.

Adaptive Capacity: Due to the dry characteristics of the land, people have developed strategies for adapting that include constant movement to find pasture, water or work. The mining of gypsum, granite, slate, quartz and porphyry makes migration to mining areas an option. Furthermore, communities have a history of communally resolving shared problems. This means that social cohesion is relatively strong.

Impacts: Drier conditions combined with falling wool prices have led to a decrease in sheep from 2.6 to 1.5 million in the area and the permanent

migration of 42% of the rural population in the mid-1980s.

Desired Futures: These communities aspire for greater access and use of water and land, including ownership.

Success in Building Adaptation Coalitions: Unlike in Salta, the communities of Río Negro lack extreme levels of inequality and social fragmentation and as a consequence coalition forming has been a much easier task. Coalitions were able to mobilize local assets for reducing vulnerability, including human, social and financial capital. Local researchers in Argentina believe that coalition building shows great potential in Río Negro.

near the capital, La Paz. All five have similar vulnerabilities and will therefore be analyzed collectively.

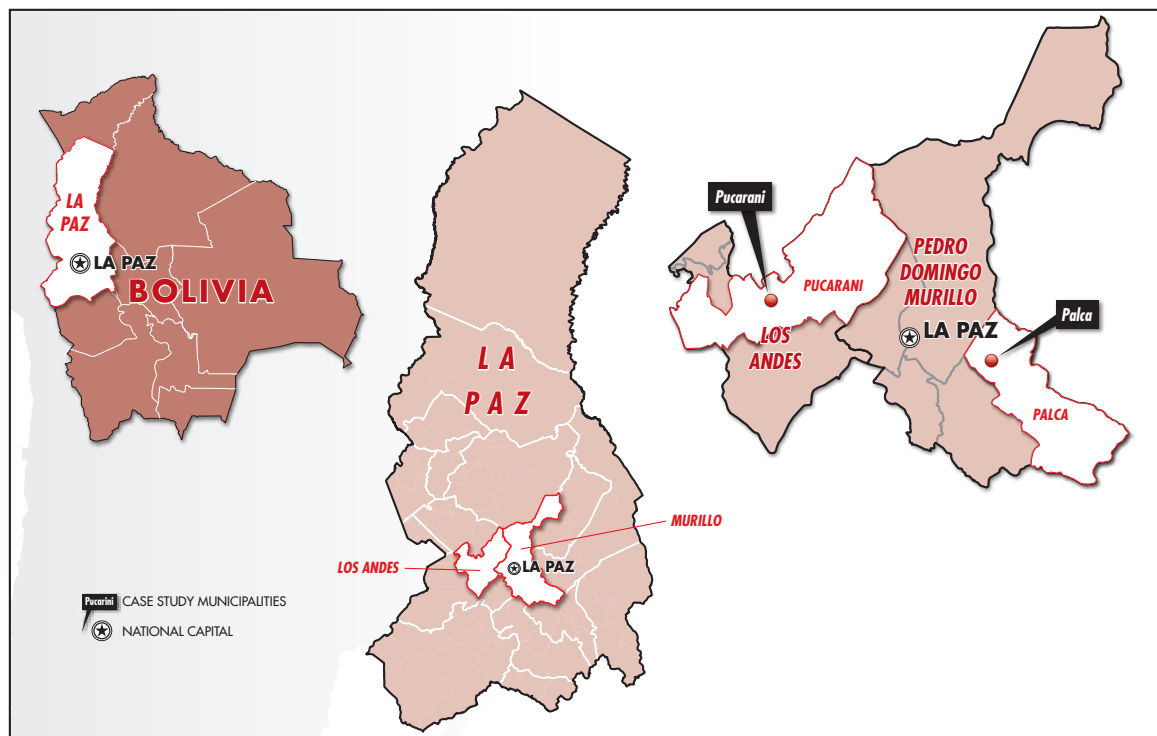
6.2.1. Los Andes and Murillo, Bolivia

These areas of Bolivia are characterized by dramatic mountain landscapes and the indigenous Aymara culture. The two case study communities in Los Andes—Chunavi and Condoriri—are supplied water by the Tuni-Condoriri mountain glacier, while the three in Murillo—Amachuma Grande and Huancapampa—are resting below the Mururata glacier.

6.2. Bolivia¹⁷

The five case study communities of Bolivia are all located in the highland areas of the *altiplano*

¹⁷ All information pertaining to the Bolivia case study is taken from CARE Bolivia (2011).



Drivers of Vulnerability

Exposure: Climate exposure in these regions is characterized by a shorter rainy season with more intensive precipitation, increased temperatures and changes in the traditional agricultural calendar. The higher temperatures are a principal driver of the rapid glacial retreat of the glaciers Tuni-Condoriri and Mururata. Since 1956, Mururata glacier has lost approximately 20% of its total surface area, which accounts for 1.6 square kilometers. Due to their location in lower altitudes, the Tuni and Condoriri glaciers are more at risk from increases in temperatures and they are expected to disappear completely by 2025 and 2045, respectively. The melting glaciers have, over the last decade, actually led to an increase in the stream water supplies that provide communities with crucial water resources for human consumption, agriculture and livestock. The current increased water availability is probably why none of the case study communities emphasized glacier retreat as a climate risk but rather underscored severe climate events (drought, frost and hail), higher temperatures (drying of the soil) and inter-annual climate changes as their major climate concerns. However, in the long-term it is expected that glacial retreat will lead to major water shortages.

Sensitivity: Typical livelihoods in these regions are exposed to extreme conditions because of their altitude (between 3,000 and 4,500 meters above sea level) and depend directly on the climate. These livelihoods include agriculture, which is mainly rain-fed and includes potatoes and quinoa; and extensive livestock production that includes llama, sheep, alpaca and dairy cattle. This livestock depends on the natural vegetation from communal lands. These activities are highly dependent on water resource availability and temperature, which are changing. This is further complicated from the lack of a quality water harvesting and irrigation infrastructure. It is estimated that current systems are highly inefficient, with water losses as high as 50 percent.

Additionally, in the communities of Murillo there is sensitivity due to the gold mining industry and the subsequent pollution of water supplies. These downstream communities are in dispute with the upstream communities that control the water resources coming from Mururata.

Adaptive Capacity: The Aymara communities in the Andean *altiplano* and valleys have always been exposed to climate variability and, over the course of centuries, have developed strategies to adapt to these conditions. This is demonstrated by both the anthropocentric landscape and diversified agricultural production on display at different altitudes. This has been made possible by strong traditional organizational structures, known as *Ayllus*, which have allowed the communities to establish relatively complex land-use systems. Nevertheless, during the last century, only some of these agricultural systems have been maintained. Due to the proximity of these regions to the major cities, La Paz and El Alto, migration is a strategy used by all communities. This proximity also ensures easy market access for a number of local products. The frequent migration has helped diversify the local economy, creating new employment in the transport sector, mining and tourism.

Impacts: Short-term water abundance in streams has been a result of glacial retreat, but long-term water scarcity issues are expected as glacial surfaces are reduced or disappear completely. More intensive rainfall is leading to more frequent landslides, flooding of vulnerable areas, the loss of critical ecosystems like wetlands, the loss of critical pasture for llamas and a general decrease in agricultural production. Increased migration rates often leave women behind in the communities with the added burden of taking over for the departed male's activities. The inconsistent availability of water resources has led to discord between upstream and downstream communities in Murillo. These disputes are likely to intensify as water availability is reduced and population

growth increases water demand. Conflicts have also been observed in the Chunavi-Condoriri communities where a nearby dam only supplies water to the cities of La Paz and El Alto. Finally, communities have highlighted the fact that an increasingly difficult to predict climate means that traditional climatic indicators and the agricultural calendar are no longer valid.

