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Follow the Water: Emerging Issues of Climate Change and Conflict in Peru



CMM Discussion Paper No. 5

June 2012

This publication was produced for review by the United States Agency for International Development. It was prepared by Jeffrey Stark, Sergio Guillén, and Cynthia Brady.

ACKNOWLEDGEMENTS

The field research team would like to acknowledge the important contributions of Claudia Rohrhirsch and Fernando Chávez of USAID/Peru, who coordinated the team's meetings and provided valuable guidance and input during the study. The team also would like to extend its sincere thanks to Dr. Karen Kraft and her colleagues at AEDES, who provided gracious assistance and made key interviews possible in Arequipa Region, and to the TMI team in Huaraz.

CREDITS: This report was written by Jeffrey Stark of the Foundation for Environmental Security and Sustainability (FESS) based on field research in Peru conducted by Jeffrey Stark, Sergio Guillén, FESS consultant, and Cynthia Brady, Senior Conflict Advisor, Office of Conflict Management and Mitigation, USAID.

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ACRONYMS

AAA	Administrative Water Authority
AEDES	Association Specializing in Sustainable Development
ALA	Local Water Authority
ANA	National Water Authority
ARMA	Regional Environmental Authority of Arequipa
CAF	Conflict Assessment Framework
CAN	Andean Community
CCCAF	Climate Change and Conflict Assessment Framework
CENAPRED	National Center for Disaster Prevention
CEPLAN	National Center for Strategic Planning
CONDESAN	Consortium for Sustainable Development of the Andean Eco-Region
CMM	Office of Conflict Management and Mitigation
EIA	Environmental Impact Assessment
ENSO	El Niño Southern Oscillation
ESAF	Environmental Security Assessment Framework
FESS	Foundation for Environmental Security and Sustainability
INDECI	National Institute for Civil Defense
IPCC	Intergovernmental Panel on Climate Change
IPROGA	Institute for the Promotion of Water Management
MEF	Ministry of Economy and Finance
MEM	Ministry of Energy and Mines
MINAM	Ministry of the Environment
MOCICC	Citizens Movement to Confront Climate Change
NAPA	National Adaptation Programs of Action
PCM	Presidency of the Council of Ministers

PNH	Huascarán National Park
PRONAGCC	National Program for the Management of Climate Change
PUCP	Pontifical Catholic University of Peru
REMURPE	Network of Rural Municipalities of Peru
SENAMHI	National Meteorological and Hydrological Service
SERNANP	National Service for Natural Protected Areas
TMI	The Mountain Institute
UNASAM	National University of Ancash Santiago Antúnez de Mayolo
UNDP	United Nations Development Program
UNECLAC	UN Economic Commission for Latin America and the Caribbean
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

INTRODUCTION

In 2007, the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) predicted that rising global temperatures will contribute to an upsurge in severe storms, floods, droughts, glacier melt, and sea level rise.

Soon thereafter, a number of policy studies concluded that there is a strong likelihood that the natural hazards and environmental stresses associated with climate change will trigger or amplify conflict, especially in vulnerable or unstable areas of the developing world.¹ Among the projected scenarios were severe resource scarcity, dramatic increases in internal and external migration, disease outbreaks, and a host of destabilizing social and political effects.

Other scholars cautioned against assertions of direct causal linkages between climate change and conflict. For example, Halvard Buhaug of the Peace Research Institute Oslo (PRIO) countered that “African civil wars can be explained by generic structural and contextual conditions” related to “political exclusion, poor economic performance, and changes in the international system.”

In the context of this debate, the Office of Conflict Management and Mitigation (CMM) of the U.S. Agency for International Development (USAID) asked the Foundation for Environmental Security and Sustainability (FESS) to conduct case studies with two main purposes: 1) to help fill the gap in knowledge regarding how climate-related vulnerabilities interact with the dynamics of fragility, instability, and conflict in specific locations around the world and 2) to identify target areas and opportunities for USAID to improve the provision and coordination of programmatic interventions that can address climate change and conflict vulnerabilities.

The first of the case studies was Uganda, focusing on the so-called Cattle Corridor and the area of Karamoja. The second was the case of Ethiopia, focusing on the relationship between climate change and conflict among pastoralists and agropastoralists in Oromia, Somali, and Afar National Regional States. Those studies confirmed the importance of both political and historical context and social and institutional responses in understanding the origins and potential trajectory of climate-related conflict (see www.fess-global.org).

The third case is the present study, which examines potential links between climate change and conflict in the central and southern highlands of Peru, focusing in particular on selected areas of the regions of Ancash and Arequipa, respectively. In the highland areas of both regions, the effects of glacier loss and other climate change impacts have contributed to existing problems of water scarcity and access and, in some instances, added new threats to water quality, with important implications for human health and agricultural production.

Both Ancash and Arequipa are home to extensive irrigated agriculture, by far the greatest water user. Industrial mining predominates in Ancash, while small-scale, informal-illegal mining has a stronger presence in some parts of Arequipa. Despite very different characteristics, both forms of mining are growing and contributing to water pollution and water competition, as well as generating conflict with local populations. Through increased weather variability, climate change is affecting the hydrological regime in these regions, which intensifies competition between and among upstream and downstream users trying to protect their water needs and interests.

The Andean highland populations are much poorer than their coastal compatriots, and their ability to influence national or regional water use politics and strategies is generally much lower than that of large-scale agro-exporters or investors in high-value mining projects. Many citizens in the Andean highlands feel their needs and voices do not receive an adequate response from either state authorities or representatives of extractive industries.

This study explores how the effects of climate change on water quantity, quality, and access may be factoring into aspects of localized instability, fragility, and conflict in Peru. To help guide the methodological approach, FESS developed a seven-phase framework—the Climate Change and Conflict Assessment Framework (CCCAF). The framework emphasizes one of the main conclusions of recent conflict analysis: conflict is always the result of the interactions of multiple political, economic, social, historical, and cultural factors, and these must be taken into account in any analysis. Moreover, the quality of governance and the resilience of political, economic, and social institutions all mediate the relationship between environmental change and conflict in important ways. The influence of climate change and climate-related policy and program responses on instability and conflict can only be understood within this web of relationships.

To conduct the study, a three-person field research team composed of two FESS researchers and one senior conflict advisor from USAID/CMM, accompanied by one or at times two colleagues from USAID/Peru, interviewed more than 50 persons from national and regional government, civil society organizations, international organizations, local communities, and the private sector. After initial meetings in Lima, the team traveled to Huaraz and Canrey Chico in Recuay, Ancash. There, field visits focused on climate change impacts in the Santa River Basin, especially the Cordillera Blanca and Callejón de Huaylas. The team also traveled to Arequipa for meetings in the regional capital as well as Condesuyos province. Interviews also were held with elected officials from communities in La Unión and Caylloma provinces. These field interviews were followed by a return to Lima and another round of meetings with key national ministries and nongovernmental organizations. While noting the constraints on time and geography, the study team believes the report effectively identifies a number of key issues and dynamics at play in the climate-conflict relationship throughout the highlands as well as elsewhere in Peru.

THE PERUVIAN CONTEXT

Peru's geography can be roughly divided into three zones: the arid plains of the Pacific coast; the mountainous highlands or *sierra* of the Andes; and the tropical jungle or *selva* of the Amazon Basin. These three regions are home to culturally and ethnically different majority identity groups, each with very different ecological endowments. The Andean highlands are populated by Amerindian-mestizo descendants with deep roots in Amerindian cultural practices and traditional forms of social solidarity. The Amazonian Basin is much more sparsely populated, with inhabitants who largely self-identify as indigenous people. These Amazonian groups, to an even greater extent than their Andean compatriots, traditionally have held views on ownership, resource access, labor, and political power that are a far cry from the perspectives of the urbanized, westernized, and globalized inhabitants of the coast.

These fractures of ethnicity, identity, economic power, and culture have made state-building extremely difficult in Peru. The weakness of the political system and its inability to give effective voice and representation to the nation's diverse population has led to correspondingly weak government institutions. In the 1980s, Peru was swept up in the Latin American debt crisis, and the nation's economy plummeted. The 1980s and early 1990s also saw an upsurge in illicit coca production and political violence. The rise of a violent, self-proclaimed revolutionary movement, *Sendero Luminoso*, or Shining Path, was a serious and direct challenge to the state. In 1997, when Secretary of State Madeleine Albright released the first U.S. State Department list of Foreign Terrorist Organizations, the Shining Path was included.

It was in this deeply troubled national context that Alberto Fujimori was able to ascend to the presidency in 1990. Fujimori dissolved congress and suspended the constitution in a so-called "self-coup" in 1992. He implemented an extensive privatization program that reversed statist economic structures but also facilitated cronyism and corruption. The mining sector was thrown open to foreign investors with generous tax provisions and minimal royalty requirements. Between 1990 and 1997, mining investment increased twenty-

fold. In 1992, Abimael Guzmán, the leader of the Shining Path, was captured in a dramatic blow to the terrorist movement. But it became increasingly clear that, under Fujimori's direction, military and intelligence personnel had engaged in widespread human rights abuses, corruption, and killings. Fujimori was eventually convicted and imprisoned for human rights abuses, embezzlement, wire-tapping, and bribery. The 1980s had ended in hyperinflation; the 1990s ended in political and institutional disarray.

The promotion of foreign investment in the extractives sector was intensified under President Alan García (2006-2011). Once in office, García set aside campaign commitments to increase the tax and royalty obligations of mining companies and struck agreements with major mining companies to pay into a "voluntary fund" for five years. Mining-related public protests increased. Economic growth took off, and increased investment in the extractives sector, aided by high international mineral prices, played an important role in that growth. Yet, complaints about the environmental costs of poorly regulated mining activities proliferated, and there was very little evidence that mining brought lasting benefits to affected communities. Community-company relationships were frequently tense and sometimes explosive. Mining communities suffered damages to both the supply and the quality of their water resources. Social conflicts related to environmental matters and extractive industries started to increase significantly.

In 2009, a confrontation in Bagua province in the Amazon over oil and gas exploration dramatized conflict in the extractives sector. Both civilians and police died in the resulting clash, and there were divergent accounts of the incident, including who was at fault. Hence, Peru faced a paradox. As rapid growth began to move the country forward, the most dynamic economic sector was also the greatest generator of conflict.

García's successor, President Ollanta Humala, a former army officer, campaigned on a platform of greater social inclusion for Andean and Amazonian groups, as well as a more equitable distribution of the revenues generated by the extraction of the nation's mineral resources. However, President Humala's efforts to craft a balanced national discourse with respect to the minerals sector and social justice did not alter the tangible conflicts of interest and extractive industry-community antagonisms at the local level. The country's existing institutional structures and capacities also remained inadequate to the task of addressing many of these conflicts. For many Peruvians, the historical legacy of the extraction of natural resources, largely for the benefit of foreign interests, traces a trajectory of injustice and resentment from the gold-seeking Spanish *conquistadores* to the vast sugar estates of the nineteenth and twentieth centuries to the twenty-first century Andean mines and Amazonian gas and oil projects.

High levels of social and economic inequality still create a strong sense of deprivation among vulnerable groups in both the cities and the countryside. These economic, social, and political rifts are deepened or ameliorated by other factors that condition specific conflictive situations. Given Peru's heavy dependence on its natural resource base for its well-being and stability, climate change is a major conditioning factor, and its effects, which already can be seen and felt, are likely to be increasingly consequential.

CLIMATE CHANGE AND HUMAN SECURITY

Peru is highly vulnerable to climate change impacts, with seven of the nine vulnerability characteristics recognized in the 1992 United Nations Framework Convention on Climate Change (UNFCCC): low coastal zones; arid and semi-arid areas; exposure to floods, droughts, and desertification; zones prone to natural disasters; areas of high urban pollution; fragile mountain ecosystems; and significant economic dependence on the production and export of fossil fuels. Few countries are as ecologically diverse as Peru, both in terms of biodiversity and distinct climatic zones. Peru holds 71 percent of the world's tropical highland glaciers, and the dry Pacific coastal region, which is home to approximately 55 percent of Peru's nearly 30 million people, has only 2 percent of the nation's water resources.

Extreme weather events and related phenomena have been increasing in frequency, intensity, and duration, sometimes occurring at unusual times of the year. These include floods, flash floods, landslides, droughts, freezes, hailstorms, and El Niño-related occurrences. In the 1990s, when measured in terms of extreme climate events and mortality, Peru ranked among the ten most vulnerable countries in the world. Peruvian glaciers have diminished in size by 22 percent since 1980. Some 95 percent of Peru's population uses water

resources that originate in the high Andean regions. Along the Pacific coast, about 80 percent of total water resources are used for irrigated export agriculture. The mining sector also is a significant consumer of water. In the cities, water originating in the highlands is used for human consumption. In the poor, rural highland agricultural sector, irrigation is based on low technology, and water availability for irrigation is decreasing due to constraints on quantity, quality, and access.

The interests of these myriad water users are diverse and often contradictory. Water management in the agricultural sector raises complex questions about irrigation rights, appropriate technology, and upstream-downstream distributions. Public concerns about mining companies' privileged water access and water pollution caused by mining operations can lead to protests that disrupt or even shut down mining projects. Under Peru's 2009 Water Resources Law, the availability of water for human consumption is considered a human right. As climate-related threats to adequate water supplies increase, imperiling human health, undermining traditional livelihoods, hampering the growth of key economic sectors, and complicating the development of essential infrastructure, the potential for conflict among stakeholders with competing needs and divergent interests is likely to increase.

FINDINGS FROM THE FIELD

New Institutional Responses to Climate Change

Under the new government of President Humala, Peru's national government is undertaking a number of important new institutional efforts to respond to climate change, some of which anticipate possible linkages to conflict.

One major challenge is the collection of weather and hydrological data and the communication of accurate information to the public. The new Water Resources Law requires the National Water Authority (ANA) to participate in the creation and management of a hydrological network. However, there is currently no up-to-date national inventory of water resources or an information system to gather and disseminate data. Much of the data on Peru's water basins is 20 to 25 years old, if it exists at all. Efforts are now being made to consolidate weather and hydrological data from both public and private sources. With concern growing over the potential for glacial lake outbursts as a result of melting glaciers, the institutional arrangements for disaster response and risk management also are being updated and revamped.

The most authoritative tracking of social conflicts in Peru is done by the *Defensoría del Pueblo* or Ombudsman's office in Lima. According to the Ombudsman, more than half of the conflicts in the country are classified as socio-environmental conflicts. Most of these are water conflicts, and a majority of them are related to conflicts involving extractive industries. The Ombudsman's office is investigating climate change in the context of human rights, focusing on water availability, water quality, and access. Social conflicts in Peru are often managed through the Office of Social Conflict Management at the Prime Minister's Office (PCM), which has responsibility for the coordination of dialogue among relevant stakeholders in government, civil society, and the private sector. The evolving policy agenda of the PCM places potential climate-conflict linkages in the broader context of concerns about diminishing water resources and expanding extractive industry activities.

Conflicts between communities and extractive industry companies are at a high level in Peru, and they are likely to increase in number. The Ministry of Energy and Mines (MEM) estimates that the value of mining project investments expected in the next decade is in the range of \$40 billion to \$50 billion. With high metal prices, large mining companies that generally operated at an altitude of 4,000 to 5,000 meters are moving to lower altitudes with higher populations and more complex and more easily mobilized communities. The impacts of climate change on water scarcity and water quality are bound to be important factors within this context, with significant implications for both potential conflict and the stability and overall investment climate of the mining sector.

The recently established Ministry of the Environment (MINAM) has a number of direct responsibilities in relation to climate change issues, but it is just beginning to assert its institutional presence within the Peruvian government. MINAM sees climate change affecting Andean populations in very tangible ways, including the migration of farmers and pastoralists in response to warmer and drier conditions. Competition is increasing

over reduced and poorly managed water resources. MINAM also sees the intersection of inefficient water management, climate change, and mining as a volatile mix. The central challenge for MINAM is to find ways to harmonize economic growth and environmental protection while defining its institutional authority.

Staff at all of the relevant state institutions expressed awareness and concern about the relationship between climate change and the potential for conflict, especially those conflicts involving water resources. However, the institutional responses to that awareness and concern are generally either in their early stages or on the drawing board. Hence, there is a large need for capacity building and improved coordination among Peru's key institutional actors.

Climate Change, Water Management, and Conflict: Quantity, Quality, and Access

The Santa River Basin in Ancash Region is one of the areas most affected by climate change. The scope of climate change effects include but go significantly beyond diminishing water supply. With the loss of one-third of the glaciers of the Cordillera Blanca, and as highland temperatures increase and precipitation becomes more erratic, highland pastures, wetlands, and prairies are losing their capacity to provide their usual sponge-like regulation and filtration of water flows and groundwater recharge. The observed micro-climate changes include prolonged droughts, more intense and shorter precipitation periods, and more intense frosts.

Mining is a constant presence in the area, and the mining canon provides funds to regional and local governments. Yet, these funds are rarely used to address environmental threats, ecological restoration, or climate change adaptation. Rather, preference is given to immediate and politically popular projects, such as town soccer stadiums or bricks-and-mortar infrastructure. This is a disappointing outcome for the growing number of local advocates of urgent measures to reverse water insecurity and conflicts in the Santa River Basin.

Little attention has been given to the problem of climate change and water quality, but it is a looming issue, and one with potentially serious implications for conflict in Ancash. As the glaciers recede, water and oxygen combine with sulfur in the newly exposed surfaces to make sulfuric acid. The sulfuric acid releases the toxic heavy metals found in the exposed rocks, and they are then carried by glacier melt into surface and ground waters. In addition to its harmful effects on human health, contaminated water is potentially a huge problem for irrigated agriculture. At the same time, toxic heavy metals also are produced by mining activities throughout the region. The uncertainties about the source of any specific instance of contaminated water could lead to finger-pointing and serious conflicts. In the judgment of local experts, the issue of water quality is "a time bomb."

Conversely, concerns about melting glaciers and water scarcity appear to be somewhat exaggerated or misplaced. Researchers and government officials in Ancash agree that problems of water scarcity are less related to absolute shortages than poor management of water supplies, especially in agriculture. Existing water rights are inefficient and inequitable, and those who benefit are resistant to change. High basin areas are the source of water while the lower basin agricultural areas are both the largest consumers of water for irrigation and the home to the main centers of administrative and political influence. Yet, highland water conservation is the essential challenge that must be addressed if sustainable water supplies are to be maintained for water users downstream.

The current dysfunctionality of water management is a reflection of the fact that the politics and cultural underpinnings of water governance in Peru are thorny and complex. Regional water governance policy reforms and project initiatives will need to be crafted and implemented with extreme sensitivity to their potential for unintentionally generating conflict.

Integrated water basin management, starting with micro-basins and moving to sub-basins and macro-basins, is regarded by many regional water experts to be the crucial mechanism for achieving sound water management. It is also clearly one of the keys to conflict prevention and mitigation in Ancash, especially in the context of climate change.

Because of its naturally arid climate, climate change challenges are perhaps even more daunting in Arequipa Region. Cutting across Arequipa Region is the Ocoña River Basin, whose waters originate in the snow and

ice cover of Coropuna, a snowcapped mountain that has been greatly reduced in size by the effects of global warming. Desertification has advanced in some parts of the region, while the highlands have seen a reduction in wetlands, springs, and lakes, as well as an increase in extreme weather events that have led to landslides, floods, and crop losses.

In the highland pastoral areas, as water supplies decrease, the remaining water is prone to contamination that produces illnesses in both people and their cattle. In some areas, as a result of changing weather patterns, the variety of food crops that are traditionally produced is diminishing, and those yields that are realized are losing nutritional value. Malnutrition is common.

In an open meeting in Chuquibamba in Condesuyos province, a discussion of climate change produced an outpouring of worries, complaints, and laments concerning changes in the area's weather, landscapes, and livelihoods. Participants agreed that there are many consequences of recent changes in the climate for plants, animals, and humans. In the highlands, pastures no longer grow as they once did, and the milk production of camelids (llamas, alpacas, vicuñas) and cattle (goats, bovines) is declining. Skin cancer is on the rise. Increasing population and the search for firewood for sale has contributed to deforestation. This has resulted in erosion and further loss of water resources. The water for irrigation is decreasing due to these climatic and environmental transformations, and scarcity is producing localized conflicts among water users.

As in Ancash, water scarcity is greatly aggravated by poor water management that is inefficient and often contentious. Small farmers who benefited from the land reforms of the 1970s did not receive water rights in sufficient quantity to meet their irrigation needs. As a consequence, the rights to use water for irrigation are still disproportionately concentrated in a few hands.

Illegal, small-scale, artisanal, and "informal" mining is a serious concern in Arequipa, as well as many other regions in the country, and it leads to many conflicts over both water supplies and water quality. In some areas, informal mining has led to a proliferation of wells that are depleting the water supply, and the chemicals used in mining are contributing to water contamination.

Water conflicts are not limited to the level of individuals or competing economic interests. There are also cross-border conflicts with neighboring regions. One such recent conflict was the "war over water" on the border between Arequipa and Moquegua, the region that lies to its south. A second regional violent conflict has taken place between Arequipa and Cuzco over the use of water for irrigation projects in Arequipa.

Regional institutions such as Arequipa's Regional Environmental Authority (ARMA) and the regional Ombudsman's office are trying to develop their capacities to prevent and manage water conflicts, and they recognize that climate change is an increasingly important contributing factor. However, they are significantly constrained by limited human and financial resources.

At the same time, there are clear opportunities to build on resilient community attitudes. In Condesuyos, for example, community representatives agreed to form committees to address water, environmental, and climate challenges through three issue-areas: reforestation; improved irrigation; and environmental education. Communities and municipalities generally have strong capacity for self-organization but lack resources and technical expertise. If these emerging and evolving efforts at the regional and community level can be brought into a set of working relationships focused on improving social cohesion and institutional performance, there could be significantly enhanced prospects for managing and mitigating the growing potential for water conflicts caused in part by the effects of climate change.

The Trajectory of Climate Change and Conflict in Peru

There is strong agreement, extensive oral testimony, and convincing evidence that highland areas of Peru are experiencing serious negative impacts from climate change, well beyond the highly publicized risks of glacier melt. While there is significant variation among specific micro-climates and micro-watersheds, the general effects include continuing glacier retreat, warmer temperatures, more erratic and intense weather events (droughts, rains, frosts), significant changes in seasonal precipitation patterns, deteriorating highland ecosystems, soil degradation and desertification, increasing water scarcity, water contamination (acid rock drainage), and more frequent natural hazards (floods, landslides, glacier lake outbursts). These are *long-term* climate trends that are not going to go away.

These stresses and hardships add significantly to conflict potential all along the watersheds that extend from the highland paramos (alpine tundra ecosystems above the timberline) to the middle basin small producers and on to the lowland agro-export plantations dependent on abundant irrigation.

Because water is crucial to the well-being and basic daily needs of Peru's citizens as well as the requirements of the country's agricultural, mining, and energy sectors, competing stakeholder interests are producing conflicts over water scarcity related to quantity, quality, and access that intertwine with other grievances (e.g., poverty, poor governance, social marginalization) that *increase* the chances of social mobilization and physical confrontation.

Climate change is not yet the dominant reason for water scarcity (inefficiency in water use in the agricultural sector is the leading factor) but it is a major contributor, and it is likely to steadily increase in importance in the coming years. The continuing expansion of the mining sector also will add to water stresses.

At present, the clear trend is toward *increasing conflict* linked to the accumulating effects of climate change. The increasing water requirements of mining and export agriculture are at loggerheads with the reality of climate change trends. Some highland communities are headed toward ecological and economic crisis. Mining companies are moving their operations into lower altitudes, where they encroach upon fragile ecosystems that are essential for the regulation of the natural water regime. In this context, a proliferation of local social explosions, whose cumulative effects could have ramifications for national stability, is entirely possible.

The new institutional arrangements in Peru's national, regional, and local governments (e.g., MINAM, ANA, Water Basin Councils, Environmental Councils, ARMA, and the semi-autonomous Ombudsman) are steps in the right direction, but they will require time, course corrections, and much better institutional coordination before they become fully effective. Decentralization is one of the main reforms now underway in Peru and still needs further consolidation. In the meantime, support for improved and participatory water management is both an important form of climate adaptation and one main pathway toward reducing conflict.

There are emerging opportunities and a variety of bright spots to build on, including the ongoing work on climate adaptation by the USAID Mission's existing partners in Ancash and Arequipa. There is considerable capacity in Andean communities for self-organization to take further steps to not only increase resilience but also to institutionalize dialogue to reduce conflicts, climate-related and otherwise. In fact, joining the agendas of strengthening resilience and promoting conflict prevention would strengthen both.

As detailed in the full report, there are a number of new (or reinvigorated) governmental and non-governmental institutions and organizations staffed with well-informed and committed personnel keen to collaborate on issues of climate change and conflict. This represents an important window of opportunity for the creation of a variety of new partnerships that can be forged to promote conflict prevention and conflict mitigation in Peru.

Recommendations based on the findings of the study can be found on page 57.

INTRODUCTION

In 2007, the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) predicted that rising global temperatures will contribute to an upsurge in severe storms, floods, droughts, glacier melt, and sea level rise. In vulnerable areas of the developing world, extreme weather is expected to intensify pressures on land and water resources, disrupt agricultural production, and threaten food security.²

Soon thereafter, a number of policy studies concluded that there is a strong likelihood that the natural hazards and environmental stresses associated with climate change will trigger or amplify conflict, especially in vulnerable or unstable areas of the developing world (CNA Corporation 2007, Campbell et al. 2007, Smith and Vivekananda 2007, Fingar 2008, UN 2009).³ Among the projected scenarios were severe resource scarcity, dramatic increases in internal and external migration, disease outbreaks, and a host of destabilizing social and political effects (Campbell and Weitz 2008). The CNA Corporation envisioned a confluence of factors that might overwhelm weak or flawed systems of governance and public institutions, setting the stage for “internal conflicts, extremism, and movement toward

increased authoritarianism and radical ideologies” (CNA Corporation 2007).

As discussion of these issues moved forward, divergent methodological approaches began to call into question the plausibility of some of the claims that were being made. A study published by the National Academy of Sciences combined climate model projections with historical linkages between civil war and temperatures in sub-Saharan Africa to project “a roughly 54% increase in armed conflict incidence by 2030” (Burke et al. 2009). Conversely, making use of “a host of different model specifications and alternative measures of drought, heat, and civil war,” Halvard Buhaug of the Peace Research Institute Oslo (PRIO) rejected this assertion and found that “African civil wars can be explained by generic structural and contextual conditions” related to “political exclusion, poor economic performance, and changes in the international system” (Buhaug 2010). Similarly, in a broad review of the dynamics of “climate conflict,” Jeffrey Mazo argued that, “Just as no specific weather event can be definitively attributed to climate change because of normal variation within a complex system, specific social or political developments cannot

be attributed to climate or other environmental factors” (Mazo 2010).

In the context of this debate, the Office of Conflict Management and Mitigation (CMM) of the U.S. Agency for International Development (USAID) asked the Foundation for Environmental Security and Sustainability (FESS) to synthesize the emerging literature and discussion about climate change and conflict linkages and to review the current state of knowledge. FESS found that upon closer examination, “the analysis and discussion of the climate-conflict relationship to date is very largely conceptual, schematic, and deductive,” and noted the potential for “costly initiatives” in response that “run ahead of firm evidence that they are meeting their stated goals” (Stark et al. 2009).

Recently, the urgency and complexity of the climate change adaptation agenda faced by developing countries was emphasized in a new report by the IPCC. In November 2011, the IPCC issued a “Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX).” The IPCC report team noted with “high agreement” and “robust evidence” that inequalities

within and among countries, including “socioeconomic, demographic, and health-related differences and differences in governance, access to livelihoods, entitlements, and other factors,” pose serious challenges for climate-related disaster risk management and adaptation (IPCC 2011).

The main purpose of this case study is to help fill the gap in knowledge regarding how climate-related vulnerabilities interact with the dynamics of fragility, instability, and conflict in specific locations. Toward that end, USAID/CMM asked FESS to conduct case studies on climate change and conflict in selected countries, with a view to producing findings relevant to Agency and Mission interests and programs. The first of these was the case of Uganda, focusing on the so-called Cattle Corridor and the area of Karamoja. That study confirmed the importance of both historical context and social and institutional responses in understanding the origins and potential trajectory of climate-related conflict in those two geographic regions (Stark and Mataya 2011).⁴ The second was the case of Ethiopia, focusing on the relationship between climate change and conflict among pastoralists and agropastoralists in Oromia, Somali, and Afar National Regional States. In that case study, the combined effects on pastoralists of increasingly frequent droughts (thought by many experts and pastoralists alike to reflect climate change), political tensions over administrative boundaries, and national economic policies aimed at rapid growth and transformation were found to intertwine in ways that contributed to conflict (Stark et al. 2011).⁵

The third case is the present study, which examines potential links between climate change and conflict in the central and southern highlands of Peru, focusing in particular on selected areas of the regions of Ancash and Arequipa, respectively (see Figure 1). In the highland areas of both regions, the effects of glacier loss (the Cordillera Blanca in Ancash and Coropuna in Arequipa) and other climate change impacts have contributed to existing problems of water scarcity and, in some instances, added new threats to water quality, flora and fauna, food safety, and human health. While Arequipa is significantly more arid than Ancash, both regions are home to extensive irrigated agriculture, by far the greatest water user. Industrial mining predominates in Ancash, while small-scale, informal, and illegal mining has a stronger presence in some parts of Arequipa. Despite very different characteristics, both forms of mining are growing and contribute to water pollution and water competition, as well as generating conflict with local populations.

Through increased and erratic weather variability, climate change is affecting the hydrological regime in these regions, which intensifies competition between and among upstream and downstream users trying to protect their water needs and interests. The Andean highland populations of Ancash and Arequipa are much poorer than their coastal compatriots, and their ability to influence national or regional water use strategies is generally much lower than that of large-scale agro-exporters or investors in high-value mining projects. In both regions, the decentralization of political power is an incomplete and weakly institutionalized process. As

reflected in frequent protests, many citizens in the Andean highlands feel their needs and voices do not receive an adequate response from either state authorities or representatives of extractive industries. This study explores how effects of climate change on water quantity, quality, and access may be factoring into aspects of instability, fragility, and conflict via a number of social, economic, and political pathways that often intertwine, eliciting responses that mitigate or intensify potential and actual conflict.

“This study explores how effects of climate change on water quantity, quality, and access may be factoring into aspects of instability, fragility, and conflict via a number of social, economic, and political pathways that often intertwine....”

Figure 1: Map of Peru (Ancash and Arequipa Regions Highlighted)



SOURCE: LIBRARY OF CONGRESS. [HTTP://WWW.LOC.GOV/RESOURCE/G5311F.CT001861/](http://www.loc.gov/resource/G5311F.CT001861/)

METHODOLOGY

To help guide the methodological approach to these climate change and conflict case studies, FESS developed a seven-phase framework—the Climate Change and Conflict Assessment Framework (CCCAF). The framework provides a process for considering a wide variety of background data that supply context for analysis of the climate-conflict nexus. It relies in part on FESS’s Environmental Security Assessment Framework (ESAF) methodology, while integrating core components of USAID’s Conflict Assessment Framework (CAF). Both the ESAF and CAF emphasize one of the main conclusions of recent conflict analysis: conflict is always the result of the interactions of multiple political, economic, social, historical, and cultural factors, and these must be taken into account in any analysis. The influence of climate change and climate-related policy and program responses on instability and conflict can only be understood within this web of relationships.

The existence of grievances related to the impacts of climate change does not mean they will necessarily result in conflict. The quality of governance and the resilience of political, economic, and social institutions all mediate the relationship between

environmental change and conflict in important ways. Even discontented populations whose grievances find inadequate or aggravating institutional responses will be unable to engage in violent conflict if they lack the requisite resources for organization and mobilization. Shocks or fast-moving and unanticipated events also may open windows of vulnerability or opportunity that animate or inhibit conflict.

The purpose of the CCCAF is to serve as a tool for analysis and to raise relevant, case-specific questions about these variables. However, it is not a formal template for the structure of the report itself.

Each phase of the CCCAF (attached as Appendix I) provides new information that may be relevant to earlier phases. Thus, while presented sequentially, the phases of the CCCAF provide a continual feedback mechanism for revisiting and revising preliminary information and findings.

The first phase of the CCCAF reviews conflict-prone areas of the selected country that have experienced extreme climate variability (e.g., droughts, floods, and unseasonal temperature fluctuations). Patterns of conflict within these areas with potential linkages to climate effects are then

identified. In Peru, these criteria in combination with consideration of USAID’s programmatic interests resulted in a focus on the highland areas of Ancash and Arequipa Regions.

Phase two seeks to ground the study in the specific context of the country or region under study. Understanding how climate change may be contributing to conflict in any specific country or region first requires knowledge about the relevant national context and areas of contention and conflict. All societies not only are marked by such cleavages but also possess a range of coping mechanisms or resiliencies that can be employed to reduce the likelihood of conflict. Formal and informal political, economic, and social institutions respond to threats in ways that are more or less successful in resolving or mitigating complaints and real or perceived injustices. The degree of a country’s or society’s resilience is pivotal in determining the pathways toward or away from violence.

Governance, in particular, is often of decisive importance. Where citizens perceive political and social institutions to be legitimate, representative, accountable, and responsive, the potential for violent conflict is reduced significantly. Yet, even where

governance is weak or corrupt and grievances and resentment are at high levels, large-scale conflict still may not occur if angry individuals or groups lack the means to marshal effective collective action and engage in organized protest or violence.

Phase three links environmental and socioeconomic factors to ask how climate change may be posing threats to essential resources, livelihoods, food security, and cultural values in the areas under study. For example, in poor rural areas of developing countries, extreme weather and increased pressures on land, water, forests, and rangelands can undermine agricultural productivity, provoking food crises, threatening livelihoods, and placing populations at risk. Phase three focuses more specifically on the capacity and effectiveness of formal and informal mechanisms for environmental governance and natural resource management. Is natural resource management, whether that of the state or traditional authorities, reducing or contributing to the potential for conflict?

The fourth phase of the CCCAF looks more closely at the responses of affected communities and individuals to climate variability, extreme weather events, and their consequences. It asks how social, human, physical, financial, and natural capital and assets are used to build resilience or coping strategies for communities and social groups. It also seeks out second-order (or unintended) consequences of coping strategies and their impact on traditional forms of social organization and community or group relations with state authorities.

Phase five identifies the relevant stakeholders from government, civil society, and affected communities and solicits their perceptions and experiences of the impacts of climate trends and natural hazards. It investigates whether and how these impacts intertwine with citizen grievances, stakeholder interests, mobilizing factors, and the potential for conflict. Stakeholders are asked to describe their own response capacities and those of other stakeholders and to give their perceptions of the political, social, and institutional responses to climate-related challenges. Phase five also is devoted to gathering the available empirical data about climate variability and climate change in the areas under study.

In phase six, based on the synthesis of all of the data and field research, scenarios are developed to illuminate potential futures. These scenarios are not predictions but ways of envisioning plausible future outcomes and their accompanying levels of potential conflict. The scenarios include consideration of windows of vulnerability and opportunity (or triggering events).

The CCCAF concludes in phase seven by bringing together the contextual impacts of environmental and climate change, relevant core grievances and drivers of conflict, patterns of resilience and mitigating factors, windows of vulnerability or opportunity (triggers), and projected future climate vulnerabilities in order to determine the links between climate change and potential conflict as well as those between climate change and adaptive resilience. Phase seven identifies lessons learned, good practices,

programmatic gaps, and target areas and opportunities to improve the provision and coordination of interventions that can address climate change and climate-related conflicts. It focuses on ways that USAID's development assistance could make a positive contribution toward filling current programmatic gaps. Recommendations suggest viable approaches and responses for USAID and other development organizations.

AREAS VISITED AND ORGANIZATIONS AND INDIVIDUALS INTERVIEWED

From October 10, 2011 to October 21, 2011, a three-person field research team composed of two FESS researchers and one senior conflict advisor from USAID/CMM, accompanied by one or at times two colleagues from USAID/Peru, interviewed more than 50 persons from national and regional government, civil society organizations, international organizations, and the private sector. Additional meetings were held with community groups. After initial meetings in Lima, the team traveled to Huaraz and Canrey Chico in Recuay, Ancash. There, field visits focused on climate change impacts in the Santa River Basin, especially the Cordillera Blanca and Callejón de Huaylas. In the following week, the team traveled to Arequipa for meetings in the regional capital as well as Chuquibamba in Condesuyos, Arequipa. Meetings in Arequipa provided the opportunity to hear firsthand from local elected officials from communities in La Unión and Caylloma as well. These field interviews were followed by a return to Lima and another round of meetings with

key national ministries and nongovernmental organizations. Because of the limited time and geographic scope of the field research, this report can only be considered a preliminary diagnostic of climate change and conflict linkages in selected areas of the highlands of Peru, although the team believes the report effectively identifies a number of issues and dynamics at play throughout the highlands as well as elsewhere in the country.⁶

Interviews followed a loosely structured format that permitted the natural flow of conversation and discussion of each person's or organization's responsibilities and priorities. Within that format, the following basic questions were addressed, followed by more in-depth discussion:

- a. Has the environment/climate changed in recent years?
- b. What have been the impacts of environmental/climate change?
- c. How have local people responded or tried to cope? Who is doing what?
- d. How have local and national government responded?
- e. Are there conflicts in your area of interest or responsibility?
- f. If so, what is causing them and how serious are they?
- g. Has environmental change contributed to potential or actual conflict?
- h. Is environmental/climate change of greater or lesser importance in relation to conflict? How and why?
- i. What further responses are necessary to deal with the negative consequences of climate-related change?
- j. Given current environmental trends, what is your vision of the future 10 years from now with/without future interventions (in addition to current coping mechanisms)?

THE PERUVIAN CONTEXT

“Although replete with significant local variations, Peru’s geography can be roughly divided into three zones: the arid plains of the Pacific coast; the mountainous highlands or sierra of the Andes; and the tropical jungle or selva of the Amazon Basin. These three regions are home to culturally and ethnically different majority identity groups, each with very different ecological endowments.”

POLITICAL INSTABILITY, ECONOMIC CRISIS, AND THE EXTRACTIVES BOOM

Since the Great Depression of the 1930s, Peru has experienced numerous cycles of political instability and economic crisis, often followed by political and economic reforms that have shown initial promise, only to falter or fail shortly thereafter. Marked asymmetries of political and economic power among groups with distinctive histories and cultures have resulted in one of the weakest and most volatile political party systems in Latin America, alongside persistent poverty and inequality.

Although replete with significant local variations, Peru’s geography can be roughly divided into three zones: the arid plains of the Pacific coast; the mountainous highlands or *sierra* of the Andes; and the tropical jungle or *selva* of the Amazon Basin. These three regions are home to culturally and ethnically different majority identity groups, each with very different ecological endowments. Settled by the Spaniards, who defeated the indigenous Incan population (soon thereafter nearly decimated by disease), the large urban areas of the coast are predominantly populated by a mestizo-hispanic population. The Spanish-speaking groups residing in these urban

areas historically have exercised the greatest power in commerce and politics. The Andean highlands are populated by Amerindian-mestizo descendants with much deeper roots in Amerindian cultural practices and traditional forms of social solidarity. The Amazonian Basin is much more sparsely populated, with inhabitants who largely self-identify as indigenous people. These Amazonian groups, to an even greater extent than their Andean compatriots, have traditionally held views on ownership, resource access, labor, and political power that are a far cry from the perspectives of the urbanized, westernized, and globalized inhabitants of the coast.