Desired Futures: The communities voiced a desire for consistent supplies of clean water, the expansion and improvement of irrigation systems, alternative water harvesting systems (e.g. dams), introduction or improvement of alternative income generating activities such as tourism or fish farming, and improved agricultural and livestock production systems such as dairy cattle or new cash crops like vegetables.

Success in Building Adaptation Coalitions: The findings of the case studies from the two regions in Bolivia offer an interesting comparative example of how coalitions can be successful in resolving issues related to climate change. The reason is that, despite similarities between the two regions, the results from building coalitions were vastly different. Similarities include the following: both regions are of the Aymara culture, equidistant from the capital city, La Paz; both depend on retreating glaciers for water supplies; and the livelihoods of both are traditional rain-fed agriculture and livestock. Yet, in Los Andes the process of building coalitions has been much more successful in reducing vulnerability. This area has formed coalitions, which have established a working relationship with the state water agency, EPSAS.¹⁸ This partnership has guaranteed that local communities' concerns are voiced in EPSAS' building of dams and other adaptation efforts. As a result, these communities have negotiated the allocation of certain amounts of water supplies from the dams, which were established to help provide water security to the major downstream communities of El Alto and La Paz. This has helped to

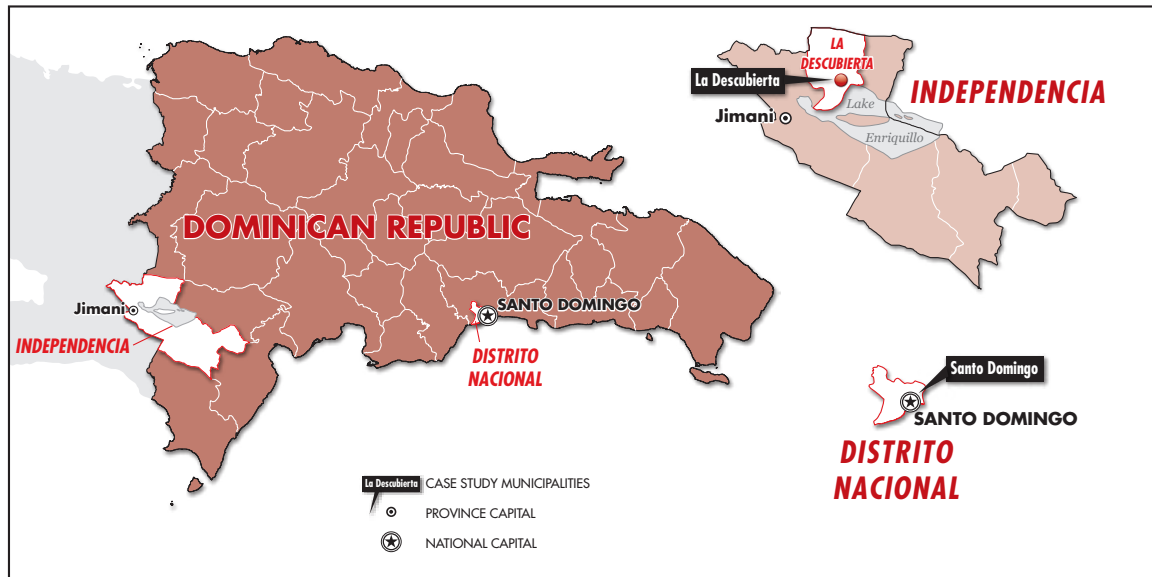
reduce competition and avoid conflict over water resources. By contrast, the communities in Murillo have more relative income and a productive gold mining industry, yet have been less successful in building coalitions and are increasingly more vulnerable to climate change. There are two main reasons for this. First, because mining is a resilient livelihood that is not directly impacted by climate change, there is little motivation to adapt. This has led to detrimental impacts to the land, traditional livelihoods and women's ability to sustain their homes and families. Second, there is increased competition over water resources with upstream communities, as well as social conflict and fragmentation. Still, it should be noted that despite the difficulties this region has faced, there is an emerging adaptation coalition, which has partnered with CARE Bolivia in an effort to improve local water management. Together they have negotiated an upgrade of local irrigation systems with the World Bank. This highlights the fact that coalition formation is a fluid process that can take many months or even years to fully develop. This case demonstrates that even young coalitions built under less than ideal circumstances (social fragmentation, weak local institutional arrangements and organization, etc.) still can lead to clear, incremental and positive results.

6.3. Dominican Republic¹⁹

There were four case study communities in the Dominican Republic. Two—La Zurza and Guachupita—are urban neighborhoods located in the north of Santo Domingo, the capital, while two—La Descubierta and Bartolome—are more rural and located around Lake Enriquillo.

¹⁸ Empresa Pública Social del Agua y Saneamiento (EPSAS).

¹⁹ All information pertaining to the Dominican Republic case study is taken from IDDI (2011).



6.3.1. North Santo Domingo, Dominican Republic

These areas represent parts of the capital city and are highly urban. They are low lying zones with La Zurza located along the Isabela River and Guachupita resting on the shores of the Ozama River, respectively.

Drivers of Vulnerability

Exposure: These areas are confronted with rising temperatures, unpredictable rainfall patterns and longer hurricane and cyclone seasons. These climate changes are leading to the rising of the water levels of both the Isabela and Ozama rivers. This climate exposure has led to flooding in these neighborhoods.

Sensitivity: The two communities are sensitive to climate change because of high levels of poverty. This poverty means that inhabitants do not possess the resources needed to effectively adapt to climate change and, with limited options, they are

compelled to live in low lying areas of the city that are exposed to the dangers of a rising river. This puts the homes of locals directly at risk of flood damage. Poor urban dwellers frequently lack the titles to their land, which means they are ineligible for many social services. In addition, since many of these people have already migrated from rural areas to the city, there is a limited ability to migrate again.

Adaptive Capacity: These areas have a long history of managing disaster risk, so preparedness and capacity to adapt to hurricanes is relatively strong. In addition, livelihoods in these urban areas are relatively diversified, with both private and public sector jobs that are not highly dependent on the natural environment. These traits make the need to adapt to climate changes less of a necessity for many in the city.

Impacts: The location of these communities in low-lands near rising rivers makes housing susceptible to flooding. This has led to the temporary resettlement of inhabitants of these neighborhoods. There

is also anecdotal evidence that violence is on the rise. Locals explained that it is commonly believed that crime rates increase when temperatures rise and local hospitals have released information that demonstrates this phenomenon. This relationship cannot be causally linked; still, locals perceive it to be true. There is also evidence of increased incidence of diarrhea and respiratory illness.

Desired Futures: Locals shared a desire to overcome poverty and relocate to better areas of the city.

Success in Building Adaptation Coalitions:

Although the coalition has not yet received any financial support, they have been active trying to raise adaptation funds. The coalition has participated in a National Meeting on Adaptation and Risk Management held in Santo Domingo and had mobilized in response to the cholera epidemic that broke out in Capotillo by helping clean wastewater and preventing the spread of the disease. Furthermore, the coalition has marshaled local resources and formed informal partnerships to reduce vulnerability. This includes building social capital in partnership with local grassroots organizations and developing human capital through the public and private sector. The May rainy season is often intense and can result in floods and landslides. The coalition participated in the 2010 rescue efforts and voiced their concerns with authorities about the resettlement policy. These concerns included issues related to developing resilience to future climate events and preserving human dignity.

6.3.2. Lake Enriquillo, Dominican Republic

Lake Enriquillo is both the largest lake and the lowest altitudinal point in the Caribbean resting nearly 40 meters below sea level. The case study communities—La Descubierta and Bartolome—are located around the lake.

Drivers of Vulnerability

Exposure: Lake Enriquillo is exposed to the same climate variables as the rest of the country, including increasingly unpredictable rainy seasons, a longer hurricane season and longer dry seasons. However, the main visible exposure is the rising water levels of the lake. Historically, the average size of the lake ranged from 245 to 260 square kilometers, but now is about 350 square kilometers. It is believed that the additional rains accumulated during tropical storm Noel in 2007 caused the rise in water levels, at least initially.