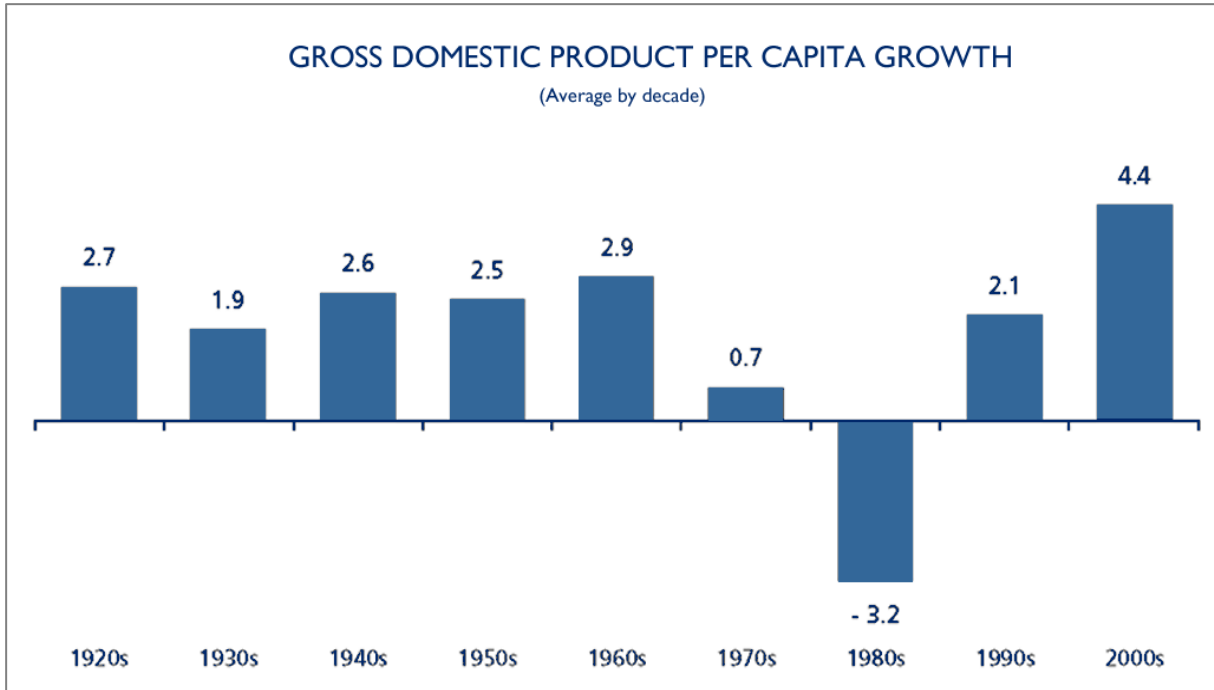
With the capital, Lima, as the hub, the coastal economy served as the center of gravity for trade and modern services in twentieth-century Peru. However, in northern Peru and the central highlands, enclave economies developed around foreign-owned sugar plantations and mining enterprises. Infrastructure was provided by the entrepreneurs, and much of the work was done by wage labor—often seasonal workers who moved between plantations or mines and subsistence farming in peasant villages. While elites in the cities had access to political power, the

rural population had low levels of political representation and organization, although protests and strikes were not uncommon in the highlands (Long and Roberts 1998). In political and commercial terms, the Amazon remained a relative backwater.

exemplified in the disagreements between two of the country's iconic political figures, José Carlos Mariátegui and Víctor Haya de la Torre. While Mariátegui argued for *indigenismo's* vision of full peasant and Indian participation, Haya's views were more hierarchical and elitist, and he struck a more

opened the way for "presidentialist" governance in which the executive exercised powers far outweighing those of congress or the judiciary. From the 1950s until the late 1970s, economic growth was fairly steady in Peru, although industrialization was promoted by often inefficient

Figure 2: GDP per Capita Growth



SOURCE: CENTRAL RESERVE BANK OF PERU, ANNUAL REPORT 2010.

These fractures of ethnicity, identity, economic power, and culture made state-building extremely difficult in Peru. As counterweights to the preponderant influences of export-oriented urban elites, radical and reformist political leaders developed discourses in the early-to-mid twentieth century around themes of anti-imperialist nationalism, Marxism, and *indigenismo*, the latter emphasizing the need to incorporate not just urban workers but also peasants, Indians, and agricultural workers in the country's political life. The failure to distill these discourses into a consensus political program was

paternalistic posture toward groups in the countryside (Angell 1998). This was of no small consequence for modern Peru, as the party created by Haya, the Alianza Popular Revolucionaria Americana, or APRA, became the one longstanding institutionalized political party in the nation. Unfortunately, for long periods of time APRA also was distrusted by the Peruvian military, thus adding a further destabilizing influence.

The weakness of the political system and its inability to give effective voice and representation to the nation's diverse population led to correspondingly weak government institutions and

state-run companies. The preponderance of large landed estates for sugar and livestock production made access to land for subsistence production a major issue for estate laborers and campesinos. In 1968, General Juan Velasco announced the formation of the Revolutionary Government of the Armed Forces, and the following year the Velasco government issued an Agrarian Reform Law that expropriated all landholdings of more than 150 hectares of irrigated land. Many enterprises were nationalized, including those in the mining sector. While millions of hectares were turned over to cooperatives, only some peasants benefited

“The weakness of the political system and its inability to give effective voice and representation to the nation’s diverse population led to correspondingly weak government institutions....”

from the land reform. The government, concerned about maintaining agricultural export levels, retained many of the existing large-scale production structures and ultimately excluded thousands of rural laborers (McClintock 1981; De la Peña 1998).

As seen in Figure 2, in the 1980s Peru was swept up in the Latin American debt crisis, and the nation’s economy plummeted. In 1985, APRA finally managed to gain the presidency in the person of the young and charismatic Alan García. Initially, President García became something of a Latin American folk hero for resisting the painful economic prescriptions of the international financial institutions and by adopting a set of “heterodox” reforms aimed at protecting vulnerable social sectors. However, after a brief period of renewed growth, the economy collapsed, and García left office in 1990 amid hyperinflation, severe indebtedness, and growing poverty.

The 1980s and early 1990s also saw an upsurge in illicit coca production and political violence. Spurred by U.S. demand, rising prices, and links to the Colombian drug cartels, Peru became the largest coca producer in the world. Not until an aggressive interdiction campaign was launched in 1995 did production decline significantly.

The rise of a violent, self-proclaimed revolutionary movement, *Sendero Luminoso*, or Shining Path, was a serious and direct challenge to the state. With origins in the political thought of young university lecturers in the southern Peruvian highlands of Ayacucho, who saw the Andean heartland of Peru as a feudal

society akin to China, the Shining Path adopted a ruthless Maoist ideology. Throughout the 1980s, after the failures of agrarian reform and in the midst of the worsening economic crisis, the Shining Path destroyed bridges, electrical systems, and water infrastructure. In a reign of terror, its cadres killed members of the police, civil servants, and thousands of other citizens, mainly peasants.⁷ Shining Path guerillas forged linkages and alliances with narcotraffickers. The state lost control of large areas in the provinces of Ayacucho, Huancavelica, and Apurímac, and Lima was hit with explosions and blackouts. The governments of Fernando Belaúnde and Alan García responded inconsistently to these attacks but each eventually authorized military responses that sometimes resulted in human rights abuses, including killings of large numbers of peasants in the countryside.

It was in this deeply troubled national context—the failure of García’s APRA government, profound economic crisis, surging coca production, and atrocities committed by a brutal revolutionary movement—that Alberto Fujimori was able to ascend to the presidency in 1990. President Fujimori took strong actions on all fronts. A political outsider with no established party base, Fujimori dissolved congress and suspended the constitution in a so-called “self-coup” in 1992. He then accelerated a host of free market reforms and put into full implementation an extensive privatization program that reversed statist economic structures but also facilitated cronyism and corruption. The mining sector was thrown open to foreign investors with generous tax provisions and minimal royalty requirements. Between 1990 and

1997, mining investment increased twenty-fold (World Bank 2005). By the mid-1990s, as economic liberalization took hold, the economy stabilized and began growing rapidly. Fujimori authorized the military to shoot down aircraft to disrupt the narcotraffickers' "air bridge" between Peru and Colombia. Coca prices fell, as did coca production. He also encouraged the military to strike aggressively against the Shining Path and promoted the use of peasant militias in support of counterinsurgency. In 1992, Abimael Guzmán, the leader of the Shining Path, was captured in a dramatic blow to the revolutionary movement.

However, as the decade proceeded, Fujimori came under increasing scrutiny and criticism. His controversial efforts to perpetuate his term in office reinforced perceptions of him as anti-democratic and authoritarian. By the late 1990s, economic growth had ground to a standstill. Corruption increased, while institutions were weakened. It became increasingly clear that, under Fujimori's direction, military and intelligence personnel had engaged in widespread human rights abuses and killings. Fujimori was eventually convicted and imprisoned for human rights abuses, embezzlement, wire-tapping, and bribery.

The 1980s had ended in hyperinflation; the 1990s ended in political and institutional disarray. Fujimori's decade in office ended with scandal, disputed electoral results, a presidential resignation-cum-dismissal, and the appointment of an interim caretaker government. With new elections, Alejandro Toledo, the first indigenous president of the

country, came to office in 2001 with high hopes and expectations that he would, at last, be the president to squarely address poverty and the needs of Peru's Andean population.

While the country's party system remained fragmented and unstable, the demands and organizational capacity of civil society had been strengthening. In order to obtain IMF assistance to revive the economy, Toledo agreed to further privatizations, including several he had promised not to implement during his campaign. Protests, sometimes violent, followed, and President Toledo was forced to backtrack and apologize for his actions and the lack of transparency in his privatization process. Objections also began to intensify, especially among highland and indigenous groups, over the expansion of the mining sector and the development of the huge Camisea natural gas project in the Amazon area of Cuzco. While Peru had opened the pathway to increased foreign investment, there was a marked institutional lag in environmental protection and oversight and an increasing public awareness of the mining sector's abysmal environmental legacy. Overseen by the Ministry of Energy and Mines (MEM), environmental impact assessments were lacking in quality, public participation, and enforcement. During President Toledo's administration, annual GDP per capita growth recovered and averaged above 5 percent, and efforts were made to reach out to Andean communities, but for much of his time in office he was an unpopular president, having disappointed public expectations that he would transform the nation's political

“The 1980s had ended in hyperinflation; the 1990s ended in political and institutional disarray. ”

culture and bring about historic change.

The promotion of foreign investment in the extractives sector was intensified after the return to office of an ideologically reformed Alan García (2006-2011). The populist president of the 1980s returned as a champion of free markets and free trade in the first decade of the new century. Just before taking office, President García published a monograph on the “*sierra exportadora*” that emphasized the unrealized mineral export potential of the Andean highlands (García 2005). Once in office, García set aside campaign commitments to increase the tax and royalty obligations of mining companies and struck agreements with major mining companies to pay into a “voluntary fund” for five years. Mining-related public protests increased. (Bebbington et al. 2007).

At the same time, economic growth accelerated significantly in Peru. As seen in Figure 3, after 30

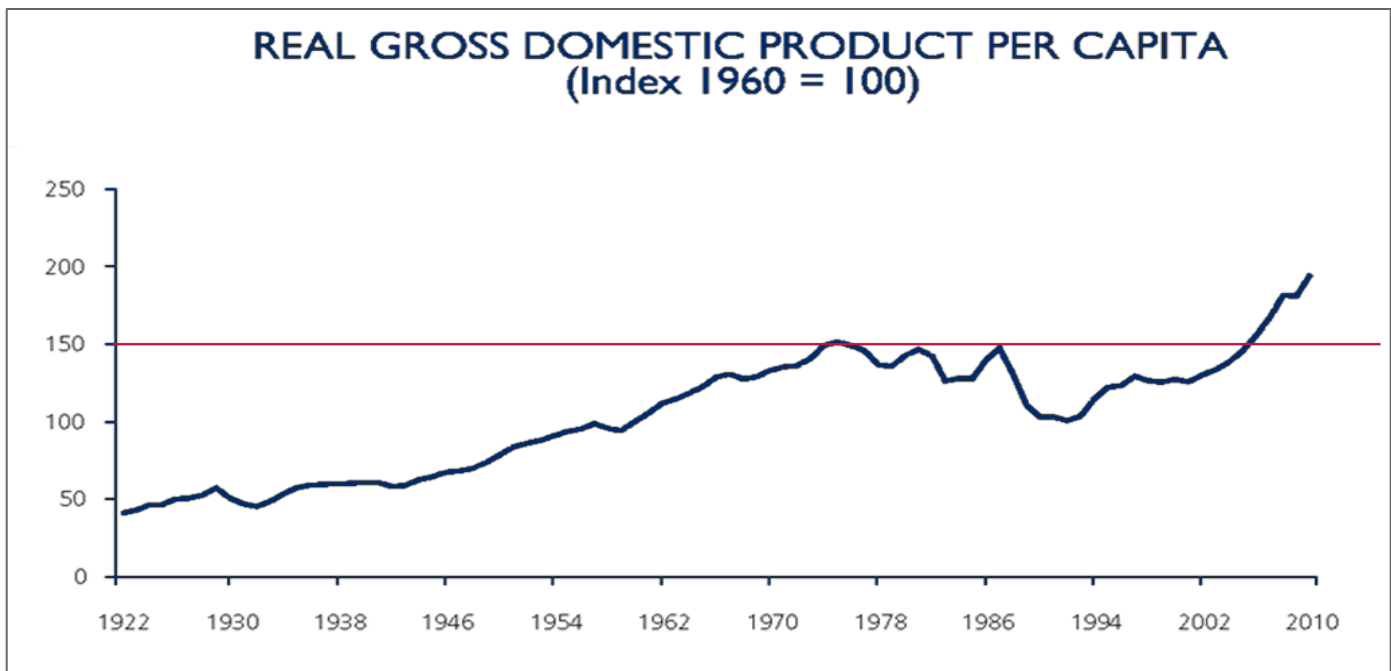
years of political and economic crises, real per capita GDP in 2005 was essentially the same as it had been in 1975. Economic growth took off in President García’s second term of office, with per capita GDP increasing by 6.8, 7.7, and 8.9 percent in 2006, 2007, and 2008, respectively (Central Reserve Bank of Peru 2010). Between 2000 and 2010, the percentage of Peruvians living on less than \$4 per day decreased from 49 percent to less than 30 percent. Increased investment in and the expansion of the extractives sector, aided by high international mineral prices, played an important role in that growth. Aided by an ever stronger commitment to free trade, eventually including a free trade agreement with the United States, growth in the smaller but higher employment agricultural sector was also strong, as exports grew from \$300 million to \$2.5 billion over the same time frame (Rathbone 2010).

The dynamism of the mining and hydrocarbons sector can be seen

in Figure 4, which shows its dominance in Peru’s private investment projects as of 2010, with over \$5 billion in new money entering the country. In 2011, it was reported that future mining investments in Peru—now the world’s second largest producer of copper, silver, and zinc—might total as high as \$42 billion (Rathbone 2011).

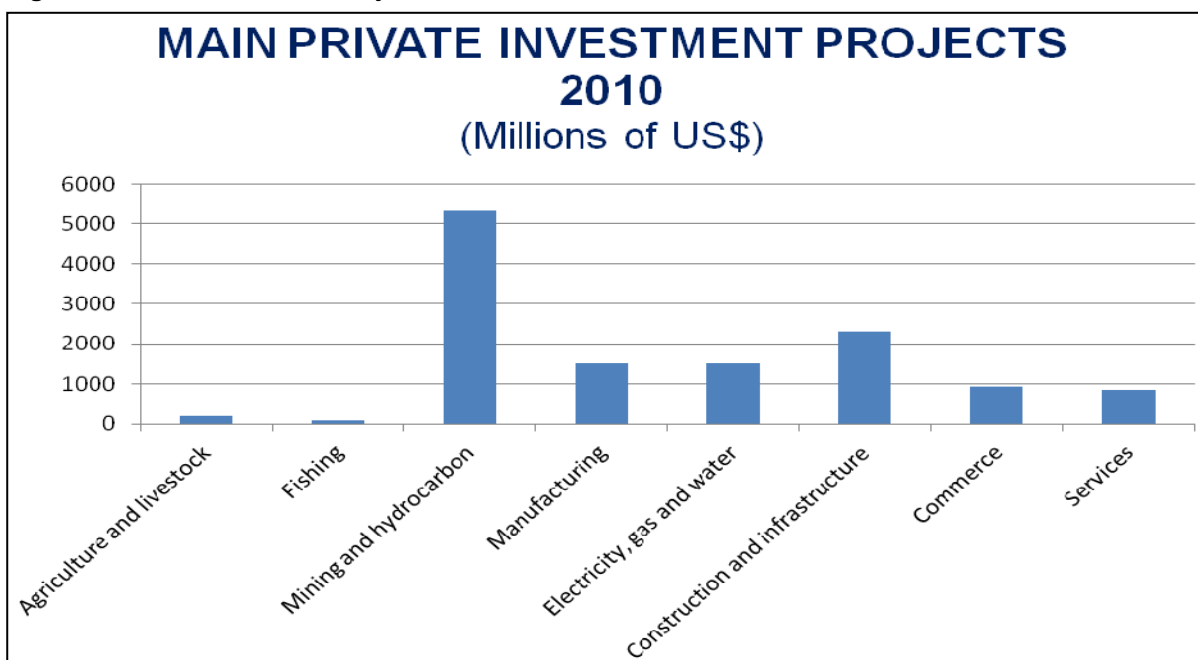
However, as new investments and favorable mineral prices brought higher national revenues, local mining-related conflicts continued to increase in number. While the complaints about the environmental costs of poorly regulated mining activities proliferated, there was very little evidence that mining brought lasting benefits to affected communities. Community-company relationships were frequently tense and sometimes explosive. Mining communities suffered damages to the supply and quality of their water resources, toxic effects from untreated tailings and acid mine drainage, and recurrent labor

Figure 3: Real GDP per Capita in Peru



SOURCE: ADAPTED FROM CENTRAL RESERVE BANK OF PERU, ANNUAL REPORT 2010.

Figure 4: Private Investment Projects



SOURCE: ADAPTED FROM CENTRAL RESERVE BANK OF PERU SURVEY 2010.

disputes, while social funds from mining companies were distributed in ways that were often perceived to be clientelistic or paternalistic (Bebbington et al. 2007).

In 2009, a confrontation in Bagua province in the Amazon over oil and gas exploration dramatized conflict in the extractives sector. Indigenous communities blocked roadways for two months to protest the entry of oil and gas companies without proper consultation with affected communities. President García's government ordered the police to intervene to remove the protestors. Both civilians and police died (32 in total) in the resulting clash, with the two sides giving highly divergent accounts of the incident.

The so-called *Baguazo* made clear that conflict around the extraction of mineral resources entailed not just conflict between companies and communities but also conflict between communities and the state itself. Hence, Peru faced a paradox. As rapid growth

began to move the country forward, the most dynamic economic sector was also the greatest generator of conflict.

This was the situation encountered by García's successor, Ollanta Humala, upon assuming the presidency in July 2011. President Humala, a former army officer of leftist leanings who had once led a brief military revolt, campaigned on a platform of greater social inclusion for Andean and Amazonian groups, as well as a more equitable distribution of the revenues generated by the extraction of the nation's mineral resources. Many businesspeople and investors looked upon Humala as potentially radical and unreliable, but he assembled a moderate cabinet that placed a number of well-known and trusted figures in key positions, and he asserted that his government would be both pro-business and pro-environment. President Humala negotiated a new tax regime for windfall profits that discomfited some in the mining

sector but was less onerous than many had feared. To promote social inclusion, he moved in his first month to achieve passage of a new Law of Prior Consultation that, while ambiguous in terms of implementation and liable to generate unrealistic expectations, required in principle substantive consultations with indigenous and originary peoples before mineral and hydrocarbon projects would be allowed to go forward.

Yet, President Humala's efforts to craft a balanced national discourse with respect to the minerals sector and social justice did not alter the tangible conflicts of interest and extractive industry-community antagonisms at the local level. In November 2011, the Ombudsman's monthly report stated that, of 220 social conflicts in the country, 125 were "socio-environmental" conflicts, defined as conflicts having to do with "the control, use, and/or access to the environment and its resources," including "political, economic, social, and cultural components."

“In November 2011, the Ombudsman’s monthly report stated that, of 220 social conflicts in the country, 125 were ‘socio-environmental’ conflicts, defined as conflicts having to do with ‘the control, use, and/or access to the environment and its resources....’”

Most of these had to do with extractive activities. Moreover, the country’s existing institutional structures and capacities remained inadequate to the task of addressing many of these conflicts. While the MEM is in the contradictory position of both promoting and regulating mining, the environment ministry, only created in 2008, is charged with environmental protection but is weak and still evolving. Many of the relevant governmental competencies and mandates regulating the mineral sector are poorly defined or overlapping, both between ministries and between different levels of government.

Although Peru has made both political and economic progress in recent years, it still is characterized by cleavages that are often associated with conflict. The historical legacy of the extraction of natural resources, largely for the benefit of foreign interests, traces a trajectory of injustice and resentment from the gold-seeking Spanish *conquistadores* to the vast sugar estates of the nineteenth and twentieth centuries to the twenty-first century Andean mines and Amazonian gas and oil projects. Differing economic and cultural values bring into conflict the interests of identity groups that range from (and beyond) urban elites to Andean campesinos and Amazonian indigenous communities.⁸ These conflicts are channeled through the contested exercise of state power and the country’s heavy reliance on the export economy. High levels of social and economic inequality still create a strong sense of relative deprivation among vulnerable groups in both the cities and the countryside. Peru’s political democracy, though much

improved, is still subject to the uncertainties of weak political parties and largely untested political leadership.

These economic, social, and political rifts can be deepened or ameliorated at any time by other circumstantial factors that condition specific conflictive situations. In a country like Peru, which is so dependent on its natural resource base for its well-being and stability, climate change is a major conditioning factor, and its effects, which already can be seen and felt, are likely to be increasingly consequential.

CLIMATE CHANGE AND HUMAN SECURITY

Peru is highly vulnerable to climate change impacts, with seven of the nine vulnerability characteristics recognized in the 1992 United Nations Framework Convention on Climate Change (UNFCCC): low coastal zones; arid and semi-arid areas; exposure to floods, droughts, and desertification; zones prone to natural disasters; areas of high urban pollution; fragile mountain ecosystems; and significant economic dependence on the production and export of fossil fuels (MINAM 2010). Peru is also one of the countries most directly affected by the El Niño Southern Oscillation (ENSO), experiencing increased temperatures from El Niño every four to five years, as well as periodic colder temperatures associated with La Niña. These variations often have significant disruptive effects on agriculture and other productive activities, and the El Niño effect is expected to increase in frequency as a result of climate change (Obregón et al. 2009).

Few countries are as ecologically diverse as Peru, both in terms of biodiversity (containing 84 of 117 identified global biological zones) and distinct climatic zones (representing 28 of 32 identified world climates). While Peru has the second largest Amazon forest, it also holds 71 percent of the world's tropical glaciers. The dry Pacific coastal region, which is home to approximately 55 percent of Peru's nearly 30 million people, has only 2 percent of the nation's water resources (MINAM 2010).

Peru's Second National Communication to the UNFCCC notes a number of signs of climate change at the national level over the previous 42 years. Rainfall has increased along the coast and northern sierra, while decreasing in the northern Amazon. Maximum and minimum temperatures have been increasing at around 0.2°C per decade over almost all of the country. Dry spells have been increasing in intensity more than have wet spells. Cold nights have been decreasing, while warm nights have been increasing, especially in the sierra. These trends are projected to accelerate in the next two decades. Moreover, there has been increased deviation from the norm in seasonal patterns, with seasons arriving both earlier and later than normal.

Especially noteworthy are extreme weather events and related phenomena that have been increasing in frequency, intensity, and duration, sometimes occurring at unusual times of the year. These include floods, flash floods (*huaycos*), landslides, droughts, freezes, hailstorms, and El Niño-related occurrences (MINAM 2010). In the 1990s, when measured in terms of extreme climate events and mortality, Peru

ranked among the ten most vulnerable countries in the world (Adger et al. 2004).

Perhaps the best known and most dramatic manifestation of climate change in Peru is glacier melt. In recent years, glacial retreat has been measured in three major areas: the Cordillera Blanca in Ancash, the Coropuna snowcap in Arequipa, and the Salkantay snowcap in Cuzco. Between 1980 and 2006, glacier retreat in the Cordillera Blanca was 33 percent; between 1988 and 2006, glacier loss for Coropuna was 50 percent; and in the Salkantay snowcap, approximately 28 percent of glacier cover was lost in just four years (2003-2007). Overall, Peruvian glaciers have diminished in size by 22 percent since 1980. Should current trends continue, Coropuna is projected to lose all of its glacier cover in 20 years. According to the Ministry of the Environment (MINAM), "by 2025, Coropuna will have a remaining ice cap that is no longer capable of producing surface runoff sufficient to meet the water needs of the zone." Indeed, along with extreme weather, these landscape changes, discussed in greater detail in the findings below, are certain to pose threats to human security in Peru, most notably with respect to water resources. Some 95 percent of Peru's population uses water resources that originate in the high Andean regions. In the rural highland agricultural sector, where approximately 60 percent of the population is classified as poor, irrigation is based on low technology, and water availability for irrigation is decreasing due to constraints on quantity, quality, and access. Along the Pacific coast, where most of Peru's agro-export production is located, about

“Some 95 percent of Peru’s population uses water resources that originate in the high Andean regions.”

“Climate change contributes to glacier melt and eventually an absolute reduction in water availability in highland areas, but other factors, such as inefficient water management and pollution from mining, intertwine with the effects of climate change to create the overall context of limited water access and availability.”

80 percent of total water resources are used for irrigated agriculture. In the cities, water originating in the highlands is used for human consumption. About 70 percent of Peru’s increasing energy needs are met by hydropower, which is threatened by both glacier melt and drought associated with El Niño (MINAM 2010).

The mining sector also is a significant consumer of water. Although it consumes only about 2 percent of total national water resources, the mining industry operates in highland areas in which water scarcity is a crucial issue for irrigation users and local communities. Mining concessions are not required to provide analyses of projected water exploitation, despite the industry’s legacy of frequently fouling rivers, lakes, and streams with toxic tailings and runoff. Nor is the mining sector subject to water use quotas, as are irrigation users. Illegal or informal mining, which is on the rise, also contributes toxic contaminants to water supplies, including mercury used in amalgamating gold. Here, the issues having to do with water scarcity commingle, since water scarcity in highland communities often has to do with not only an absolute reduction in available water resources but also the availability of *usable* water resources. Climate change contributes to glacier melt and eventually an absolute reduction in water availability in highland areas, but other factors, such as inefficient water management and pollution from mining, intertwine with the effects of climate change to create the overall context of limited water access and availability.

Human security also is threatened by increased water flow from

melting glaciers. The number of glacial lakes in Peru has increased, and increasing water volume can burst open natural dams created by glaciers or terminal moraines. Glacial lake outbursts (*aluviones*) produce massive floods of liquid mud that carry rocks and ice. In 1941, a glacial lake outburst from Lake Palcacocha destroyed part of the city of Huaraz, killing some 5,000 people (Carey 2010). Elsewhere in the Cordillera Blanca, triggered by an earthquake, a rock and ice avalanche from Huascarán Norte killed approximately 23,000 people in Yungay in 1970 (USGS pubs.usgs.gov). Climate change is increasing the underlying conditions that produce or contribute to such natural disasters. Similarly, increased ice melt has contributed to what MINAM terms an elevated risk of downstream rivers overflowing their banks and flooding nearby areas.

Hence, the economic costs and cumulative threats to human security resulting from climate change in Peru are potentially enormous, and the majority of them are linked to water quantity and water quality, as well as issues of water management and disaster risk reduction. Water is crucial to the livelihoods and health of millions of Peruvians, the functioning of the fast-growing mining sector, the irrigation needs of both agricultural smallholders and large-scale agro-exporters, and the provision of hydropower for the country’s rapidly growing energy needs.

However, the interests of these myriad water users are diverse and often contradictory. Water management in the agricultural sector raises complex questions about irrigation rights, appropriate

technology, and upstream-downstream distributions. Public concerns about mining companies' privileged water access, and water pollution caused by mining operations can lead to protests that can disrupt or even shut down mining projects. Large-scale hydropower projects are often highly controversial in terms of both their environmental impacts and compensation issues, and in the context of water scarcity, these controversies may be intensified (Avalos 2008). Under Peru's 2009 Water Resources Law, the availability of water for human consumption is considered a human right. Water shortages, especially in urban areas, could easily provoke volatile political crises.

As climate-related threats to adequate water supplies increase, imperiling human health, undermining traditional livelihoods, hampering the growth of key economic sectors, and complicating the development of essential infrastructure, the potential for conflict among stakeholders with competing needs and divergent interests is likely to increase. In the findings that follow, emerging issues in the relationship between climate change and conflict are explored through examples from field research in Lima and selected areas of Ancash and Arequipa Regions.

FINDINGS FROM THE FIELD

LIMA: EMERGING INSTITUTIONAL ARRANGEMENTS TO ADDRESS CLIMATE CHANGE AND CONFLICT

Socio-Environmental Conflicts and Divergent Cultural Values

Although by no means the only source of information, the most authoritative tracking of social conflicts in Peru is done by the *Defensoría del Pueblo* or Ombudsman's office, which compiles reports from the nation's respective regions to produce a monthly report.⁹ These social conflicts are then classified as active, latent, or resolved, as well as categorized by type: socio-environmental, territorial, illicit coca, labor, electoral, communal, and other. In recent years, more than half of the conflicts in the country have fallen consistently into the category of socio-environmental conflict. For example, in November 2011, out of 220 identified conflicts, 125 or 57 percent were socio-environmental conflicts. According to staff at the National Water Authority (ANA), the majority of these are water conflicts, and according to Carlos Monge of Revenue Watch Institute, a majority of them are related to conflicts involving extractive industries.¹⁰ In fact, in most socio-environmental conflicts in Peru,

these two issue-areas— water and extractive industries—intersect.

Given the predominance of these socio-environmental conflicts and their resource-related characteristics, the Ombudsman's office is aware of and concerned about the role that climate change may play in triggering or aggravating them. Most conflicts are localized to specific areas, such as a basin or watershed. With the system already in place to map and classify conflicts, it would be possible in principle to incorporate localized climate change data and thus analyze the climate-conflict relationship in greater depth. However, downscaled data on weather and water resources is still very limited. Rolando Luque, ombudsman for prevention of social conflicts, stated that, as a starting point, the *Defensoría* was preparing a report on climate change and human rights, focusing on water availability, water quality, and access. The Ombudsman's office also is interested in possible climate change linkages to other conflict-related issues, such as land use disputes and migration caused by environmental change. Staff at the Ombudsman's office noted that it would be possible, even in the absence of enhanced climate data, to begin to code those

conflicts that appear to have plausible linkages with climate change, with a view toward developing a kind of climate change checklist that might be used for early warning and to guide appropriate responses.

Most of the conflicts reported by the Ombudsman fall under the competency of the national government, and they are often managed through the Office of Social Conflict Management at the Prime Minister's Office (PCM),¹¹ which has responsibility for the coordination of dialogue among relevant stakeholders in government, civil society, and the private sector. As with the Ombudsman's office, engagement on climate change issues is seen by the PCM as important, but according to Victor Caballero, Chief of the Office of Social Conflict Management, the Peruvian government is not yet institutionally prepared to respond effectively to climate change and conflict issues, especially as they intertwine with the complexities of extractive industry controversies. Nevertheless, he stated that climate change and conflict issues are finding a place on the Humala government's evolving policy agenda. This is reflected, for example, in concerns about diminishing water resources, climate-related shifts in the

agricultural frontier, and the possible need for no-go zones in alpine wetlands and prairies that play an important role in sustaining and regulating existing hydrological systems.

Caballero noted that a fundamental challenge faced by the government of President Humala on environmental issues is a legacy of citizen mistrust and the state's lack of public credibility on natural resource management issues. In response, the government is seeking to increase and diversify the institutional mechanisms that provide public information and facilitate dialogue and meaningful public participation. Toward this end, the Water Resources Law of 2009 envisions the creation of decentralized water authorities—suprabasin Administrative Water Authorities (AAAs) and Local Water Administrations (ALAs)—as well as water resources basin councils that will involve national, regional, and local authorities, along with civil society and private sector participants. A similar process is anticipated for multilevel environmental commissions. One especially important challenge, he noted, is the need for national authorities to work more closely with the regional presidents.¹²

The PCM sees equal potential for conflict mitigation through improvement in the conduct and community relations of extractive industry enterprises, which have both historically neglected the environmental damages they have caused and failed to understand and effectively engage the communities in which they operate. Controversies over the use of the *canón minero* (the legally mandated mining tax or levy) have contributed to conflict,

and recent revisions to the law may continue to make community-company relations problematic. According to Jaime Gálvez, the head of community social funds for Antamina—regarded by many as one of the most socially responsible mining companies in Peru—the revenues lost by mining companies because of the newly increased obligations of the *canón minero* are likely to make social funds such as the Fondo Minero Antamina no longer viable. However, according to other interviewees, the added operating costs resulting from the new levies are often exaggerated and represent more a redistribution of funds toward the central government than a large increase in the overall royalties and voluntary payments paid by mining companies. These interviewees believed that mining companies, despite their complaints about their tax obligations, would have to continue to provide social funds to affected communities simply as a matter of retaining the necessary “social license” to maintain their operations. The contribution of climate change to water scarcity and the resulting increase in the potential for social conflict with mining companies over water resources is likely to add to those pressures.

Professor Jorge Yamamoto of the Pontificia Universidad Católica del Perú has been conducting research on the communication gap between extractive companies and local communities. That research may have useful lessons for conflict mitigation and climate change adaptation initiatives. For example, Yamamoto notes that differences in the “cultural matrix” between (and even within) Andean, Amazonian, and coastal Peruvian populations often leads

to incommensurate values that easily generate conflict over the proper use of natural resources. Moreover, due to some of the same cultural disjunctures, those community-company consultations that do occur often involve the wrong participants. The research suggests that “values mapping” and training can help to avoid conflicts and identify key individuals who can cross cultural bridges effectively. Without better awareness of the problem of divergent cultural values and needs, he believes that conflict will increase as Peru's use of natural resources and the impacts of climate change intensify. For example, the new Law on Prior Consultation, although well-intended, requires assiduous and skillful attention to issues of conflict sensitivity that are likely to surpass the institutional capacity of the various government ministries and agencies with consultative responsibilities under the law. Thus, dialogue undertaken without a full appreciation of these cultural and normative fault lines may generate rather than mitigate conflict.

Evolving Engagement with Climate Change Issues: Water, Weather, and Disasters

The pattern of growing engagement with climate change issues unfolding within the context of emerging institutional arrangements can be found in several other key government agencies and ministries. At the National Water Authority (ANA), Estrella Asenjo, Advisor to the General Secretary, and Jorge Baitez, Director of Water Resources Conservation and Planning, agreed that the central axis of climate change effects in Peru is water (e.g., glacier loss, wetlands, watersheds, lakes).

“...INDECI staff was highly attuned to the potential linkages among climate change, water issues, natural disasters, and conflict. Their most immediate concern was the increasing number and volumes of glacial lakes now being formed as a result of melting glaciers and the growing potential for glacial lake outbursts.”

They believe there are significant challenges for ANA to meet its obligations as the agency responsible for water under Peru’s climate change strategy. ANA sees a clear relationship between water scarcity, mining, and conflict, especially as the extractives sector continues expanding. As one interviewee remarked, “a glance at the map of existing mining and oil concessions makes it seem as though the entire country has been concessioned.” But the largest immediate tasks for ANA are institutional and informational. Besides the decentralization process now underway, the new Water Resources Law requires ANA to participate in the creation and management of a hydrological network. However, there is no up-to-date national inventory of water resources or an information system to gather and disseminate data. ANA staff noted that this is an instance where actors outside government also can make a contribution. For example, private companies working on water services, mining, and hydropower have a great deal of information that could and should be incorporated into Peru’s water resources inventory.

At the technical level, the primary responsibility for climate and water information falls upon the National Meteorological and Hydrological Service (SENAMHI). However, SENAMHI faces a problem common to many meteorological agencies in developing countries—the growing attention to climate change has placed increasing demands upon its services without a corresponding increase in budget resources. According to staff at SENAMHI, much of the data on Peru’s water basins is 20 to 25 years old, if it

exists at all. Information is fragmented. SENAMHI staff noted that, in addition to private companies, universities and NGOs also have important data on Peru’s water resources but, currently, there is no centralized repository or process to capture these non-government sources of data and information.

Given the anticipated increase in severe weather events resulting from climate change, the conflict potential of natural disasters is another area of major concern. Here, too, the Peruvian government is cognizant of the dangers but is only just beginning to put in place the institutional arrangements that will need to respond to future crises. Under a new law passed in May 2011, the National Institute of Civil Defense (INDECI) will no longer be the lead agency dealing with natural disasters and risk management. The National Center for Strategic Planning (CEPLAN) is in charge of planning, and the National Center for the Prevention of Disasters (CENAPRED) will be in charge of risk prevention.¹³ However, INDECI remains responsible for disaster preparedness, response, and rehabilitation, and regional and local governments are responsible for the execution of the necessary actions.

In an interview with the research team, INDECI staff was highly attuned to the potential linkages among climate change, water issues, natural disasters, and conflict. Their most immediate concern was the increasing number and volumes of glacial lakes now being formed as a result of melting glaciers and the growing potential for glacial lake outbursts. In their estimation, there are now 14 or 15 lakes in Ancash that are in danger of producing

flash floods of the sort produced 70 years ago by Lake Palcacocha. In fact, Lake Palcacocha itself has now returned to a water volume roughly equivalent to that at the time of that disaster. Some glacier lakes have the added instability of lying along geological fault lines. In the view of INDECI interviewees, there is an underappreciated risk of a glacial lake outburst producing a natural disaster of major proportions, even as Peru reconfigures its basic institutional mechanisms to respond to and address such a disaster.

Conversely, citizens feel threatened by large and sudden water withdrawals from major glacier lakes, as was the case in 2009 with the lowering of lake levels in Lake Parón to supply the Cañón del Pato hydroelectric facility operated by Duke Energy. In that instance, farmers acted to shut down the company's hydraulic machinery out of fear of the loss of their primary water source. Communities in Huaylas Province also feared that increased flows produced by the release of lake waters would erode downstream irrigation systems. The changes in the number and size of glacier lakes brought about by climate change are making these water management issues ever more sensitive and prone to conflictive outcomes.

Mining, Water, and Conflict

At the Ministry of Energy and Mines, José Luis Carbajal, the Director General of Social Management, observed that water is "a very emotional issue and situations evolve from conflict to crisis very rapidly." In his experience, nearly all water and mining conflicts have violence at

some moment, and water conflicts can be expected to increase in the years ahead. MEM estimates that the value of mining project investments expected in the next decade is in the range of \$40 billion to \$50 billion, representing a huge expansion of the sector. At present, with rising metal prices, large mining companies that operated at an altitude of 4,000 to 5,000 meters are moving to lower altitudes with higher populations and more complex and more easily mobilized communities. A further contributor to conflict is the practice of smaller mining companies to initiate exploration and then sell their rights to larger mining companies. Frequently, the smaller companies, working in a more speculative "start-up" mode with a short time horizon, raise the expectations of affected communities and pass these community expectations along to larger companies that are not prepared to meet them on a long-term basis.