Sensitivity: The areas around the lake are suffering from high levels of deforestation and the loss of flora and fauna. This leads to soil erosion and a general loss in fertility. Furthermore, these areas are highly reliant on the natural environment for their livelihoods, leaving activities such as agriculture, fishing and cattle raising as highly sensitive to climatic events. Persistent poverty in the region is also a factor.

Adaptive Capacity: Despite losses in forest cover and other vegetation, this region is still rich in natural resources. The case studies suggest that, compared to their urban counterparts, the communities in this region are rich in social capital and networks. Finally, there is the presence of livelihoods associated with the public sector and tourism, which are less sensitive to climate change than natural resource based livelihoods.

Impacts: The changing water levels and loss of native forest and vegetation is leading to a loss in animal and fish species. Decreased soil fertility and soil erosion has led to a decrease in agriculture and livestock productivity. This loss in productivity has a direct and negative impact on incomes. In addition, reports of respiratory illnesses and diarrhea are on the rise.

Desired Futures: Communities envisaged a future with higher incomes and greater economic diversification.

Success in Building Adaptation Coalitions: The coalitions of the communities in Lake Enriquillo have benefitted from extensive media coverage surrounding the rising water levels of the lake. This media coverage reached its pinnacle after heavy rains in May 2010 led to the rapid swelling of the lake. As a result, USAID sought out areas affected by these exposures to take part in a major adaptation project. The coalition was able to communicate with USAID and is now being considered for this major initiative. The goals of this project are to diversify economic activities and agriculture towards greater sustainability and less vulnerability; to promote ecotourism; and to create, with local and civil society participation, a local community defense network and environmental warning system. At press time, the project was still only a proposal, but indications were that it would go forward in La Descubierta and surrounding areas.

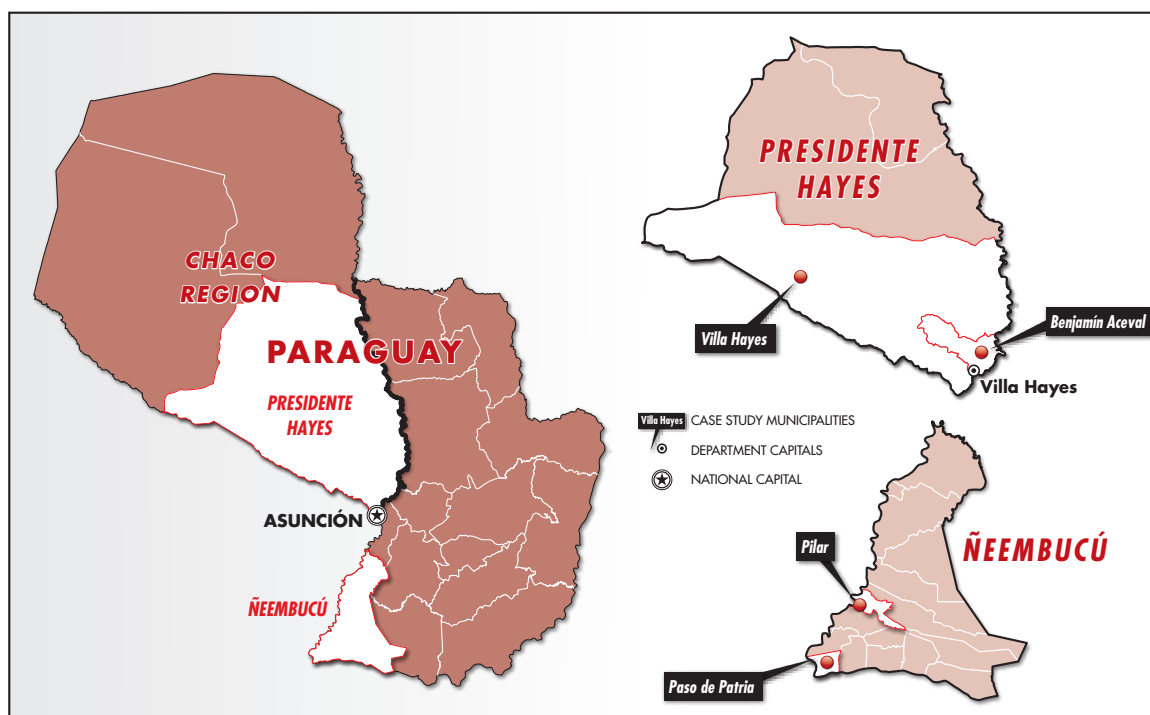
6.4. Paraguay²⁰

The two regions of Paraguay chosen for the case studies are located in the dry, savannah-like Chaco and the lush southwest of the eastern half of the country. The Chaco communities include Villa Hayes and Benjamín Aceval in the department of Presidente Hayes and Ñeembucú, of the eastern half, includes the towns of Pilar and Paso de Patria.

6.4.1. Ñeembucú, Paraguay

The two communities of Ñeembucú—Pilar and Paso de Patria—occupy wetland areas in southwestern Paraguay. Both towns are small and have urban and rural characteristics. They are both located along major rivers, with Pilar located

²⁰ All information pertaining to the Paraguay case study is taken from Instituto Desarrollo (2011).



alongside the Paraguay River and Paso de Patria located where the Paraguay and Parana rivers intersect.

Drivers of Vulnerability

Exposure: Changing weather patterns in southwestern Paraguay are leading to the depletion of these traditional wetlands. Dry seasons have grown longer, which is causing the dieback of many of the marshes and other natural ecosystems. When the rains do come, they tend to be more intense and have been known to cause flash flooding and an overflow of the Paraguay and Parana rivers.

Sensitivity: Inhabitants of this region rely heavily on livestock raising, agriculture and fishing for their livelihoods. Each of these activities is reliant on the natural ecosystem, and therefore, highly sensitive to climate exposure. In Pilar, the biggest job creator is a single, large factory (*Manufactura Pilar*), with few alternative economic opportunities. Farmers in this region tend to practice unsustainable agricultural techniques such as slash-and-burn and, as a result, have depleted the soils and caused erosion. This has increased runoff from farmlands into the rivers, leading to decreased water quality and pollution. This area is also known for poor infrastructure generally, but especially roads, which are predominantly unpaved. In urban areas, a lack of affordable land combined with high poverty rates has led to populations moving into the poor slums located in lowland areas near the rivers, which are sensitive to flooding. Finally, a problem that is widespread in Paraguay is the issue of political clientelism. This takes the form of public and private leaders either directly collecting and hoarding resources or indirectly funneling them to allies or others with longstanding relationships. This stifles development and adaptation efforts as it leads to the inequitable distribution of adaptive capacity and risk management (see more on inequitable adaptation in Section 7.4).

Adaptive Capacity: Members of these communities often migrate to find work or pursue education. In Pilar, with the loss of wetlands, farmers have been shifting away from agriculture towards livestock management. Paso de Patria has been developing the industries of trade and tourism, taking advantage of the proximity of its relatively wealthy neighbors across the river in Argentina.

Impacts: There has been a significant decline to natural fish stocks in the region, affecting one-fourth of the 2,000 fisherpersons in Ñeembucú. In part, this has been compensated by the creation of fishing subsidies at the national level during the fishing ban season (November–December). Generally, agricultural productivity in the region has declined as a result of the loss of moisture in the wetlands and exhausted, eroded, nutrient poor soils. The wetland dieback has also led to greater competition between humans and native wildlife over the natural environment, leading to the decline of certain animal populations. Because of extended dry seasons that made rural livelihoods difficult, some families moved to riverbank slums exposing themselves further to flood risk.