Disputes over water will continue to arise due to its finite nature and many competing uses, and climate change will almost definitely add additional stresses, but these disputes need not turn violent or intractable. Therefore, the challenge for MEM is to find ways to encourage cooperative outcomes and to work with companies and communities to help them manage conflict and avoid crises. This way of framing the near-to-medium term outlook for mining and water conflicts, which might be characterized as suboptimal-but-realistic, points to a very tense conflict environment in affected areas for the foreseeable future. The impacts of climate change on water scarcity and water quality are bound to be important factors within this

“The impacts of climate change on water scarcity and water quality are bound to be important factors...with significant implications for both potential conflict and the stability and overall investment climate of the mining sector.”

context, with significant implications for both potential conflict and the stability and overall investment climate of the mining sector.

The MEM is especially troubled by the explosion of artisanal, “informal” mining, which also enters into competition and conflict over the use of water, among other resources. Artisanal mining is not merely “informal” but also illegal. In March 2012, a legislative decree (Article 307-A) was added to the Penal Code to establish a variety of sanctions, including prison terms of up to 10 years, for artisanal mining not authorized by proper government authorities or resulting in environmental damage such as pollution of irrigation systems or the fouling of water intended for public consumption. Originally small-scale in both scope and the number of miners, this sub-sector has grown very rapidly, now reaching perhaps as many as 500,000 small-scale miners. While regional governments have had oversight responsibility, their enforcement of laws and norms has been severely lacking. Firearms, labor abuses, violence, and the use of toxic chemicals such as mercury and cyanide are widespread. In the nearly lawless environments where illegal miners operate, disputes over natural resources have the potential to become lethal very quickly.

José Luis Carbajal also expressed concern about the new Law of Prior Consultation, noting that in many areas in the high Andes and the Amazon “the collective memory of exploitation” leads many communities to say “no” to new mining and hydrocarbon projects almost as an automatic response. In his view, the activities of some activist NGOs have served to reinforce this disposition.

He believes that the early stages of implementing the law are likely to be “explosive,” as poorly prepared ministries try to determine whether consultations are under their authority or not, how required consultations are to be done, and whether they have the appropriate capacities to implement the consultations and respond to public feedback and concerns.

Harmonizing Economic Development and Environmental Protection

While the Ministry of the Environment (MINAM) has a number of direct responsibilities in relation to climate change issues, it was established only in 2008, and it is just beginning to assert its institutional presence within the Peruvian government. MINAM has an intersectoral role and its legal framework is still evolving. As Eduardo Durand, the Director of the Office for Cooperation and International Negotiations, put it, MINAM is still “trying to get understood.”

MINAM sees climate change impacts affecting Andean populations in very tangible ways—for example, while potato and corn cultivators are moving to higher altitudes as temperatures increase, alpaca herders are being driven to lower altitudes in search of moister grass, resulting in increased potential for competition over a shrinking resource base. However, the abundance of micro-climates and the tremendous diversity of ecosystems and communities in the highlands pose a difficult challenge in terms of mapping these trends through empirical data collection and analysis. Improved science and technology are essential to help forestall resource conflicts and address these gaps.

According to Rosa Morales, MINAM’s Director General for Climate Change, Desertification, and Water Resources, donors are mostly focused on climate mitigation, but the public in Peru is more concerned with the need for climate adaptation. Under her direction, the Climate Change Unit in MINAM is approaching adaptation as a form of risk management. The identification of risks is to be done through a process of natural and social vulnerability mapping. The results of that mapping will contribute to the formulation of climate adaptation pilot projects and address the broader challenge of land use planning. However, she noted that in relation to climate change “the main issue is water.”

The decentralization of environmental responsibilities to the regions is another major challenge for the Climate Change Unit. More staff is needed at the regional level to act upon the powers vested at that level, including issues such as forests and land titles. MINAM would like to see its own staff in the capital working less on projects and more on neglected public policy issues, but the lack of budgetary resources often requires the former at the expense of the latter.

One central challenge faced by MINAM is the need to harmonize economic growth and environmental protection. Absent that balance, socio-environmental conflicts will continue to grow in number, driven in part by the increased awareness of indigenous groups of their rights and state incapacity or unwillingness to enforce those rights.

Nonetheless, Durand sees the possibility of progress in a number of areas. Companies can move

toward models of responsible mining, with better information systems and increased energy efficiency. To date, responsible mining has been more a discourse than a reality. Similarly, inappropriate and inefficient irrigation systems are wasting large amounts of water, but better technology and improved water management could achieve large savings in water use. Even if some glaciers disappear entirely, effective water management could fill the gap and generate viable alternatives to mitigate the reduction in water supply.

Unsurprisingly, MINAM believes that certain key functions not currently within its purview should be brought within its institutional authority. For example, environmental impact assessments for mining projects have been handled through the Ministry of Energy and Mines, not MINAM. Water issues are dealt with by ANA under the Ministry of Agriculture, not MINAM. If MINAM is to make a contribution to dispute resolution, more institutional power will be required. After the cabinet shuffle in the Humala government in December 2011, the efforts of the new Minister of the Environment, Manuel Pulgar-Vidal, in trying to address the crisis over Newmont Mining's Conga project in Cajamarca reflected a potentially larger role for MINAM in mining and water disputes.¹⁴

The Need for Capacity Building and Coordination

In Lima, interviewees at all of the relevant state institutions expressed awareness and concern about the relationship between climate change and the potential for conflict, especially those conflicts involving water

resources. However, the institutional responses to that awareness and concern were generally either in their early stages or on the drawing board. Most of the interviewees saw the climate-conflict linkage enmeshed to a large degree in the intersection of mining and water conflicts.

There is a clear consensus that there is an urgent need for more and better climate data as well as the mapping of socio-environmental vulnerabilities under conditions of climate change. There also is an interest and readiness to move forward on developing early warning mechanisms and adaptation measures to avert or mitigate climate-related conflicts. A new matrix of institutions is being developed to address natural disasters. However, there is a very large need for capacity building and improved coordination among the key players at both national and subnational levels in this still-evolving climate change agenda in order to animate and sustain their efforts.

In the meantime, two trends appear to be clear. First, climate change is likely to continue to place additional stresses on water resources and sensitive highland ecosystems in Peru. Second, the continuing expansion of the mining sector is likely to bring more conflict for the foreseeable future. These two trends will likely interact in ways that reinforce or amplify the country's conflict dynamics. However, an opportunity exists to engage with and support Peru's emerging institutional responses to climate change in ways that help to reduce the prospects for conflict.

“...two trends appear to be clear. First, climate change is likely to continue to place additional stresses on water resources.... Second, the continuing expansion of the mining sector is likely to bring more conflict....These two trends will likely interact in ways that reinforce or amplify the country's conflict dynamics.”

SANTA RIVER BASIN: INCREASING RISKS OF CLIMATE-RELATED CONFLICT AND EFFORTS TO ORGANIZE A COLLECTIVE RESPONSE TO WATER MANAGEMENT CHALLENGES

Environmental Problems, Informational Gaps, and Limited Resources

The Santa River Basin in Ancash Region (the Basin also is partly located in La Libertad Region) is one of the areas most affected by climate change in Peru. The Basin is the most extensive on the Pacific slope, ascending from sea level to 22,205 feet at the peak of Huascarán. The Santa River flows south to north between two ranges, the Cordillera Negra to the west and the Cordillera Blanca to the east. The Cordillera Blanca is the highest tropical mountain range in the world (Obregón 2009). The Santa River traverses the inter-Andean valley known as the Callejón de Huaylas. This valley is the home to several urban areas, including the city of Huaraz. The field research team conducted interviews in Huaraz and surrounding areas.

Diverse stakeholders in and around Huaraz identified climate change as an already evident and tangible threat. Ricardo Villanueva, the Head of Huascarán National Park (PNH) within the National Service for Natural Protected Areas (SERNANP), emphasized the scope of observed climate change effects, which he said include but go significantly beyond diminishing water supply. With the loss of one-third of the glaciers of the Cordillera Blanca, and as highland temperatures increase and precipitation becomes more

erratic, highland pastures, wetlands, and prairies are losing their capacity to provide their usual sponge-like regulation and filtration of water flows and groundwater recharge. This is endangering entire highland ecosystems in and around the Park. Poor people are moving into higher reaches of the area, often having received titles or access as patronage rather than on the basis of prudent land use. Illegal miners also are moving into these ecologically sensitive areas. Villanueva pointed out that these poorly regulated high-altitude settlements are not merely adding to environmental stresses but also often are unsafe to the residents themselves. As glacier lakes increase in water volume, these migrants are exposed to increased risk of glacial lake outbursts.

The condition of the Andean high, tropical montane vegetation and cloud forest soils known as the paramo exemplifies how climate change can interact with and accelerate already occurring landscape changes and threats to water supply. In these natural ecosystems, water is collected from rainfall and fog interception (moisture absorbed from fog and dew by the vegetation), while the amount consumed by the vegetation and lost due to evapotranspiration is low. Therefore, the water yield of the drainage basin (surface runoff and ground water outflow) has been found to be comparably greater than for other types of land use (Céleri and Feyen 2009; Tobón 2009). At the local level, ecosystem degradation has resulted from overgrazing, expansion of the agricultural frontier, drainage of wetlands, burning of pastures, and deforestation of shrublands. The

“Diverse stakeholders in and around Huaraz identified climate change as an already evident and tangible threat.”

“The observed micro-climate changes included hotter days and colder nights, recurring and prolonged droughts, more intense and shorter precipitation, and more intense frosts.”

observed micro-climate changes included hotter days and colder nights, recurring and prolonged droughts, more intense and shorter precipitation, and more intense frosts. A Quechua expression has been coined by campesinos to refer to these changes—*chirimanta ruphaymanta*, the cold and heat of the Andes—which have always existed, but never in as extreme a

environmental knowledge and governance capacity in this area. In his view, one of the first and most urgent tasks is to determine “what we have in the house” in terms of an inventory of highland water resources, flora and fauna, livestock, and human occupation and use of the land. Without this basic knowledge, making informed decisions about land use and sharing water resources is

these funds are rarely used to address environmental threats, ecological restoration, or climate change adaptation, despite their centrality to the availability and quality of water resources urgently needed for agriculture, mining, and human consumption. One main stumbling block is the manner in which the “participative budget” is used to decide how funds from the mining canon are



CYNTHIA BRADY

ABOVE: An appeal for just distribution of taxes on mining enterprises in Ancash Region.

form as seen now. These conditions reflect the impact of the interplay between global climate and local micro-climate alterations (Torres and Gómez 2008).

Although the Huascarán National Park staff is asked for advisory opinions on water use in the area, decisions are made by the ALA, which is generally more inclined to approve water use requests, given its mandate. Villanueva observed that this is part of a more generalized deficit of

extremely difficult. This viewpoint was reinforced by Jorge Recharte, Director of the Andean Project of The Mountain Institute (TMI), who stated that, “in terms of information, it’s a desert.” TMI itself, an international NGO, is one of the main providers of information to MINAM on the Andean paramos.

Mining is a constant presence in the area, and the mining canon provides funds to regional and local governments. However,

used. Requirements for the preparation of project proposals considered under the participative budget are onerous. But the greater challenge is that public awareness and political preferences do not align with environmental or climate change initiatives whose benefits may be perceived to be vague or in the distant future. Rather, preference is given to immediate, practical, and politically popular projects, such as town soccer stadiums or bricks-and-mortar infrastructure.

Given the persistent intersection of mining activities with water conflicts of various sorts, this is a somewhat ironic and disappointing outcome for local advocates of urgent measures to reverse water insecurity and conflicts in the Santa River Basin.

Climate Change and Water Quality: A “Time Bomb?”

Staff from TMI took the field research team to the highland area around Canrey Chico in Recuay, Ancash. There, TMI is implementing projects with three goals: improved pastures; improved water quality through restored wetlands; and applied research comparing improved water management in two paired basins. Discussions began with the community leaders of Canrey Chico, who described a process of learning and engagement over the past 20 years that has led to improved pastureland and a reduction in conflicts. Key to these efforts has been the creation of an improved water management group and increased production resulting from better agricultural practices. The community president also noted that the community turned down an expression of interest from a mining company six years ago in favor of protecting their health and way of life, an unusual act for a poor community in that area. While revenues might have been lost, he said, residents were happy to be living free of conflict. Public services also have improved, and some young people who had emigrated to the coast have returned.

Nevertheless, both the Canrey Chico community leaders and TMI staff noted climate-related problems faced by the community. In addition to the melting glaciers, seasonal rains have been erratic

and at times torrential. Frosts also have become more common. This has both impacted agriculture and affected pasture grasses. In response, TMI is looking at the water retention of different pasture grasses, and some communities are raising improved cattle breeds better able to withstand the changes in weather and climate.

At Canrey Chico, there appeared to be potentially serious problems affecting water quality. Community leaders said they had observed changes in the appearance and mineral content of the waters of the Rio Negro. This observation was confirmed by TMI’s scientists in at least two locations. One explanation is that when the glaciers recede and moraine is exposed, heavy metals with toxic effects such as lead, mercury, arsenic, and cadmium can be released into the water. TMI confirmed that natural exposure was the cause at one test site, while in the second location the toxicity could be traced back to a mining operation. In both cases, the heavy metals present in the water supply of communities could produce serious health consequences through contamination of drinking water, milk, and agricultural produce. Community leaders believe this process may already be happening in Canrey Chico, but more study is needed to determine both the possible level of contamination and the source.

Professor Julio Palomino, an environmental scientist at the Universidad Nacional de Ancash Santiago Antúnez de Mayolo (UNASAM), confirmed and expanded upon the climate-related threat posed to water quality. He stated that many water sources now have traces of heavy metals. As the glaciers recede, water and

oxygen combine with sulfur to make sulfuric acid. The sulfuric acid releases the toxic heavy metals found in the exposed rocks, and they are then carried by glacier melt into surface and ground waters. Traces already can be found in the Rio Santa. In addition to harmful effects on human health, contaminated water is potentially a huge problem for irrigated agriculture and high-value exports like asparagus. The situation is complicated considerably by the fact that toxic heavy metals also are produced by mining throughout the region, including mining taking place in protected areas. So, the problem is twofold: First, are toxic heavy metals present in the water supply and to what extent? Second, are they being produced by climate-related glacier melt or by mining operations? While techniques do exist for the remediation of the presence of heavy metals in water sources, they require careful planning, significant technical capacity, and effective implementation.

In the meantime, only limited research is being conducted to better understand the dimensions of the problem or the scope of the challenge, and no government institutions are taking action or setting policies to address it. If this looming problem is left unaddressed, the question will eventually become “who is to blame” and, in terms of conflict, “how will public grievances be manifested”? Obviously, the uncertainties about the source of any specific instance of contaminated water could lead to serious conflict. Water resources with toxic heavy metals produced “naturally” by climate change could easily be attributed by affected communities or

“...the uncertainties about the source of any specific instance of contaminated water could lead to serious conflict. Water resources with toxic heavy metals produced ‘naturally’ by climate change could easily be attributed by affected communities or agricultural producers to higher altitude mining operations. Water contaminated by mining activities could be alleged to be the ‘naturally’ occurring consequence of glacier melt. ”

agricultural producers to higher altitude mining operations. Water contaminated by mining activities could be alleged to be the “naturally” occurring consequence of glacier melt. Government authorities operating in this ambiguous context will be hard pressed to formulate a coherent response to citizen grievances. Palomino states flatly, “The issue of water quality is a time bomb.”

Climate Change and Institutional Weaknesses of Water Users

One of the most important stakeholders groups in the Callejón de Huaylas is the Water Users Board (*Junta de Usuarios*). The Callejón de Huaylas Water Users Board is made up of some 35 commissions, which administer 650 irrigation canals used by approximately 70,000 farmers. Agricultural production in the area includes beans, carrots, corn, and squash. Producers are struggling with a number of climate and water-related difficulties. In the past, very little irrigation was needed between October and April, but according to Gaudencio Villavicencio, the president of the Water Users Board, “it now rains only half as much,” and there is little or no rain between October and January. Some people have abandoned their plots because of water scarcity. At the same time, he stated that many people in Carhuaz have stopped planting because of the greater frequency and unpredictability of frosts. With production down, some people have emigrated from the region.

These reports of shifts in weather and the seasonality of rainfall may be harbingers of climate changes that become more permanent over time, as can be seen in Figures 5 and 6. First, Figure 5 shows the

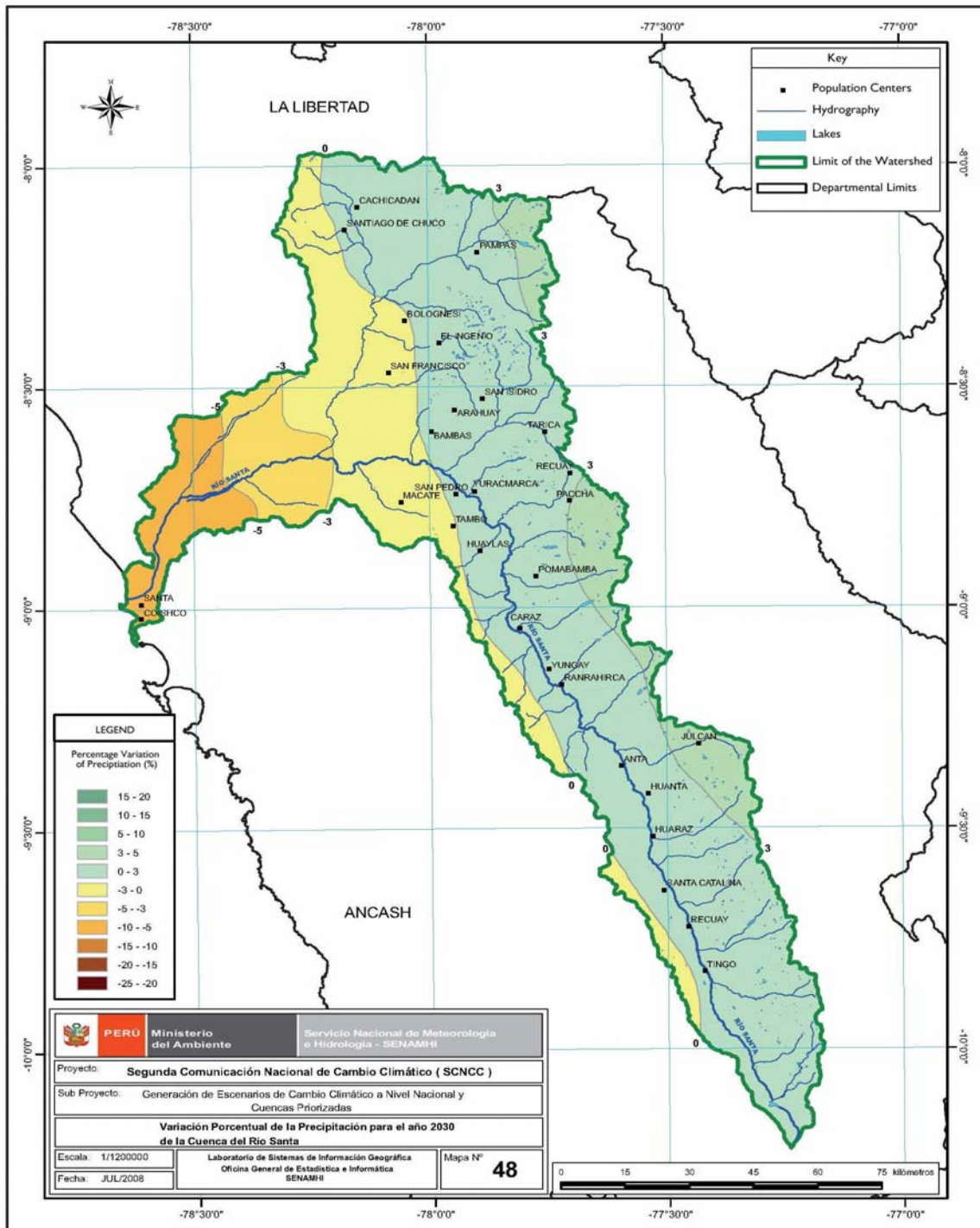
predicted changes (percentage variation) in *annual* rainfall over the Santa River Basin by the year 2030. On an annualized basis the variation is not large, ranging from a maximum 10 percent increase in the upper basin to a maximum 10 percent decrease in the lower basin, with most areas experiencing a variation of 5 percent or less.

However, as shown in Figure 6, the picture is quite different for the projection of rainfall in 2030 over the Santa River Basin during the traditional heart of the *rainy season* from December to February. At this crucial time of the year, reduced rainfall is projected for the entire basin, with the most populated agricultural areas falling in the range of a 15 percent to 20 percent decrease. These projected changes, it should be remembered, are apart from the impact on water resources of melting or disappearing glaciers at higher altitudes.

Conflicts over water scarcity among water users in the Callejón de Huaylas tend to take place between those already coping with limited water supplies and more favored beneficiaries. The Water Users Board distributes water first to major canals, which results in conflicts with communities who use smaller canals with less water. These conflicts may find their way into court or be expressed in actual physical confrontations. In either case, the pressures that lead to such conflicts appear to be increasing.

Despite its large membership, the Callejón de Huaylas Water Users Board is relatively weak in terms of both institutional capacity and influence. Villavicencio said that the Water Users Board had

Figure 5: Predicted Change (Percentage Variation) in Annual Rainfall by 2030, Santa River Basin



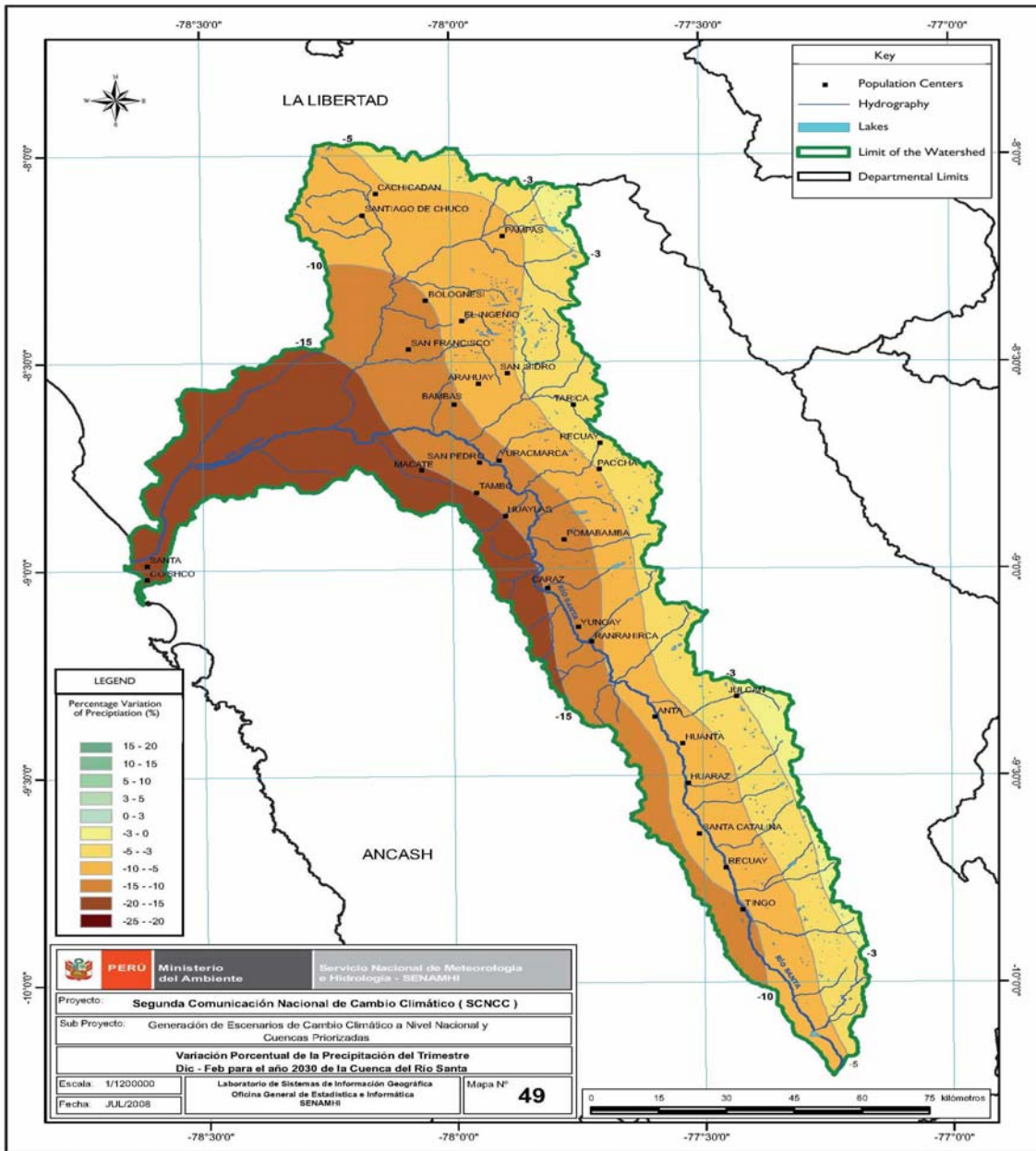
SOURCE: SENAMHI

submitted 111 project requests to the Ancash Regional Government over the past four years, but only 10 projects were approved and are being currently implemented. While the Board views this as a marked lack of attention on the part of the regional government,

he acknowledged that the Water Users Board also needs help to improve its capacity to formulate and submit proposals and complaints. With respect to the latter, the Board has been quite ineffective in getting a response to members' complaints about

pollution from mining. The Water Users Board believes both formal and informal mining have introduced mercury and lead into water supplies. In Anta, local health authorities determined that water was unsafe for human consumption. However, both the

Figure 6: Predicted Change (Percentage Variation) in December–February Rainfall by 2030, Santa River



SOURCE: SENAMHI.

Ministry of Energy and Mines and the Ombudsman’s office determined that there was no water contamination. Hence, the factual basis of these potentially serious concerns remains unclear, while public grievances remain unaddressed.

Challenges of Regional and Local Water Governance

Initial efforts to organize a collective response to the need for

improved water management and climate change adaptation have faced a number of obstacles. To encourage collaborative resource management, TMI is working with the Commonwealth of Municipalities in three watersheds, including the Santa River Basin. The Commonwealth has tried to access funds from the participatory budget in Ancash Region but by late 2011 it had only received funding for three projects.

By law, the region requires recipients of funding to operate within an elaborate institutional framework and to establish local offices. This has proved to be a laborious process, and although the Commonwealth has made incremental progress in building the requisite capacities, much more remains to be done.

Larger structural political problems also make coordination on water

management issues difficult. The basic asymmetry hampering action is that the high basin areas are the source of water, while the lower basin agricultural areas are both the largest consumers of water for irrigation and the home to the main centers of administrative and political influence. For example, the Chavimochic irrigation project is managed by the downstream water users, who prioritize plentiful water access and persuasively communicate their needs to powerful political supporters. Yet, water conservation and the prevention of overgrazing in the upper basin are the essential challenges that must be addressed if sustainable water supplies are to be maintained for water users downstream. Moreover, the failure to regulate and store water flows in the upper basin has serious implications for the long-term viability of water infrastructure in the lower basin. One local academic reported that estimates are that removing sediment from the Chavimochic canal due to the high sediment content of the Santa River would cost 10 million soles (approximately \$3.7 million). Water basin councils will need to find ways to integrate and balance these competing upstream and downstream water management imperatives and political realities.

While glacier melt and water scarcity are often viewed as the main problems resulting from climate change, municipal officials from Carhuaz cited a number of other manifestations of climate change, including changes in seasonal rain and frost patterns, an increase in agricultural pests, diseases moving to higher altitudes (e.g., bartomelosis), phytosanitary problems, opportunistic species (e.g., a surge in the rat population in

Huaraz), loss of endemic species, and cultivators migrating to higher altitudes for agricultural production. Cesar Portocarrero, former director of the Huaraz Glaciology Unit of ANA, noted that, despite significant glacier loss, water scarcity issues are generally not connected by the public to climate change but rather viewed simply as water governance problems per se. Water issues are highly contentious and water-related conflicts are numerous, but the problem is not one of absolute scarcity. The more immediate problem is extremely poor water management in the agricultural sector, which consumes some 80 percent of the total water supply. ANA analyses suggest that traditional irrigation is using 5 to 7 times the water necessary for cultivation, a situation that could be rectified with modernized drip irrigation. Though less consequential for the overall hydrological balance, water also is wasted as the result of poor infrastructure in urban settings.

Climate change does complicate water scarcity, however. Julio Palomino directed attention to how the specific timing and location of water shortages drives conflict. Seasonal rainfall patterns appear to be increasingly erratic, and the key factor for stability is the availability of water at the actual moment in time that it is needed. Similarly, water deficits may be spread unevenly across water basins. In the Santa River Basin, the Cordillera Blanca has both glacier and rainwater supplies, while the Cordillera Negra is dependent on rainfall. While there are some efforts to transfer water across basins, this is often a contentious process, and inter-basin conflicts are likely to become more acute as mismanaged supplies dwindle.

Portocarrero argues that Andean water management needs to take an entirely new strategic direction. He stated that it is far more cost effective to store water in smaller, high altitude lakes than massive dam projects near the coast. For example, according to his figures, saving water in a highland lake would cost 3 cents to 10 cents per cubic meter, while a dam on the coast costs \$1 to \$15 per cubic meter. At the same time, Portocarrero did not minimize the growing significance of climate change. He emphasized the importance of such measures as highland reforestation and small lake reservoirs as responses to broader changes in the overall hydrological regime. Portocarrero also highlighted the dangers of glacier melt avalanches and the need for drainage tunnels, dams, and glacier lake-lowering measures (Haerberli et al. 2011).¹⁵ Overall, he sees the fundamental challenge of improved water management as “not scientific but social.”

David Ocaña, the Ancash Regional Coordinator for CARE, also cautioned that the task of promoting more efficient use of water through modernized irrigation and improved agricultural practices is more complex than might be immediately apparent and requires close attention to sensitive issues of governance and public expectations. For example, CARE has found that the transference of successful irrigation technology from the coast to the sierra is not a straightforward matter because of the much more atomized land holdings in the highlands. The average irrigated plot in the sierra is about one-half hectare, while plots near the coast may be as large as 50 hectares. Traditions and customary practices also play an important role in changing

water use practices. Ocaña noted that farmers generally seek to retain their allotted hours of irrigation rights even after technological improvements reduce the time needed to achieve the same or better results, often leading to some users wasting water while other users go without.

Hence, at present, the primary problem and contributor to conflict is not absolute water scarcity but poor water governance, a problem that in principle could be addressed through demand-side management interventions and the strategic application of development resources. However, the current dysfunctionality of water management is a reflection of the fact that the politics and cultural underpinnings of water governance are thorny and complex. Regional water governance policy reforms and project initiatives will need to be crafted and implemented with extreme conflict sensitivity.

Similarly, the local political system has failed to respond well to the need for improved water management and water conservation. Revenues from the mining canon have been devoted to patronage-based job creation rather than pressing environmental concerns. In the district of San Marcos, for example, which has grown wealthy rapidly as a result of mining funds derived mostly from Antamina, citizens are hired to do public works at salaries far over market rates. According to Dante Cruz of ProParticipación, a local NGO, the situation has become so distorted that teachers take leave to engage in these jobs.

Two other concerns also are problematic. First, the distribution of the revenues from the mining canon is very uneven, with a few

districts like San Marcos benefiting far more than many other poorer areas, thus generating grievances among the population. Second, local governments frequently have difficulty executing their budgets, especially in their first year in office. The last administration in San Marcos could only execute 20 percent of its budget in its first year, although the rate improved over time. In fact, the lack of capacity of local governments to execute their budget was a problem mentioned by a number of interviewees throughout the field research. Hence, poor water management at the local level is the result of a tangle of factors, including skewed and squandered financial resources, lack of attention, and low implementation capacity.

The key question is how to forge a social consensus in support of the appropriate institutional arrangements and technical measures at both the regional and local levels. Integrated water basin management (or integrated water resources management), starting with micro-basins and moving to sub-basins and macro-basins, is regarded by many water experts to be the crucial mechanism for linking effective social participation with practical and appropriate scientific technologies for sound water management.¹⁶ It is also clearly one of the keys to conflict prevention and mitigation in Ancash, not to mention the central organizing principle promoted by those environmental experts with whom the research team met. For the Santa River Basin, this means creating and supporting efforts that enable the effective participation of all stakeholders in the upper, middle, and lower basin communities.

“Water issues are highly contentious and water-related conflicts are numerous, but the problem is not one of absolute scarcity. The more immediate problem is extremely poor water management in the agricultural sector, which consumes some 80 percent of the total water supply.”

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Poor Governance, Weak Conflict Management, and New Water Basin Initiatives

The national Ombudsman’s monthly reports show that Ancash is consistently one of the most conflictive regions in the country, and most of the conflicts are related to water scarcity, water contamination, poor governance, and extractive industries. Two recent high-profile cases provided examples. The first was Duke Energy’s excessive water withdrawals from Lake Parón and the resulting takeover of the company’s hydraulic machinery by angry and exasperated farmers from Huaylas Province. The second was a more recent conflict concerning the use of the waters of Lake Conococha by Chancadora Centauro, a gold mining company. Lake Conococha is important to citizens of the region both as a source of water for agriculture and for cultural reasons. In this case, protestors alleged that the mining company had failed to consult all of the communities affected by their operations, which residents feared would deplete and contaminate the lake waters. In December 2010, protestors were met with tear gas, shots were fired, one demonstrator was killed, and three were injured. It was this act of violence that threatened to turn the situation into a larger and more explosive confrontation.

These and other cases reflect a number of important deficiencies in conflict management in the region. First, there is a huge lack of reliable information. According to Editha Rodríguez, the Chief of the Ombudsman’s office in Ancash Region, while individual offices may have pieces of relevant information, governments at all levels do not have a culture

of information sharing, and communication between private companies and communities is extremely poor and unreliable. When the Local Water Authority *did* serve a rumor control function in the Lake Conococha dispute by providing needed public information, tensions were quickly lowered. Second, the media tend to inflame issues rather than provide key information to the public. Third, leadership and clear institutional mandates are lacking—in some cases, leaders of campesino groups are actually not representative of anyone, and in others uncertainties about institutional competencies lead to collective inaction. Public officials have very little training in dealing with resource conflicts. Fourth, there are two major lacunae in dealing with climate change and water conflicts—the lack of a regional environmental authority and the absence of any sort of land use planning. Without these key elements of policy planning and regulatory enforcement, suboptimal outcomes and chronic disputes are almost inevitable.

Rodríguez recognizes the linkage between climate change and conflict and its growing importance. She has been in discussion with Ricardo Villanueva of Huascarán National Park about the possibility of conflict mapping for highland areas within Ancash. They believe that identifying and tracking conflict patterns within areas vulnerable to climate change can be a powerful tool in conflict prevention and conflict management. At present, they lack funding to proceed with such a project.

However, Rodríguez shared information with the research team about the Foro Agua Santa, a much larger, multistakeholder

initiative. The Foro Agua Santa is organized by a group of organizations from civil society, academia, and government, including such participants as UNASAM, ALA-Huaraz, SERNANP, CARE, Huaylas municipality, large-scale commercial enterprises, water users organizations, and The Mountain Institute, among others (see foroaguasanta.org). The Foro aims at creating space for dialogue among all the stakeholders, public and private, as well as upstream and downstream, in the Santa River Basin. According to the Foro's program document, this dialogue hopes to mobilize an effective response to the recognition that "the basin is sick and increasingly vulnerable" with "water supply exceeded by growing demands of multiple users, both in the upper and middle basin as well as zones along the coast." These conditions are driven by population growth, environmental degradation, mining, and climate change, with the consequence that "all of these processes are affecting the water regime of the basin and generating conflicts among the actors."

The Mountain Institute, with the support of USAID, has taken a leading role in supporting the launch of the Foro Agua Santa. This is in line with its mission objectives over the past 15 years of working with mountain communities to improve natural resource management, strengthen livelihoods, and preserve fragile mountain ecosystems. Many of the lessons learned by TMI derive from earlier work aimed at increasing dialogue between communities and mining companies. According to Jorge Recharte, mining remains a

defining and highly conflictive issue everywhere, but the central concern of the population is water, whether it is related to the degradation of the paramos or sedimentation in large-scale downstream irrigation projects.

TMI's most recent work is its program "From the Peaks to the Coast" (*De las Cumbres a la Costa*), which tries to address the challenge of climate change adaptation through the development of effective local institutions (see cumbrescosta.mountain.pe). The program is implemented in conjunction with the Network of Rural Municipalities of Peru (REMURPE) in Ancash and Piura regions. In Ancash, TMI is supporting the development of a commonwealth of communities within the Santa, Fortaleza, and Pativilca basins with a view toward enhancing their collective capacity to better manage Andean highland ecosystems. TMI hopes that the entire program will be informed by new data on climate change in the high mountain areas generated by an Andean Community (CAN) initiative among mostly non-governmental organizations that is served by an executive secretariat based at the Consortium for Sustainable Development of the Andean Eco-Region (CONDESAN) in Lima.

The Peaks to the Coast program goes beyond local interests to try to link highland and coastal communities in mutually beneficial dialogue and action. As an example, Recharte remarked upon TMI's experience with dialogue involving the irrigation users of San Lorenzo, a middle basin area located in Piura. Through those discussions, farmers in San Lorenzo became better informed about the close linkages between

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“In Ancash, not only is climate change already evident and extremely likely to increase but through its effects on both water quality and water quantity it is inextricably linked to water conflicts, which are the main source of tensions and instability in the region.”

the conditions of the highland paramos and the lower watersheds crucial to their needs. As a result, they recognized their own interests and became advocates for the environmental concerns of highland communities and were able to add their political influence in the consideration of those issues.

The sorts of collaborative dialogues represented by the Foro Santa Agua and From the Peaks to the Coast seemed to the field research team to be key “bright spots” that could be built on in beginning to address important climate change and conflict linkages. In Ancash, not only is climate change already evident and extremely likely to increase but through its effects on both water quality and water quantity it is inextricably linked to water conflicts, which are the main source of tensions and instability in the region. Water conflicts are often linked to citizen fears about the effects of mining on water availability and water quality—and mining is continuing to expand throughout the region. Climate change also is altering the agricultural and pastoral frontiers, thus driving localized migration that contributes to competition. Jorge Recharte noted that TMI has focused so far on climate change adaptation, but he observed that in order to achieve its goals with respect to sustainability, preventing conflict could be added as an essential component of the agenda of the Peaks to Coasts program and the efforts of REMURPE. With the deepening interrelationships among climate change and the other conflict factors identified above, there would appear to be a compelling logic for taking this next step.

HIGHLAND AREAS OF AREQUIPA REGION: REGIONAL GOVERNMENT AND LOCAL COMMUNITIES IN SEARCH OF INSTITUTIONAL RESILIENCE

Climate Change and Social Vulnerabilities

In Arequipa Region, challenges of climate change are daunting. The climate is arid, and water management is a critical issue. Glacier water is essential for irrigation and human consumption. Cutting across Arequipa Region is the Ocoña River Basin, whose waters originate in the snow and ice cover of Coropuna, a snowcapped mountain that has been greatly reduced in size by the effects of global warming. The Ocoña River Basin is a crucial productive zone that is bordered by desert to both the north and the south. Both daytime and nighttime maximum temperatures have increased in Arequipa, and as a consequence of more frequent drought some farmers have abandoned their lands. Desertification has advanced in some parts of the region, while the highlands have seen a reduction in wetlands, springs, and lakes. Other manifestations of climate change have included an increase in extreme weather events, including frosts, freezes, and hail, as well as downpours that have led to landslides, floods, and crop losses. Competition and conflict over scarce water is on the rise, involving the competing interests of pastoralists, irrigation users, communities, and both legal and illegal mining operations.