Desired Futures: These communities identified many desired futures but the most consistently mentioned was the desire to attain support, technical and resource-based, from external institutions, particularly governments. Fishermen voiced concern over their dwindling livelihood.

Success in Building Adaptation Coalitions:

Generally, there was more interest in building coalitions in rural than in urban areas. This was because of the more direct impact that climate exposure has had on livelihoods combined with fewer options for diversification. Coalitions have approached municipal authorities about support in terms of protecting waterways for fishing and reducing the relative isolation of rural areas. Coalitions have not attained outside resources to

help build resilience to climate change, and facilitators have noted that this is due to the relatively small amount of time that coalitions have had to develop (to date, only a couple of months). Still, in the short-term, communication on the theme has improved greatly between communities and local governments as a result of the nascent adaptation coalitions.

6.4.2. *Presidente Hayes, Paraguay*

Presidente Hayes is the region of the Chaco closest to the capital of Asunción. The Chaco makes up the vast, dry and sparsely populated western half of Paraguay. Although it represents over half of the total landmass of Paraguay, it contains less than ten percent of the total population. It is a region well known for its lack of water. There were two communities from this region involved in the case study. Villa Hayes is a town with both urban and rural attributes, while the community of Benjamín Aceval is purely rural.

Drivers of Vulnerability

Exposure: This region has traditionally been exposed to very long dry spells and near permanent drought like conditions, but climate change has caused dry seasons to become even longer. In addition, there have been periodic but intense rainfalls, which lead to flash flooding.

Sensitivity: Due to the predominantly rural makeup of these two communities, they are both engaged in livelihoods wholly dependent on the natural environment—livestock in Villa Hayes and organic sugar production in Benjamín Aceval, respectively. There are very few alternative productive activities in the latter. Some of the poor urban areas of Villa Hayes are slums that rest on the banks of the Paraguay River. Both communities lack a consistent supply of potable water and have poor infrastructure, most notably their dirt roads (either

muddy or dusty depending on rainfall). Finally, like most of Paraguay, the structure of political preference and clientelism is fully practiced in this region, leading to the inefficient distribution of resources.

Adaptive Capacity: Communities in the Chaco possess traditional knowledge on how to make the most of their lack of water. These techniques include catchment systems as complex as rooftop eaves collecting and retaining water, and as simple as locals running outside on a rainy day. Due to the proximity of Villa Hayes to the nation's capital, Asunción, there have been efforts to diversify the economy beyond livestock and to integrate more with the major city, including the most important steel plant in Paraguay. In Benjamín Aceval, the soils are much more productive than other parts of the Chaco, so there is potential to diversify agriculture production beyond the sugar industry.

Impacts: Population growth combined with decreased water availability has led to competition over resources and the decreased productivity of livestock and agriculture activities, including sugar in Benjamín Aceval. In Villa Hayes, there has also been the forced resettlement of urban slum dwellers when river levels swell. These changes to the river have also led to a loss in fish stocks. Benjamín Aceval has faced food security issues because of its isolation during the rainy season and lack of crop production the rest of the year.

Desired Futures: Both communities seek to diversify their economic activities and attain more government support in times of climate stress, especially for infrastructure. In the urban areas of Villa Hayes, the coalitions were focused on water related issues such as the lack of drinking water and the risk of flooding in the poor slums on the banks of the Paraguay River.

Success in Building Adaptation Coalitions: There is a strong interest in both communities for the

coalitions to continue functioning. Awareness of the role that climate change plays in vulnerability has increased markedly. As a result, coalitions have successfully identified alternative livelihood options, particularly in the private sector in Asunción, for locals whose assets are affected by climate change. This has strengthened both social and financial capitals through the greater connectivity and increased incomes that have resulted from labor migration and remittances.

6.5. Peru²¹

Peru is a vast and geographically diverse country with a variety of climates, topographies and cultures. In order to take advantage of this diversity, two regions were selected in the case studies for their very different characteristics. This includes two Aymara communities from the Peruvian *altiplano* and two Machiguenga communities from the Amazon, respectively.

6.5.1. Peruvian Altiplano

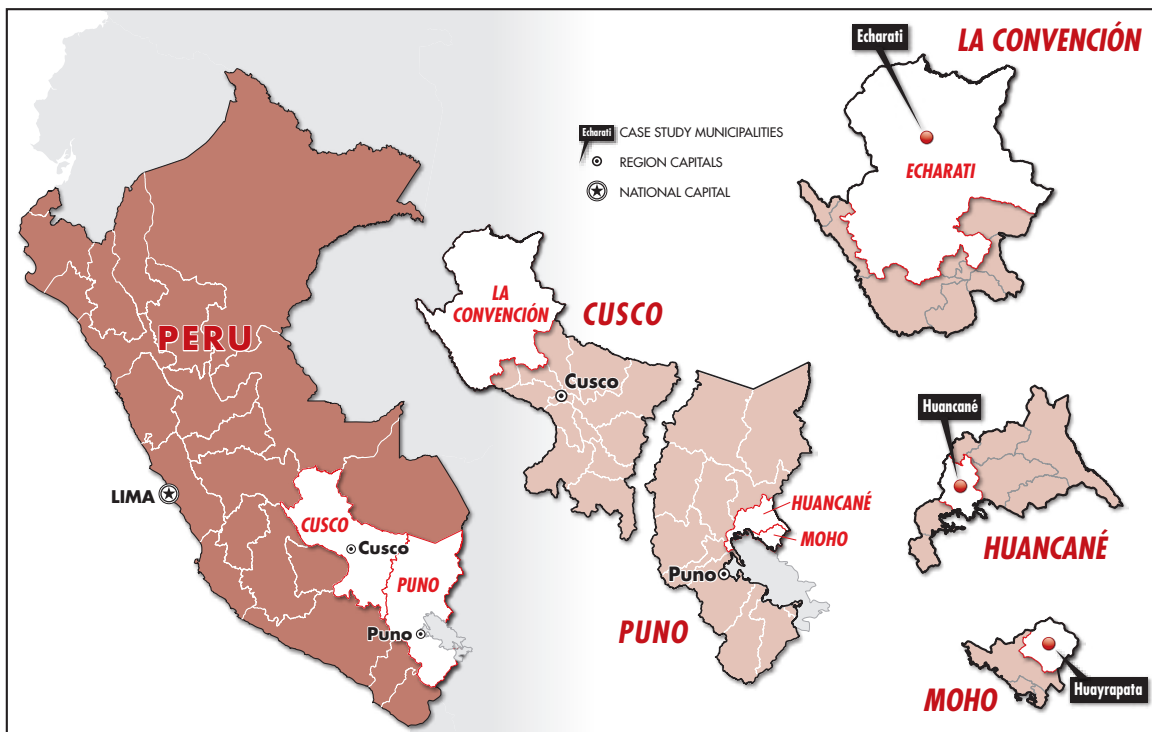
The case study areas of Moho and Huancané are located in the department of Puno on the northwestern side of Lake Titicaca and rest nearly 4,000 meters above sea level.

Drivers of Vulnerability

Exposure: The communities in Puno are exposed to rising temperatures, increased precipitation and as a result, times of both water abundance and water scarcity. Longer dry seasons, coupled with shorter, but more intense rainy seasons, have made efficient water use a challenge.

Sensitivity: Cattle raising is the main source of income in these communities, though crops are

²¹ All information pertaining to the Peru case study is taken from CONDESAN (2011).



grown and harvested for subsistence. Alpaca and llama production has decreased over the years as cattle production has increased and become more profitable. Still, some farmers, especially in Moho keep alpaca and llama for their meat and fiber. Predictably, these communities are also very poor and have reported having very little communication or connectivity with the local municipalities. In fact, due to civil society interventions, these communities are more connected to regional and national markets than they are to their own municipality.

Adaptive Capacity: The communities in this region are looking to diversify their livestock in order to reduce the risk from shifting market prices and variable weather. Local producers are represented by highly organized producer organizations that help link local goods to national and regional markets. This task is made easier by the relatively good road access to this region.

Impacts: There have been decreases in the yields of subsistence agriculture thanks to a myriad of climatic factors, which have led to increased food insecurity. More alarming, from an economic standpoint, is the decreasing llama population in the region. This is likely due to a loss of ideal grazing habitat. Communities have also reported an increase in human illnesses, specifically diarrhea and respiratory problems.

Desired Futures: The communities of Puno desire the increased productivity of livestock and crops as well as support from the municipality in building resilience.

Success in Building Adaptation Coalitions: As a result of the coalition formation process, a municipal environmental committee was formed to respond to issues such as climate change. The committee is comprised of representatives from several communities. In the case of Moho, the formation of this committee, with the community as a member, seems to have provided

a space for an improvement in the relationship between Moho and the municipality. Currently, there are also plans to integrate this committee into the Huancané Provincial Committee of Farm Management (COPROGAH—Comite Provincial Ganaria de Huancané). Recently, a new government has come into power and local authorities have changed and it, therefore, remains to be seen if the municipal environmental committee continues to develop. In addition, coalitions have succeeded in attaining technical support from CARE Peru²² and financial support from AGRO RURAL²³ and FONDOEMPLEO²⁴ for a livestock-fattening project.

6.5.2. Peruvian Amazon

Just downriver from the ancient city of Machu Picchu in the upper and lower Urubamba River, live the Machiguenga people. The Machiguenga is an indigenous group that occupies parts of the Peruvian Amazon. The region's two case study communities are Matoriato and Timpia. They are similar in many respects except that the latter has about twice the population size as the former—720 versus 340 people.

Drivers of Vulnerability

Exposure: Over 90% of respondents from the community observed some form of climate change occurring, including changing precipitation patterns, increasing cold spells and changing seasons, although none of them identified “climate change” as a cause. The water levels of the rivers Timpia, Sihuaniro and Urubamba are rising.

²² CARE Peru <<http://www.care.org.pe>>

²³ Programa de Desarrollo Productivo Agrario Rural (AGRO RURAL) <<http://www.agrorural.gob.pe>>

²⁴ Fondo Nacional de Capacitacion Laboral y Promocion del Empleo (FONDOEMPLEO) <<http://www.fondoempleo.com.pe>>

Sensitivity: The Machiguenga people are traditional hunters and gatherers who have historically relied on their forests and rivers for a variety of animal and fish species. More recently they have begun small plot agriculture to produce coffee, cacao, annatto, banana and the more traditional yucca root. These communities are highly isolated from the rest of Peruvian society, and their settlements are only accessible through a combination of driving, boating and walking. Deforestation of the Amazon is occurring as a result of climate change in combination with the expansion of the agricultural frontier and the presence of extractive industries for timber and natural gas. The Camisea natural gas project that extracts from this region has suffered several damaging spills from ruptured pipelines, leading to the pollution of local water sources.

Adaptive Capacity: Locals have engaged in several adaptation projects. These include: building fish farms and raising small animals such as chickens, ducks, turkeys, and guinea pigs; reforestation; training in sustainable coffee production; improving water disbursement infrastructure; construction of a health post; some erosion control; and planning to construct a dam. Locals have a relatively strong voice, given their isolation. This is due to their representation by the Machiguenga Council of the Urubamba River²⁵ (COMARU), an organization promoting local indigenous rights.

Impacts: The increases to river water levels are likely attributable to shorter, more intense rainfalls combined with less forest and vegetation cover to absorb water and prevent runoff. Flora and fauna diversity has decreased, and community members commented that fish population levels are lower than anytime they can remember. Animal species for hunting have become more and more scarce. Pests and disease have ravaged coffee production, and other crops are experiencing decreasing yields as well. More frightening is the increase in illnesses such as coughing, the flu,

colds, tonsillitis, bronchitis and, the most common, diarrhea. Focus group discussions reveal that locals believe these impacts are a result of changes in the weather, poor land management practices, pollution caused by a series of spills from the gas pipeline and angry spirits. The climate variability has made it more difficult for locals to predict growing, hunting and fishing seasons, rendering traditional knowledge of the natural environment unreliable.

Desired Futures: Locals aspire for a more productive natural ecosystem with more ample and diverse supplies of animals to hunt and fish.

Success in Building Adaptation Coalitions: These communities have not taken steps to build coalitions. The research period coincided with massive protests against the Camisea Natural Gas Project, which interrupted the coalition building process. The conflicts between communities and the national gas project created a volatile environment that locals felt would be dangerous for researchers. Transportation costs and the ongoing volatility prevented researchers from returning. Therefore, ideas for future actions were discussed and community leaders voiced their interest in coalition building, but there were no formal agreements on who should form the coalition and with what external actors they should partner. Nevertheless, the researchers, who know these communities well, believe that coalition work has great potential in the region and should continue. They believe that coalitions will provide locals with the opportunity to directly interact with external actors at the regional and national level, something that was missing in this research.

²⁵ Consejo Machiguenga del Rio Urubamba (COMARU) is the largest indigenous Machiguenga organization representing 30 native communities. They have become well known for their persistent resistance to the Camisea natural gas extraction project.

6.6. General Conclusions

Based on results from field-testing the ACF, it has been shown that this approach is an effective mechanism for building community resilience to climate change. Short-term outcomes demonstrate successes in the building of Bridging and Bonding Social Capital, mobilization of internal resources and increased access to external resources, including knowledge. These outcomes include the following:

- The majority of communities identified and formed coalitions with the stated aim of reducing vulnerability to climate change. The formation of these groups creates long-term, local champions for building climate resilience and reducing vulnerability.
- In all five country case studies, communities increased their levels of communication with nonlocal actors and raised their internal awareness of climate change and its dangers.
- In all five countries the building of coalitions led to some form of agreement with external institutions and, as a result, strengthened local-nonlocal alliances.
- In about 75% of the communities tested, local community capitals were mobilized in order to adapt to climate change.
- In three out of five countries, communities were able to gain access to financial or material resources to adapt to climate change, despite having only a few months for the coalitions to form and strengthen. It would usually be expected that financial or material investment into local communities would be

more of a long-term outcome, but evidence suggests that this support can happen quickly too.

6.7. Risks

There are some limitations and risks associated with the ACF that should be taken into account when planning. First, social indicators are notoriously difficult to quantify and this is also true of measuring Bridging and Bonding Social Capital. A monitoring mechanism is included in the final stage of the Toolkit, but even with this as a guide, demonstrating the totality of results in all of their forms remains difficult.

Second, one objective of this approach is to organize and mobilize previously marginalized communities or social groups. Giving voice to populations that traditionally have not had it may ruffle some feathers in certain established circles or disrupt beneficial and exclusive political arrangements. In other words, such an approach has the capacity to disrupt the status quo and, depending on perspective, this could be for the better or for the worse.

Third, as in the case of a highly conflictive area like Tartagal in Northern Argentina, this approach requires a certain honest broker to begin to facilitate the process. Developing partnerships requires a certain amount of trust within and between coalitions. If a basic level of trust is not attainable, as is arguably the case in Tartagal, developing this framework, or any other adaptation strategy for that matter, could prove difficult or impossible.

7. Lessons Learned

Besides the general conclusion that forming adaptation coalitions is an effective means to building community resilience to climate change, there were several other interesting findings derived from the case studies.

7.1. Social Impacts of Climate Change are Diverse, Long-term and Uncertain

Evidence from the field studies support the assumption that the social impacts from climate change are highly diverse and locally specific, long-term, and difficult to predict.