In Arequipa, the nongovernmental organization most directly engaged with communities to address the issues of climate change and climate adaptation is the Association Specializing in

Sustainable Development (AEDES). It was clear to the field research team that, under the direction of Dr. Karen Kraft, AEDES has developed high levels of trust in its working relationships with highland communities threatened by climate change. AEDES staff provided details about climate change effects and how they interact with the social vulnerability of affected populations in the region.

While poverty is the fundamental contextual vulnerability, there are also a wide variety of micro-climates, livelihoods, and types of crop production affecting community level vulnerabilities and resiliencies. The Ocoña River Basin itself can be divided and classified into 22 different ecological or livelihood zones. High altitude peasant families have little or no access to basic services, while those in the middle basin may have water, sanitation, and electricity, if they live in more urban areas.

In the highland pastoral areas, as water supplies decrease, the remaining water is prone to contamination that produces illnesses in both people and their cattle. In some areas, as a result of changing weather patterns, the variety of food crops that are traditionally produced is diminishing, and those yields that are realized are losing nutritional value. Malnutrition is common. With the decline and diminishing appeal of traditional livelihoods, there is a marked migration of young people toward towns or artisanal mining centers, and schools are closing in some areas where the student population has decreased sharply. Left behind is a vulnerable and aging population. The resilience of the local population to natural hazards is

low in many areas. When natural hazards such as landslides and floods strike, they are sometimes amplified by poor water management practices, and the response capacity of local government is very limited, resulting in the loss of life and livelihoods.

Irrigation is essential to agriculture, but in many areas there is very weak organization and management of irrigation systems. Moreover, the whole issue of water rights is one fraught with the potential for conflict. When land reform was carried out in Arequipa (and elsewhere) in the 1970s, it was not accompanied by a redistribution of water rights. Therefore, the rights to use water for irrigation are generally inefficient, inequitable, and still disproportionately concentrated in a few hands. Those small farmers who benefited from the land reform did not receive water rights in sufficient quantity to meet their irrigation needs. The inequalities among irrigation users and uncertainties about water supply, whether organizational or climate-related, create insecurities that contribute to conflict.

In response to the negative effects of climate change on landscapes and livelihoods as well as the institutional shortcomings that fail to provide—or hinder—community resilience, AEDES works with community groups and municipalities on a broad spectrum of activities to confront climate change. These include research on ecosystems, monitoring of glacier retreat, environmental education, assistance in strategic planning, soil and water conservation, reforestation, improvement of irrigation, promotion of organic production, capacity building for

local leaders and regional and local governments, and incorporation of traditional knowledge in climate change adaptation. With funding from USAID, AEDES will work with producer families and municipalities in La Unión, Condesuyos, and Caylloma provinces for the next three years on managing climate risks and promoting local development.

Although AEDES does not currently work directly on conflict issues, its staff shared with the field research team preliminary conflict mapping that they have done for the areas in which they are working in the Ocoña River Basin. The great majority of these conflicts (29) were water conflicts, arguably affected directly or indirectly by climate change. Other conflicts (16) were categorized as disputes over mining and water, mining, land ownership, boundaries, and water pollution. In principle, it would be possible to refine conflict mapping exercises of this sort to identify and analyze climate-conflict linkages and propose climate adaptation interventions that also might avert or mitigate conflict.

Regional Environmental Governance: A New Resource for Conflict Management?

One of the weaknesses in environmental governance in Peru is at the level of regional government. This makes Arequipa an interesting case, as it is the only region to have its own Regional Environmental Authority (ARMA), with a much broader mandate than the natural resources management offices found in other regions. For example, according to the manager of ARMA, Aníbal Díaz, and Gladys Márquez, its conflict

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“...climate change is clearly contributing to water scarcity and the entire array of water conflicts in the region....One such recent conflict was the 'war over water' on the border between Arequipa and Moquegua....”

specialist, ARMA approves EIAs for all issues within its purview, and it is seeking to build its capacity to anticipate and prevent conflicts. Given the centrality of water issues, Arequipa also is establishing the Water Institute, which will have key responsibilities in implementing water projects in the region, such as the construction of dams and irrigation canals.

As a relatively new authority, ARMA has a varied and complex agenda that places a large burden on a small staff. To date, the region's climate change strategies have focused mostly on establishing and enforcing protected areas and supporting biodiversity. However, Díaz and Márquez said that climate change is clearly contributing to water scarcity and the entire array of water conflicts in the region. Some of these are cross-border conflicts with neighboring regions, while others involve water issues and both legal and illegal mining. As drought and increasing temperatures place further pressures on water supplies, climate change is increasingly part of the mix.

One such recent conflict was the “war over water” on the border between Arequipa and Moquegua, the region that lies to its south. In that dispute, the Ministry of Agriculture divided water management of the Tambo Valley water basin between the two regions. The governor of Arequipa protested that no other watershed in the country was divided between two administrations in such a manner. Eventually, the situation was calmed by a negotiation ensuring Arequipa's access to increased water flows in the dry season. However, Díaz

said that conflict remains latent rather than resolved.

A second regional dispute is taking place between Arequipa and Cuzco. One of the most important economic development initiatives in Arequipa is the massive Majes Siguanas II irrigation project. According to Díaz, there are 38,000 hectares to be added in the latest expansion of the project. However, authorities in Cuzco Region (notably, Espinar Province) have objected that citizens there were not properly consulted and might be left without water once the infrastructure is in place. Díaz felt that the irrigation project should take priority over what he perceived as Cuzco's less pressing needs, but he recognized the volatility produced by the differing regional and individual perspectives.

Although fewer in number than in Ancash, there also are water conflicts between large mining companies and communities in Arequipa. In one highly controversial case, farmers from the Tambo Valley blocked the road between the city of Arequipa and Islay Province to protest Southern Copper's Tia Maria open pit copper mine. Production in the valley includes agro-industrial rice and sugar cane plantations as well as smaller crops of olives and hot peppers. Producers feared that the Tia Maria mining operations in the mountains would divert water and contaminate both water and soil in agricultural areas near the coast. After clashes between protestors and police resulted in several fatalities, the Peruvian government announced the cancellation of the mining project in April 2011, citing inadmissible deficiencies in the mine's environmental impact assessment.



PANORAMIO

ABOVE: The Coropuna snowpeak seen across the paramo, Arequipa.

Illegal, small-scale, artisanal, and “informal” mining is an even greater concern in Arequipa than in Ancash, and it leads to many conflicts over both water supplies and water quality. ARMA estimates there are now 30,000 illegal miners in Arequipa, driven in part by rising gold prices. In some areas, informal mining has led to a proliferation of wells that are depleting the water supply. Water contamination also is an issue. Such chemicals as mercury, cyanide, boron, and arsenic have been detected in streams. Some of these are more likely to have been produced by industrial mining (climate change does not appear to be a significant factor), but mercury and cyanide are used in informal mining to amalgamate gold. Some of these toxic contaminants have been found in shrimp, which is a major food commodity produced in Arequipa.

The regulation and oversight of small-scale, artisanal, and informal mining is the responsibility of the regional government, but lack of capacity combined with the dispersed and growing numbers of artisanal miners makes this an extraordinarily difficult task.

According to Gladys Márquez, ARMA would like to place more emphasis on conflict prevention than other institutions. The Ombudsman’s office must wait for conflicts to become manifest, while ANA processes existing cases through tribunals. Lacking clear alternatives, communities sometimes ask ARMA to intervene in conflicts, even though it does not have the necessary authority. As a result of this demand, she observed that ARMA’s staff was badly in need of conflict training. With respect to building capacity in civil society to deal with

environmental conflicts, she said that assistance to communities and organizations to help them review and understand EIAs would be highly beneficial. For example, in the case of the Tia Maria mine, civil society groups were only given 30 days to review a highly complex EIA.

More generally, both Díaz and Márquez noted ARMA’s need for more staff and financial resources. For example, just to visit an area of water conflicts in the highlands often requires a full day’s travel. Clearly, there are also limits to the kinds of conflicts in which ARMA can play a central role—for example, disputes between regional governments must be resolved at a higher level—but it has considerable potential for conflict prevention at the local level. The field research team was impressed by ARMA’s

“Illegal, small-scale, artisanal, and ‘informal’ mining is an even greater concern in Arequipa than in Ancash, and it leads to many conflicts over both water supplies and water quality.”

engagement with emerging climate-conflict linkages and its focus on conflict prevention. As such, it may be an emerging model of one viable institutional response to the intersection of climate change, water-intensive large-scale projects in the mining and agricultural sectors, and conflicts over diminishing water supplies. As with all of the *Defensorías*, the mandate of the Arequipa Ombudsman’s office is one of horizontal accountability—to be “a stone in the shoe of the authorities,” as one staff person put it. Although the Ombudsman’s office seeks to serve a conflict early warning function when possible, in practice disputes require that several criteria be fulfilled before they are termed a “conflict.” These include the involvement of more than one actor, some form of public demand, and the manifestation of some sort of “outburst.” As a result, more than 50 percent of conflicts involve some act of violence prior to their listing in the office’s monthly reports. However, the Ombudsman’s office tries to provide public information and support dialogue to dispel rumors, which are one of the main conflict triggers in Arequipa. The provision of accurate information on resource conflicts is one of the most badly needed services in the region.

Environmental conflicts have become more acute in Arequipa in recent years. According to Manuel Amat, the Head of the Ombudsman’s office, public trust of government institutions is low, in part because when agreements to resolve conflicts are reached the compliance rate is low, and it is often the government authorities who fail to fulfill the agreement. Institutional competence is

another highly problematic issue; some issues fall between the cracks because no institution is deemed responsible for them. Enforcement also is sometimes suspect. The Ombudsman’s staff gave the example of an EIA approved by the Ministry of Mines and Energy that was referred to the UNDP for review, whereupon it received more than 100 critical observations of deficiencies. At the same time, the Ombudsman’s staff believes that in response to this mistrust and growing socio-environmental concerns, people are becoming better organized and more prepared to confront state authorities.

The Ombudsman’s office has great concern about water issues, which dominate the many socio-environmental conflicts reported to the office. Moreover, the office recognizes that climate change is very likely to have an important impact on water conflicts. In 2012, the Ombudsman’s office will be conducting a study to better determine the nature and extent of climate-related linkages to social conflicts. One example cited by the Ombudsman’s staff involved Aracel, a gold mining company. Aracel is seeking to set up operations in the already threatened wetlands near the source of the Cotahuasi River. Here, as in other instances, one main pathway to conflict appears to be the intersection of climate change, fragile ecosystems, depleted and degraded water resources, and the water demands of extractive industries.

With 109 districts to cover in Arequipa Region, the Ombudsman’s office is yet one more institution stretched thin. However, the staff has a clear focus on socio-environmental issues as a central concern, and

they indicated an interest in partnering with like-minded organizations. With additional support, they feel they can move forward on what the research team found to be an evolving but well-articulated agenda for the future that explicitly plans to take into account the linkages between climate change and conflict.

Environmental and Climate Challenges at the Community Level: Crisis or Resilience?

In an open meeting in Chuquibamba in Condesuyos Province attended by a diverse group of more than 40 participants from highland communities in surrounding districts, a discussion of climate change produced an outpouring of worries, complaints, and laments concerning changes in the area's weather, landscapes, and livelihoods. Participants agreed that, in addition to the obvious shrinkage of Coropuna's snowcap and resulting water scarcity, temperatures are increasing and frosts occur with greater intensity. As in Ancash, rains have become less reliable and more forceful in the rainy season. There are many consequences of these changes for plants, animals, and humans. In the highlands, pastures no longer grow as they once did, and the milk production of camelids (llamas, alpacas, vicuñas) and cattle (goats, bovines) is declining. Skin cancer is on the rise. Even the frogs of the wetlands have disappeared. Increasing population and the search for firewood for sale has contributed to deforestation through the clearing of *tola* (shrubs) and *queñuales* (hardy layered-bark trees of the *polylepis* species). This has resulted in erosion and further loss of water resources. The water for irrigation is

decreasing due to these climatic and environmental transformations, and scarcity is producing localized conflicts among water users.

Mining, especially the expansion of informal mining, was identified as a growing irritant and source of water conflicts in relation to both water supply and water contamination. One participant posed the dilemma succinctly: "Mining requires water, and there is no water." A colleague added, "Informal miners will take water no matter what, for good or for bad." Another said simply, "Mining *is* conflict." As the water supply becomes ever more unpredictable and scarce, grievances related to the intersection of mining and competition for water will likely be aggravated.

The sense of approaching crisis was expressed in a number of statements made by the attendees. As one participant put it, "We don't have an environmental culture. Everyone is suffering from climate change and no one is doing anything." A representative from the local agricultural association said, "We are not mindful. We do not reforest, and we need to stop using agrochemicals." Several participants complained about the ways in which governments are contributing to conflict. The budget of the provincial municipality is distributed very inequitably, and favored organizations monopolize benefits, thereby angering those who feel marginalized. The head of the local water users board exclaimed, "This community is about to die and has been headed toward a collapse for some time now. Coropuna no longer has a snowpeak—it is a little hat. This is an emergency."

"In an open meeting in Chuquibamba in Condesuyos Province attended by a diverse group of more than 40 participants from highland communities in surrounding districts, a discussion of climate change produced an outpouring of worries, complaints, and laments concerning changes in the area's weather, landscapes, and livelihoods."

However, just as striking as the sense of urgency imparted by the participants about climate change and conflicts was their resilient attitude and determination to take steps to address the situation. Several main areas for action were identified. One top priority was reforestation, including the replacement of eucalyptus with pines, in order to combat water scarcity and its effects on vegetation and animals in high altitude communities. A second was related to water management, including improved irrigation, water conservation, and more rational water distribution. A third, linked to the other two, was a critical need to educate communities about climate change, environmental change, and their options for adaptation. There was a clear consensus on the urgent need for raising community awareness and empowering citizens to shift from behaviors that aggravate negative climate change effects to those that mitigate them.

Underlying the discussion of these issue-areas was an even more fundamental exchange among participants about mechanisms for self-organization, from the level of neighborhoods up to communities and towns. In the words of one participant, "We need to be talking about these things all the time." At the conclusion of the meeting, the participants agreed to form committees coordinated by Angelo Manchego, the mayor of Condesuyos province, to follow up on the three identified themes: reforestation; improving irrigation; and educational projects.

Yet, despite this positive outcome and fairly extensive discussion of the problems of water conflicts among irrigation users, communities, and miners, the

issue of how to prevent and manage conflicts was largely left hanging. Water conflicts were seen as within the purview of the water users board, but many conflicts fall outside of its competence. In a separate conversation with Manchego, the research team asked him how he dealt with conflicts brought to his attention by constituents. He said that he tried to resolve them through his own influence and good offices, and if that were not possible he referred the complainants to what he thought to be the relevant institutional authority. This somewhat ad hoc approach also seemed to reconfirm the gap, or at least disconcerting fuzziness, in managing conflicts in Arequipa, even as water-related conflicts, linked in part to climate change, seem very likely to increase in number. However, the highland communities of the Ocoña River Basin are not lacking in their resolve to address their environmental and climate challenges. It was clear to the field research team that support to strengthen highland communities' organizational capacities has strong potential to advance both climate adaptation and conflict prevention and mitigation.

In Arequipa Region, conflict is at lower levels than in Ancash, but it appears likely to increase, driven in part by climate change. Water scarcity and the deterioration of ecosystems in the sierra are threatening livelihoods and driving some highland communities toward crisis. Climate-related water scarcity exacerbates tensions around poor water management and the inefficient and inequitable distribution of water for agriculture. Informal and illegal mining is creating a new

source of competition for diminishing water supplies and aggravating social relations. As in Ancash, large-scale commercial producers along the coast require increasing amounts of water. Water conflicts with Moquegua and Cuzco Regions continue to simmer. Flawed governance, institutional gaps, and a lack of clarity about institutional authority add to citizen frustrations.

On the other side of the ledger, however, there are clear opportunities to build on resilient community attitudes, new institutional opportunities, and the possibility of forging new partnerships to advance conflict prevention and mitigation. Communities and municipalities generally have strong capacity for self-organization, although resources and technical expertise are often limited. Relatively new institutions like ARMA and the Ombudsman's office in Arequipa have a strong commitment to addressing environmental conflicts and a clear sense of the relevant issues, although they, too, have resource constraints. AEDES appears to be successfully implementing a comprehensive set of programs to advance climate adaptation. If these emerging and evolving efforts could be brought into a more coherent set of working relationships or collaborative partnerships focused on improving social cohesion and institutional performance, there could be significantly improved prospects for managing and mitigating the growing potential for conflicts linked to the harmful effects of climate change.



CYNTHIA BRADY

ABOVE: An open meeting to discuss the effects of climate change in Chuquibamba, Arequipa.

THE ECONOMICS OF NATIONAL GOVERNMENT POLICIES AND CIVIL SOCIETY PARTICIPATION

As a concluding note, two areas of strong influence are worth special mention in relation to efforts to avoid climate-related conflict in Peru: 1) central government perspectives on the economics of climate change and conflict and 2) civil society participation and advocacy in relation to those issues.

As in most countries, the ministry that controls the purse strings—the Ministry of Economy and Finance (MEF)—is in many ways the most powerful in Peru. The MEF intends to emphasize risk management, market mechanisms, performance measures, and accountability to drive the nation’s climate change policies for both mitigation and

adaptation. The policy is to be implemented through the use of increased information, clearly defined institutional roles (designated national agencies), and tangible incentives created by various economic instruments.

Javier Roca, the Director General for International Economic Affairs, Competitiveness, and Productivity, said that in order to frame policy the Peruvian government will be producing something akin to its “own version of the Stern Review,” the famous 2006 study on the economics of climate change led by Sir Nicolas Stern of the United Kingdom. This is a fairly ambitious statement about which one might be forgiven for some degree of skepticism, if one recalls that the main conclusion of the Stern Review’s cost-benefit analysis was that the benefits of strong early action on climate change outweigh

the costs. Even though quantification goes beyond the scope of this short study, it is clear to the field research team that the negative effects of climate change and conflict pose what are potentially very high costs for the Peruvian economy.

At a minimum, climate change effects are likely to include such factors as huge losses of ecosystem services in the Andean highlands, reduced agricultural and pastoral productivity, loss of livelihoods in the countryside, rural-to-urban migration, increased public health problems, and more frequent and costly natural disasters.

As for conflict, it is almost axiomatic that its costs regularly surpass original estimates. In the Peruvian case, the key factor linking climate and conflict may be the intensification of water

“In the Peruvian case, the key factor linking climate and conflict may be the intensification of water conflicts related to water quantity, water quality, and water access in the extractives and agricultural sectors. As mining concessions move from exploration to active operations in more and more areas of the country already experiencing climate-related stresses, the potential for conflict will increase.”

conflicts related to water quantity, water quality, and water access in the extractives and agricultural sectors. As mining concessions move from exploration to active operations in more and more areas of the country already experiencing climate-related stresses, the potential for conflict will increase. As shown by the state of emergency declared by President Humala in relation to the Conga project in December 2011, such conflicts may have national ramifications. If they become chronic, they can have a more permanent chilling effect on the entire investment climate for extractive industries in the country, with very large negative economic consequences. From a sociocultural point of view, it is also worth remembering that there is a kind of congruence in the resentment of Andean populations toward mining and their feelings of helplessness in the face of climate change—both are woes visited upon them by wealthy outsiders.¹⁷

According to Roca, the executing agencies for climate adaptation will be coordinated through a National Program for the Management of Climate Change (PRONAGCC) run as an interagency process (MEF, MINAM, Ministry of Foreign Affairs, and regional and local government representatives) under the prime minister’s office (PCM). The idea is to mainstream climate change into government policies. The MEF will provide funds to designated national authorities and regional and local governments, but they will be held accountable for identified benchmarks and measurable results. Ministries will be asked to map risks, develop a management plan, and produce an investment plan that incorporates public-

private partnerships wherever possible. Ministries and governments that achieve goals for sound environmental management will be rewarded by continued or additional funding. The country’s districts have been prioritized based on estimates of their present capacity.