7.1.1. Diverse Impacts

The case studies verify that climate change has very diverse sub-regional and local impacts that often contradict regional trends. For example, 15 of 24 communities in this case study reported being threatened by both floods AND droughts. In the Bolivian *altiplano*, located near the tropical glaciers that supply water to large portions of the country, there is actually an abundance of water resources. As warmer weather and rains melt the glaciers, these water resources flow through the communities, yet there are still water shortages. One reason for this is that despite increased rainfall during the rainy season from increasingly intense downpours, the dry season has actually become longer. As a result, during the rainy

season catchment has become more difficult, and during the dry season water is simply not as readily available. In the communities of Los Menucos in Argentina, drought has always been a challenge, and this continues to be the case, however with more intense rainfall, flash flooding is also increasingly an issue. In other words, the first example is a region that is threatened by increased precipitation yet faces serious water shortages, and the second example is an arid region forced to confront an overabundance of water.

Additional layers of complexity compound these diverse impacts. Even communities exposed to similar climatic events will be affected in very different ways as a result of having variable sources of vulnerability. In the Dominican Republic, both the urban areas of northern Santo Domingo and the rural areas surrounding Lake Enriquillo are threatened by increased precipitation and rising water levels; the latter faces a rising lake and the former is confronted by a rising shoreline from the nearby Isabela and Ozama rivers. In the rural areas, the increased precipitation is having deleterious consequences on the traditional livelihoods of livestock management, fishing and agriculture. Santo Dominicans, however, do not depend as

much on the natural environment for their livelihoods, and rely more on industry. However, in the city, several slums are located in lowlands near the rivers putting these homes at risk of flooding. To put simply, in the rural areas, climate change adaptation is a question of livelihoods; in the urban areas it is a question of housing. Furthermore, the threat to natural resource based livelihoods often leads to rural to urban migration, as in the Dominican Republic. These migrants are typically poor when they arrive in the cities and must find cheap housing; this cheap housing, in turn, tends to be located in lowland areas threatened by floods or on slopes threatened by landslides. In the end, these migrants ended up escaping one type of impact related to flooding only to be confronted by another.

7.1.2. Long-Term Impacts

Another distinguishing characteristic of climate change impacts, supported by the case studies, is they are often long-term. For example, it has been predicted that both the frequency and intensity of storms in the Caribbean will increase due to climate change. Therefore, the increased frequency of storms in the Caribbean is not just a temporary rough spot that countries can withstand for a few years, before returning to normalcy.²⁶ Likewise, in the Paraguayan state of Ñeembucú, the drying of wetlands that communities are facing is not temporary, but is likely to be a permanent fixture of the seasons. The permanence of these changes means that communities that have traditionally adapted in the short-term must now adapt for the long-term as well. This change in thinking is a major challenge. In each of the five case study countries, communities tended to focus on present needs and found it more difficult to think in terms of years or decades, rather than weeks or months. We found that the ACF, specifically its longer-term organization and alliances with external actors, allowed communities

to revisit their challenges periodically and revise their adaptation strategies appropriately. By creating or strengthening adaptation coalitions, and thereby forming institutions dedicated to responding to climate change vulnerability over the long-term, communities were able to sidestep the need for long-term planning.

Long-term impacts can also be very different, or even contrary to short-term impacts. For example, in the Bolivian communities of Chunavi and Condoriri, increased rainfall and the building of dams has increased the availability of water resources for these communities. The communities have, in turn, begun adapting to these changes by planting potatoes at higher elevations to maintain harvests, and expanding irrigation systems and llama-grazing areas. However, increased temperatures and rainfall is leading to the disappearance of the mountaintop glaciers of Tuni and Condoriri that supply water to the region. This has prompted the construction of dams to regulate the glacier melt for year-round use. These communities, situated on the front lines of threatened water availability, do not feel threatened, in fact, they feel emboldened. In several focus group discussions from these areas, locals voiced their contentedness with climate change. The reason was that climate change increased the amount of attention and investment their communities have received. However, as these water resources continue to be diminished, these communities will inevitably be faced with water shortfalls. Adaptation efforts in these areas, whether autonomous or planned, must therefore focus on the long-term prospect of water scarcity, and not just short- and medium-term conditions.

²⁶ This does not refer to the El Niño/La Niña (ENSO) phenomenon, which does lead to temporary increases in the frequency and intensity of Caribbean storms. Because of this the Caribbean hurricane season has 15-year highs and lows.

7.1.3. Uncertain Impacts

In any venture, it is important to plan for the unknown. Unforeseen events transpire that force individuals and communities to evolve with shifting circumstances. However, climate change makes this unpredictability more of a threat, especially for communities that have come to rely on the predictability of the weather for their livelihoods. The Machiguenga indigenous people of the Peruvian Amazon are traditional hunters, fishers and gatherers who have developed hundreds of years of knowledge on how and where to find food. These techniques and practices are tried and true, that is, so long as the natural environment is predictable and understood.

However, climate change is full of uncertainty. Scientists are unable to find consensus on the impact that humans are having on global warming, climate models cannot account for all of the relevant factors to accurately predict weather changes, data collection is woefully behind and seldom reaches vulnerable communities and climatic events are increasingly variable. To relate this to a specific case, we see in the present day that the Machiguenga are faced with fewer fish in the river, fewer animals in the jungle and are finding their very way of life threatened. The combined changes to the climate and the degradation of parts of the Amazon ecosystem through resource extraction and other land use changes, have led to an uncertainty that has reduced the value of one of the Machiguenga's greatest assets, their traditional knowledge.

7.2. Developing a Practical Vulnerability Framework

We found through the field research that the IPCC vulnerability framework of exposure, sensitivity and adaptive capacity is practical as a general guide to identifying the problems and

risks associated with climate change, but that it is also limited in certain respects. As described below, first, the definition of exposure is misleading to community groups, second, commonly used definitions of sensitivity are incomplete and should be expanded to include social sensitivities like conflict, and third, the definitions of adaptive capacity are theoretical and vague and should be developed further.

7.2.1. Exposure

Exposure is defined as the character, magnitude, and rate of climate variation to which a system is exposed (IPCC 2001, Glossary). A World Bank (WB 2010c) report goes on to say that, "Populations will be vulnerable when exposed to extreme weather events; increased water insecurity; sea-level rise; reduced agricultural productivity; increased health risk; large-scale singularities and aggregate impacts that worsen over time (e.g., temperature rise)." However this definition groups together weather events, like temperature rise, with the eventual impacts from these events, like reduced agricultural productivity. In our development of the ACF, we found this grouping as misleading and problematic. For example, the loss of agricultural productivity is a result of the interaction between exposures like drought with sensitivities like infertile soils caused by soil erosion and land use changes. In other words, to use this broad definition of exposure is to group contributors to vulnerability with effects, in determining vulnerability. Since one of the purposes of determining vulnerability is to understand how impacts are felt and how coalitions could be formed, we separated the outcomes from the causes and created another "impact" category. See the example in Table 2 of how these terms were arranged in the Argentina case study. Another reason to do this, is that the vulnerability framework is used to determine how a given system and population is vulnerable to climate change, and not to determine

how communities are already impacted. However, since communities are already feeling climate impacts, we decided to include current “impacts” as another important indicator to measure due to its interrelation with vulnerability.

7.2.2. Sensitivity

The IPCC (2001) defines sensitivity as “the degree to which a system will respond to a given change in climate, including beneficial and harmful effects.” However, in application, community groups and researchers alike found it difficult to distinguish between a community “sensitivity” that is beneficial and an “adaptive capacity.” For example, if community resources are mobilized as a response to climate exposure, is that a “sensitivity” that is beneficial or “adaptive capacity?” By contrast, is poverty, which is a trait that increases vulnerability, a “sensitivity” or a lack of “adaptive capacity?” Because of this confusion, we have adapted IPCC’s original definition of sensitivity to include only harmful effects. Beneficial effects are included under the category of adaptive capacity.

The importance of sensitivity in determining vulnerability cannot be overstated, and should include social factors, especially the existence of conflict. This was evident in the Argentine communities of Tartagal, as shown in Table 2, which were arguably the most at risk to climate change of the 24 communities involved in this study. The reason for this was simple: Tartagal suffers from high climate sensitivity. In fact, sensitivities like land-use changes were exacerbated by climate change to the point where it was impossible to decipher which impacts resulted from which factor. Specifically, climate changes combined with the expansion of the soy frontier and exploration for gas and oil have contributed to rapid deforestation and the displacement of numerous peasants and indigenous groups. This has led to high levels of conflict, where powerful and vested interests

have moved to substitute subsistence agriculture, cattle raising and hunting and fishing with major extractive industries. This contributed to certain livelihood losses, and as a consequence, open-conflict between big businesses operating in the area and traditional inhabitants, many of whom were forced to emigrate. With a changing climate, these sensitivities were compounded to contribute to the further loss of livelihoods for locals, high levels of inequality and poverty, an uptick in cases of malaria and dengue and additional conflict. In 1999 and again in 2002–2003, the city of Tartagal was the scene of violent conflict. Many blamed this conflict on dissatisfaction over high levels of unemployment (Bendini, et al. 2010). In 2006, intense rainfalls led to landslides and an overflow of the Tartagal River. This led to wide spread flooding and caused serious damage to livelihoods and the city’s infrastructure. In 2009, this happened again, but with more severe consequences, including several confirmed deaths and the disappearances of locals whose bodies were not recovered. Such high-levels of conflict severely limit the ability of communities to work together and build partnerships, hence severely limiting their capacity to adapt. As will be described in section 7.6, the ACF has been shown to reduce social conflict in certain situations.

7.2.3. Adaptive Capacity

The IPCC (2001) defines adaptive capacity as “the degree to which adjustments in practices, processes, or structures can moderate or offset the potential for damage or take advantage of opportunities created by a given change in climate.” However, measuring the capacity to adapt can be challenging. The World Bank (2010c) elaborates that, “The climate change literature is filled with attempts to develop specific indices of adaptive capacity that take into account all the factors that may go into adaptation and enhancement of resilience to climate hazards, but it has proven difficult

Municipality	Exposure	Sensitivity	Adaptive Capacity	Impacts
Los Menucos (Patagonia) <ul style="list-style-type: none"> • Los Menucos • Sierra Colorada • Ministro Ramos Mejía 	<ul style="list-style-type: none"> • Drought • Infrequent but intense rains • Flash flooding 	<ul style="list-style-type: none"> • Extractive industries (mining) and natural resource livelihoods (livestock) • Ag. expansion • International livestock markets 	<ul style="list-style-type: none"> • Traditional land management • Sparsely populated • History of working together to resolve conflicts • Temporary internal migration 	<ul style="list-style-type: none"> • Challenges to livestock raising (loss of grazing land) • Health impacts • Territorial movements by families
Tartagal (North) <ul style="list-style-type: none"> • Tartagal • Salvador • Mazza • Aguaray 	<ul style="list-style-type: none"> • Increased precipitation and intensity • River level rise • Flooding • Landslides • Sporadic drought 	<ul style="list-style-type: none"> • Land use changes • Deforestation • Ag Expansion (soy) • Gas exploration • High levels of conflict (little trust in the State) • Soil erosion • Inequality (concentrated wealth) 	<ul style="list-style-type: none"> • Natural resource wealth (oil and gas) • Highly organized interests • Extra regional migration • Financial wealth 	<ul style="list-style-type: none"> • Loss of productive lines like agriculture for others like gas exploration • Resettlement/expulsion of peasant and indigenous communities and extra-regional migration • Increased levels of conflict • High levels of poverty • Inequality (as a result) • Dengue and malaria

Table 2 >
Argentina
Case Study
Vulnerability
Matrix

to develop simple typologies, especially when the data from the on-the-ground field studies remains lacking (Kates 2000; Yohe and Tol 2002; Smit and Wandel 2006)."

In developing the ACF on the ground, the Community Capitals Framework and its seven capitals were used to measure adaptive capacity. Using this framework was helpful in defining adaptive capacity and identifying resources and assets that are often taken for granted or not considered valuable, even by locals. In other words, it was not only a way to measure adaptive capacity but also a means to build it by mobilizing these resources.

7.3. The Creation of Perverse Incentives through Climate Interventions

The case studies have shown that some interventions designed to respond to impacts exacerbated by climate change can actually increase community vulnerability. This happens when perverse incentives are created through public or private policies (or the lack of them) that promote the

very activities that made people vulnerable in the first place. For example, in Río Negro, Argentina and other arid regions of Patagonia, vulnerable indigenous populations use state funds to replace their lost livestock with others, as the law dictates this is the only way they can keep their ancestral lands and not have to sell them. While replacing livestock lost in the event of a natural disaster can be a helpful response to protect livelihoods, doing the same for a landscape undergoing long-term desertification can be problematic. If an ecosystem is becoming less habitable for a particular crop or animal over the long-term and there is little chance that it will ever be productive again, then guaranteeing this livelihood would lead to inefficiencies, lower yields, less sustainability and continued vulnerability. A more sound strategy under this scenario would be to ensure land rights AND provide support in developing alternative productive strategies. Generally speaking, when designing adaptation strategies it is important to differentiate between one-time natural disasters and long-term climate changes. The former represents an event that will not prevent a return to the status quo, while the latter represents permanent systemic change. Other examples of these

perverse incentives identified in the case studies include the following:

- In the case of Paraguayan fishers, annual subsidies are paid to compensate for income lost during a two-month fishing ban period. However, this compensation may encourage the continuation of fishing when that livelihood has become less and less viable.
- In Paraguay and Argentina, increased use of agrochemicals in response to increased climate variability and declining soil fertility, as well as poor state regulation of agrochemical use, contributes to increased water contamination and, as a consequence, increased sensitivity to climate exposure.
- In the Paraguayan Chaco, due to market incentives, owners of large cattle ranches build dams to retain water from seasonal river floods. In the eastern Ñeembucú region, cattlemen and agriculturalists build channels to drain wetlands in order to increase the amount of available land for agriculture and pasture. These activities, while helping short-term profitability in the face of water abundance, increase the vulnerability of other social groups such as small landholders and fisherpersons.

Of course, no adaptation strategy should be deemed appropriate or inappropriate for every situation. For example, in contrast to the Paraguayan Chaco scenario above, in the Andes, building dams has been a highly effective strategy for maintaining water supplies in the face of glacial retreat. Therefore, what is important is that context specific realities and possible long-term consequences are taken into account when designing adaptation policies. To sum, while it is easy to fault vulnerable communities for not adapting to longer-term climate change impacts, it is often government, civil society and donor interventions or market incentives that encourage maladaptive livelihood strategies.

7.4. Inequitable Adaptation Contributes to Vulnerability

It is common knowledge that diversified economies, economic growth and access to resources build resilience to climate change. However, the case study examples demonstrate that if benefits are not distributed in an equal way, they will actually lead to greater vulnerability to climate change.

Agrawal (2010) defines diversification as the distribution of risk across asset classes. This principle can be applied to households, social groups and communities. Certainly evidence from ACF case studies has demonstrated that diversification is an important strategy for building community resilience to climate change. In the comparative analysis of urban and rural areas from Paraguay and the Dominican Republic, it was clear that rural communities are more vulnerable than their urban counterparts precisely because of the increased livelihood diversity in cities. The two rural areas of the Dominican study, La Descubierta and Bartolome, were highly dependent on three livelihood activities all of which were vulnerable to climate change, namely agriculture, livestock and fishing. However, the urban economies of Guachupita and La Zurza in the north of Santo Domingo were much more diverse and as a result less vulnerable to climate change.

The primary reason that the two rural areas were more vulnerable to climate change was that most of their livelihood strategies were reliant on the natural environment, which is much more sensitive to climate change exposure than non-natural resource based livelihoods. Evidence of this dynamic is present across the five countries participating in the case studies. This dynamic is further supported in the literature, which has repeatedly demonstrated that communities whose livelihoods rely on the natural environment are the most vulnerable to climate change (for example see World Bank 2010a, 2010c, and 2010e).

Still, case study results show that even economically diverse communities can be highly vulnerable to climate change if accompanied by high levels of inequality. In Salta of northern Argentina, communities were highly vulnerable to climate change despite the diversifying of the economy from one of mainly livestock raising and sustainable forest practices to one of soy agriculture, oil and natural gas exploration and logging. This diversification had brought enormous wealth to the region, but it was concentrated in the hands of specific groups and, as a result, came at a high cost to others who use the land. More and more resources were poured into expanding the soy frontier, increasing mineral exploration and harvesting forest materials. As a consequence, forests were cut down and natural ecosystems were destroyed. This led to soil erosion, land degradation and the pollution of water resources. This higher sensitivity led to greater damages from the floods that hit the region in 2006 and 2009. These transformations have left the traditional livestock raising and forest communities without viable livelihood options, forcing many of these people to resettle. In addition, the great disparity in incomes and wealth contributed to resentment and violence on at least two occasions, in 1999 and 2002–2003.

Northern Argentina is an extreme case, but diversification when coupled with inequality was also shown to contribute to reducing adaptive capacity in other case study regions. In three communities in the Bolivian *altiplano*—Amachuma Grande, Huancapampa and Pueblo de Palca—gold mining had become an important industry and took precedence over traditional potato farming and alpaca herding. However, the fact that mining is not highly exposed to climate changes has left this part of the community uninterested in investing time or effort into adapting to it. This happened despite the fact that some members of the community, particularly women, still relied overwhelmingly on agriculture and livestock. This dynamic of

unequal diversification leading to sensitivity was also evidenced in the Dominican Republic. In this case, rural communities were highly knowledgeable about the impacts, reality and need to adapt to climate change and went about taking action. By contrast, urban communities who perceived themselves to be much less affected by climatic changes were also less compelled to act despite greater access to information. This left specific climate vulnerable communities, like riverbank slums, with less traction when advocating for adaptive actions.

7.5. The Many Faces of Migration

A large amount of literature²⁷ rightly suggests that migration is a climate change impact and/or adaptive strategy. The ACF case studies support both assertions. However, case studies also show that migration is a source of sensitivity that increases climate change vulnerability.

7.5.1. Migration is a Climate Change Impact and Adaptive Strategy

The issue of migration and climate change is both complex and hotly debated. In much of the literature, migration is described as the result of environmental threats. In the aftermath of extreme weather events there has been a well-documented history of populations being internally or externally displaced, leading to “environmental refugees.”

In the aftermath of non-extreme weather events, the causal link between climate and human mobility is less clear. In such cases, there are other contributing factors such as internal stressors like poverty or poor schooling and external

²⁷ For a good summary of the literature and the debates surrounding migration and climate change see World Bank 2010e: Chapter 4.

opportunities such as economic or educational options in urban areas. The causal link between migration and long-term climate change (which is not a singular event) is weaker still, yet when a totality of vulnerabilities is considered it is clear that people migrate in response to them. Agrawal (2010), by contrast, defines human mobility as the distribution of risk across space, which is a form of adaptation. These competing narratives suggest that climate related migration can be the result of an internal push from the communities (an impact) or an external pull towards opportunities (an adaptive strategy). In other words, migration can be categorized as both a largely negative or largely positive response.

Evidence from the case studies suggests that mobility is a consequence of both opportunities and threats. In the case of the lowland, flood-prone, urban areas in the Dominican Republic and areas in Northern Argentina exposed to landslides, the idea of climate “refugees” could certainly be applied. In other areas, like the Bolivian highlands, migration is more a result of economic incentives from gold mining, where monthly incomes can reach between US\$500 and US\$1,000. This is a relative fortune in rural Bolivia. By looking at the existing literature and the real life evidence from the five-country case study, one can safely assert that migration is both an adaptation strategy and a climate change impact.

7.5.2. Migration Increases Vulnerability to Climate Change

Case study results suggest that migration can fall under the category of sensitivity as well, thus contributing to vulnerability. In Bolivia, a major inhibitor to adaptation was the consistent migration of community leadership to urban areas for employment opportunities. In these cases, migration led to a sort of local “leadership drain” where many of the communities’ leaders and decision makers were

absent and efforts to make community decisions or develop adaptation strategies without them proved difficult. Furthermore, their absence also meant they were not available to engage in local livelihood activities, leading to an increased burden on the women and children who were more likely to stay behind. This increased burden, exacerbated by difficult climate changes, meant that those who stayed in the community did not have the time nor resources to engage seriously in organizing, building social capital, mobilizing assets or generally adapting to climate change, despite a clear recognition of the threat. These factors demonstrate that migration is not only a climate change impact and adaptive strategy, but also a source of vulnerability. It seems that human mobility is even more complex than originally thought.

7.6. The Adaptation Coalition Framework as a Tool of Conflict Prevention

While testing this framework in upland communities in Bolivia, another application for the ACF was accidentally discovered. Communities of the Valles Alto Andino region, like Huancapampa and Amachuma Grande, are uniquely situated between the primary water reserve for the region - the glaciers of Mururata - and the main destination for these resources - larger population centers of Palca and the gold mines that rely on this water. Upstream from these villages is a small community, Choquecota, which has first access to these glacial resources and is responsible for allocating water to the downstream communities. The placement of Huancapampa and Amachuma Grande in between the source and primary destination of water resources has left these communities stuck between the proverbial rock and a hard place. This is because they do not have direct access to the water, nor the collective power to demand greater supplies. As a result, these communities have a history of disputes

with Choquecota. Combining this history with the increased scarcity of water resources due to climate change and the resultant tropical glacial retreat, the situation is rife with opportunity for additional conflict, even of the violent sort.

Studies have shown a very weak correlation between climate change and violence, though for years many people have been sounding alarms that this is a possibility (refer to World Bank 2010e Chapter 3 for a good summary and analysis of this literature). However, in Peru, violent protests have erupted under similar conditions to those of the studied communities in Bolivia (ANA 2010).

In the Bolivian province of Los Andes a similar situation exists. In this region, the Tuni-Condoriri glaciers provide massive water supplies to the major population centers of La Paz and El Alto, and upstream communities in Los Andes, like Chunavi and Condoriri, are caught in between the main supply and demand for this water. This is a similar situation to the example from Palca, but with even more opportunity for conflict given the increased importance of water arriving to the capital. However, in this region, rather than specific communities controlling water sources, it is EPSAS, the public firm in charge of providing potable water to the region. Taking these threats into account,

EPSAS had developed a strategy of engagement to reduce the risk of conflict in the region. This strategy entailed three major objectives:

1. Establish a direct relationship with municipal governments and indigenous groups in the region.
2. Increase EPSAS' knowledge of the local context and the Andean culture.
3. Implement projects in partnership with local leaders that directly benefitted local communities.

By coincidence, the objectives of the ACF ran parallel to EPSAS' objectives, but from the perspective of the community instead of the government. It did not take long for the communities and EPSAS to realize they could help each other by entering into partnerships around common desired futures. Over the course of implementing the ACF in this region, EPSAS was able to become further integrated with the communities and as a result, the communities could directly voice their concerns and needs to planners. In the end, EPSAS' strategy influenced the development of adaptation coalitions and lessons attained from this experience are directly reflected in the Toolkit. Although the ACF was not developed as a conflict prevention tool, it is clear from this experience that it can be useful as one.

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