The MEF is very aware, Roca said, of the potential for climate-related water conflicts. From the MEF’s point of view, the failure to price water is the main obstacle to its rational use. As he said, from an economic point of view, “it does have a price, like it or not.” The MEF also recognizes, however, that some conflict is inevitable in relation to water issues. First, in addition to the effects of climate change, as the country moves forward with economic development, there will be more pollution. Second, there are intercultural conflicts between the “two logics” of the central government in Lima and campesino communities in the Andean highlands. Dialogue and positive incentives based on tangible results are the mechanisms that are seen as bridges to overcome these conflicts.

How and whether this entire process will work in practice remains unclear. There would certainly appear to be many points of tension between MEF’s vision of central government planning for climate change and conflict based on risk management and market principles and the norms and priorities of MINAM and other regional and local authorities. Moreover, based on the research team’s observations during the course of this study, information flows from the center to lower levels of government tend to be weak at best, there is limited

capacity to implement those policies at lower levels of government, and there is considerable potential to aggravate existing fault lines with poorly applied policies. But whatever the outcome, the policy framework described by the MEF will heavily condition the implementation of all aspects of Peru's climate change policies.

A second strong influence on issues of climate change and conflict will be the way in which civil society participation and advocacy engages on these issues. Many of these interactions will be at the regional or local level, but Lima-based NGOs will have important exchanges with government at the national level that connect to and influence the other levels. Two NGOs with whom the field research team met exemplify two very different sides of the potential input from civil society organizations.

The Institute for the Promotion of Water Management (IPROGA) is a non-governmental public policy organization dedicated to research, training, and public-private dialogue in support of improved water management. In addition to its own professional staff, IPROGA has formal institutional linkages with a wide array of other well-regarded organizations (for example, TMI and AEDES are both members, among many others). Although IPROGA has conducted research on the theme of climate change and conflict, it has taken to date a circumspect approach to the issues, noting the relative absence of reliable empirical data on climate change. Instead, its primary focus has been on analysis of the social, institutional, and economic factors related to water conflict as well as providing

courses and training materials on integrated water resource management. However, IPROGA has done conflict mapping and intends to do further research on the linkages between climate change and water scarcity. In short, IPROGA is a civil society organization that has the potential to be a tremendous resource for governments, donors, and other stakeholders on climate-related conflict issues.

The Citizens' Movement on Climate Change (MOCICC) is an umbrella organization composed of over 50 organizations that include NGOs, educational institutions, and citizens' groups (REMURPE is an important member). Its profile is generally in line with that of citizen advocacy groups, and its members' activities and projects (generally not undertaken as MOCICC) address a wide array of climate change policy issues, from national and regional climate strategies to food security, land use, and the establishment of no-go zones in ecologically sensitive areas. MOCICC is especially interested in the effects of climate change and conflict in Amazonia, as well as the potential effects of sea level rise in Peru's coastal cities. While MOCICC's membership does not generally have the scientific or professional expertise of IPROGA, it involves a more diverse universe of stakeholders affected by climate change and conflict impacts. It would be easy to overlook MOCICC given its fairly weak level of organization and expertise, but that would be a mistake. As climate change effects increase in scope and intensity, it can be anticipated that MOCICC and other advocacy groups will become more vocal on climate change issues, and a track record

of dialogue with them is likely to be an important asset.

These two sides of engagement with civil society—expert policy input and diverse citizen participation—are important contributions if progress is to be made on issues of climate change and conflict. It is sometimes easier to include the former rather than the latter, but both are essential. This is especially true given Peru's still-evolving democratic institutions and the many institutional weaknesses identified throughout this report.

“From the MEF’s point of view, the failure to price water is the main obstacle to its rational use.”

KEY FINDINGS AND STRATEGIC CONSIDERATIONS

Based on field research in Lima, Ancash, and Arequipa, the following section briefly sets out some key findings and strategic considerations that the research team wishes to highlight for the attention of the USAID Mission to Peru. This provides the context and logic for the Recommendations that follow.

impacts of climate change, exacerbated by weak environmental governance and fragile state-society relationships in the areas studied.

These climate effects are exposing growing numbers of people to increasing environmental stresses and serious hardships, including threats to agricultural and pastoral livelihoods, lack of water for irrigation, degraded pastures, reduced productivity of highland crops and cattle, human health hazards and diseases, and natural disasters. These stresses and hardships add significantly to conflict potential all along the watersheds that extend from the highland paramos to the middle basin small producers and on to the lowland agro-export plantations dependent on abundant irrigation.

Although not addressed in this report, these effects will threaten the human security not only of communities in the Andean watersheds but also increasingly in the Amazonian regions and coastal urban areas (where there has been even less attention to understanding the threats from climate change).

However, there is a huge lack of empirical data about climate change at the level of Andean

“There is strong agreement, extensive oral testimony, and convincing evidence that highland areas of Peru are experiencing serious negative impacts from climate change, well beyond the more well-publicized risks of glacial melt....These stresses and hardships add significantly to conflict potential....”

KEY FINDINGS

There is strong agreement, extensive oral testimony, and convincing evidence that highland areas of Peru are experiencing serious negative impacts from climate change, well beyond the more well-publicized risks of glacial melt. While there is significant variation among specific micro-climates and micro-watersheds, the general effects include continuing glacier retreat, warmer temperatures, more erratic and intense weather events (droughts, rains, frosts), significant changes in seasonal precipitation patterns, deteriorating highland ecosystems, soil degradation and desertification, increasing water scarcity, water contamination (acid rock drainage), and more frequent natural hazards (floods, landslides, glacier lake outbursts). These are *long-term* climate trends that are not going to go away. Rather, the consensus projections are for the continuing and accumulating negative

river basins and watersheds. The collection and compilation of accurate hydrological data and downscaled climate data is urgently needed to facilitate the development of appropriate climate adaptation measures.

The Government of Peru is pursuing two logical and reasonable goals that are nevertheless certain to come into conflict: 1) the promotion of mining investments and 2) the promotion of sustainable development (i.e., environmental protection and social inclusion). For the foreseeable future, the mining boom will continue, and many citizens will protest the real and perceived environmental and social costs of mining, including hydrocarbons.

As long as international prices remain high, informal and illegal mining also will continue to expand, accompanied by a corresponding increase in environmental and social conflict.

These two trends—increasing climate change impacts and the ongoing expansion of extractive industries poorly regulated for social and environmental protection—will intersect in ways that make conflict, primarily conflicts over water resources, both more frequent and more volatile.

Because water is crucial to the well-being and basic daily needs of Peru's citizens as well as the requirements of the country's agricultural, mining, and energy sectors, competing stakeholder interests are producing conflicts over water scarcity related to quantity, quality and access that intertwine with other grievances (e.g., poverty, poor governance, social marginalization) that *increase* the chances of social

mobilization and physical confrontation.

Although less well recognized, including by government, issues of water quality and the contamination of water by toxic heavy metals also are potentially explosive. This is especially true because toxic heavy metals are produced by both mining processes and acid rock drainage resulting from glacier melt. The uncertainties and blurring about manmade versus "natural" causes are likely to lead to rumors and finger pointing that can easily trigger conflict in communities that have a tradition of mobilizing for collective action to seek redress for grievances.

Thus, although there are a variety of important problems presented by climate change, in relation to conflict the main (although not exclusive) problem is *water*. Climate change is not yet the dominant reason for water scarcity (inefficiency in water use in the agricultural sector is the leading factor) but it is a major contributor, and it is likely to steadily increase in importance in the coming years. Therefore, improved and participatory water management is both an important form of climate adaptation and one main pathway toward reducing the possibility of social conflict. (See Appendix III for a chart laying out some of the main dynamics and challenges in water management).

It is important to note that conflicts related to climate change can involve actors other than citizen groups, communities, and companies. There already have been significant inter-regional disputes (e.g., Arequipa-Moquegua and Arequipa-Cuzco), and these may be repeated elsewhere. Of a different nature,

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“There is considerable capacity in Andean communities for self organization to take further steps to not only increase resilience but also to institutionalize dialogue to reduce conflicts, climate-related and otherwise. In fact, joining the agendas of strengthening resilience and promoting conflict prevention would strengthen both.”

but also worth noting, are the many institutional conflicts about climate change and the respective competencies of differing levels of government (national, regional, local), as well as similar conflicts between and within government ministries and agencies.

The new institutional arrangements in Peru’s national, regional, and local governments (e.g., MINAM, ANA, ALA, Water Basin Councils, Environmental Councils, ARMA, Law of Prior Consultation, and the semi-autonomous *Defensorías*) are steps in the right direction, but they will require time, course corrections, and much better institutional coordination before they become fully effective. In the short term, they will be inadequate to their assigned tasks. A large body of literature suggests that conflict increases in incomplete or evolving democracies, and this may well be applicable to the handling of climate change in Peru.

Indeed, at present the clear trend is toward *increasing conflict* linked to the accumulating effects of climate change. The increasing water requirements of export agriculture and mining are at loggerheads with the reality of climate change trends. Some highland communities are headed toward ecological and economic crisis. Mining companies are moving their operations into lower altitudes, where they encroach upon fragile ecosystems crucial to larger and more numerous communities. In this context, a proliferation of local social explosions, whose cumulative effects could have ramifications for national stability, is entirely possible.

Although difficult to quantify, the economic costs of climate change in Peru are almost certainly going to be very large.¹⁸ Estimating the costs of conflict associated with climate change is more problematic. However, if the added stresses on Peru’s hydrological systems caused by climate change lead to increased conflict with extractive industries and the withdrawal of some portion of the billions of dollars anticipated in investments in the near to medium term, the economic impact could be enormous.

Despite these alarming but plausible scenarios, there are emerging opportunities and a variety of bright spots to build on, including the ongoing work on climate adaptation by the Mission’s existing partners in Ancash and Arequipa. There is considerable capacity in Andean communities for self-organization to take further steps to not only increase resilience but also to institutionalize dialogue to reduce conflicts, climate-related and otherwise. In fact, joining the agendas of strengthening resilience and promoting conflict prevention would strengthen both. Field interviews also identified a number of new (or reinvigorated) governmental and non-governmental institutions and organizations staffed with well-informed and committed personnel keen to collaborate on issues of climate change and conflict. There clearly are new partnerships that can be forged to promote conflict prevention and conflict mitigation.

STRATEGIC CONSIDERATIONS

The Mission's current programming does not address climate change and conflict, although climate-related conflict has the clear potential to negatively impact the Mission's democracy and governance initiatives and support for economic growth.

Because of the linkages of climate-related conflict to other political, economic, social, and institutional issues explained at length in this report, climate adaptation efforts are important and necessary but not sufficient to address climate-related conflict.

In the team's judgment, for all of the reasons cited above, the Mission will shortly face a classic choice of "getting ahead of the curve" on climate-conflict issues or taking a "fire brigade" approach to these conflict issues as they arise, probably in a much less tractable form.

That being said, it also is the team's judgment that it is neither necessary nor advisable to make large Mission investments in new initiatives to explicitly address climate-conflict linkages (which are inherently cross-sectoral and complex, lending themselves to multiple entry points). Rather, a window of opportunity exists to build on the Mission's existing work in various sectors to engage constructively in a number of areas at a relatively low cost and to use that as a learning experience to build the Mission's capacity to deal with a set of issues that are very likely to be part of the Mission's operating environment for a long time to come.

The main decision for the Mission is whether to establish a process of engagement on climate change and conflict issues because of their likely impact and the probability that they will increase in significance over the near to medium term. This comes down to a focus on two key sets of issues: 1) how to explicitly enhance conflict sensitivity (e.g. minimize negative impacts and maximize positive ones for peace and security) of existing programs, especially those related to the climate adaptation agenda; and 2) where to prioritize climate-related investments that will explicitly attempt to prevent or minimize conflict.

It should be noted that this will include consideration of a set of climate change and conflict challenges in the Amazon that are quite different from the Andes but similarly complex and consequential, especially given the Amazonian focus of the Mission's country plan for the next five years.

RECOMMENDATIONS

Based on the findings of this report, there are six key areas for the Mission to consider where USAID can take actions that will help to reduce the potential for conflict linked to climate change in the Andean highlands and watersheds of Peru:

I. Foster leadership on the issue of climate change and conflict, recognizing it as a long-term challenge that will affect overall development goals and outcomes:

- Introduce the Mission's attention to the issue of climate change and conflict through a roundtable or workshop that brings together and solicits the ideas and participation of key representatives from government and non-governmental organizations for whom this is an important issue. A summary version of this report could serve as a background document.
- Form a core working group or steering committee from the initial workshop to develop and announce a series of regularly scheduled meetings on climate-conflict issues to be held at venues identified or sponsored by the

participants. The purpose of these meetings should be to identify actions in the climate-environment area in support of conflict prevention, management, and mitigation.

II. Build on the climate change work of two strong partners, The Mountain Institute (TMI) and the Asociación Especializada para el Desarrollo Sostenible (AEDES), by adding conflict objectives to their scope of work:

- Encourage and support work by TMI and AEDES to map and analyze the causes of conflict in the areas where they are working on climate change issues. This should include "bright spot" partnerships of the type described in the following section and should consider the development of conflict training for their staff and interested stakeholders.
- Continue to encourage and support TMI's work with the Foro Agua Santa in Ancash as a promising model of stakeholder involvement in integrated water basin management.

- Encourage and support TMI and AEDES to hold regional workshops on climate change issues that actively bring together competing stakeholders and perspectives and solicit the ideas and participation of local representatives from government, communities, and non-governmental organizations for whom this is an important issue and with whom communities will need to work constructively to solve climate change challenges.

- Encourage and support the development of a core working group or steering committee from each of these regional workshops to identify actions in support of conflict prevention, management, and mitigation.

III. Through both the Mission in Lima and TMI's and AEDES's respective presences in Ancash and Arequipa, encourage and support collaborative working relationships among institutional and organizational "bright spots" of the sort identified in this report:

- Develop appropriate mechanisms for collaboration with the Ombudsman’s Office and encourage and support the coding of conflicts for linkages to climate change (and possibly the development of a climate-conflict checklist) by the Ombudsman’s office in Lima.
- Working with TMI, encourage and support the mapping and analysis of the causes of environment-related conflict by the Huascarán National Park (PNH) and the Ombudsman’s office in Huaraz in order to determine where climate change adaptation interventions might serve dual purposes.
- Working with AEDES, encourage and support the mapping and analysis of the causes of climate-related conflict by the Ombudsman’s office in Arequipa.

IV. Make improved water management a central focus of the Mission’s efforts to address both climate change and conflict:

- Through the Mission and TMI and AEDES, encourage and support discussions and initiatives to advance integrated watershed management in

the Andes. This could include stakeholder workshops or community-based initiatives specifically focused on this topic in Lima, Huaraz, or Arequipa. Appendix III provides elements of a possible agenda.

- Through TMI and capacity building with local government, encourage and support discussions and initiatives to address the looming and highly conflictive problem of water quality (toxic heavy metals caused by either mining or climate change) in the Santa River Basin.
- Through AEDES, encourage and support discussions and initiatives to address the highly conflictive problem of water conflicts and related problems caused by the rapidly expanding informal, illegal mining sector.
- Through TMI and AEDES, encourage and support discussions and initiatives to address improved water management as a means of promoting disaster risk reduction.

V. Collaborate with ongoing efforts of other organizations and donors to advance and disseminate scientific knowledge of climate change in the Peruvian Andes:

- Collaborate to increase awareness and help in the dissemination of climate change data and research findings produced by the Andean Community (CAN, represented by CONDESAN in Lima) and other organizations such as IPROGA, PUCP, and UNASAM.
- Consider sponsoring training for journalists working in both print and electronic media on the current state of knowledge about climate change in the Peruvian Andes, with a special focus on linkages to conflict and the need for conflict sensitivity in reporting.

VI. Expand the Mission’s expertise to include understanding of emerging climate change and conflict issues in the Amazonian regions of Peru:

- Working with USAID/CMM, develop next steps to conduct a study on climate change and conflict in the Amazonian regions that are the principal geographic focus of the Mission’s work over the next five years.

Endnotes

1. As the dependent variable and central concern of this study, “conflict” refers in its strongest sense to widespread, deadly violence. However, conflict management and mitigation requires attention to the precursors of violent conflict, including the emergence of group grievances, the organization of the material and social capacity for collective action (mobilization), and the impact of triggering events. In that larger context, the term “conflict” is often used here in the looser sense of opposing interests that give rise to social and political tensions and protests.
2. According to the IPCC, “climate change refers to a change in the state of the climate that can be identified...by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer” (IPCC 2007).
3. See endnote 1 above.
4. The full report can be found at http://www.fess-global.org/Publications/Other/Climate_Change_and_Conflic_%20in_Uganda.pdf.
5. The full report can be found at http://www.fess-global.org/Publications/Other/Climate_Change_and_Conflic_%20in_Ethiopia.pdf.
6. The report does not cover climate-conflict relationships in the Amazonian regions of Peru, nor does it address climate change and conflict in the country’s more heavily populated urban areas and coastal zones. These relationships are likely to be consequential and are deserving of separate study.
7. In 1997, when Secretary of State Madeleine Albright released the first U.S. State Department list of Foreign Terrorist Organizations, the Shining Path was included.
8. Obviously, each of these identity group clusters can be further disaggregated into a number of other socioeconomic and sociocultural subgroups with relevant characteristics and distinctive interests and concerns.
9. Social and environmental conflicts also are tracked by units within such national and regional bodies as the National Water Authority (ANA), the Ministry of the Environment (MINAM), and the Arequipa Regional Environmental Authority (ARMA). Some interviewees felt that the *Defensoría*’s estimate of socio-environmental conflicts understates their true numbers and significance because of its criteria involving minimum levels of stakeholder mobilization. These observers argued that better information about early stage or latent conflicts could serve an important early warning function.
10. According to Magdalena Guimac of the Institute for the Promotion of Water Management (IPROGA), who coordinates projects related to the monitoring of water conflicts, the Ombudsman’s monthly reports also miss or do not include many water conflicts.
11. The Prime Minister is the President of the Council of Ministers, and his office is referred to as the Presidency of the Council of Ministers or PCM.
12. The lack of effective coordination and cooperation between national and regional institutions with resource-related responsibilities was a theme heard on numerous occasions by the research team during the field study.
13. According to a number of interviewees, CEPLAN itself has been a very weak institution in recent years, a situation that the Humala government is trying to rectify. The salient point in this context is that planning in relation to natural disasters is just one of many strategic planning challenges faced by CEPLAN.
14. The Conga project is an extension of Yanacocha, the largest gold mine in Latin America. The U.S. firm Newmont Mining Corporation is the majority owner of the project, which would affect four high-altitude lakes and entail the construction of reservoirs. Protestors asserted that the project would severely deplete water resources and create pollution that would harm agriculture. In December 2011, in view of the protests and complaints about the inadequacy of the environmental impact assessment (including the resignation of the deputy environment minister), President Humala declared a 60-day state of emergency in the provinces of Cajamarca, Celendin, Hualgayoc, and Contumaza.
15. For example, according to David Ocaña, Ancash Region Coordinator for CARE, the Swiss Agency for Development and Cooperation (SDC), known as COSUDE in Spanish, has financed a disaster risk reduction project to use tunnels in one glacier lake to reduce the risks posed by impact waves of ice and rock avalanches.
16. For example, the Global Water Partnership, which is comprised of development agencies, governments, NGOs, and research organizations in 161 countries, states that “integrated water resources management is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.”
17. The heads of the Water Users Boards in both the Callejón de Huaylas and Chuquibamba posed the same question to the field research team: “This is a global problem caused by the industrial countries... What are they doing about it?”
18. By way of very rough comparison, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) estimates that the costs of “extreme events associated with climate change” in Ecuador, a smaller neighboring Andean country with half the population, will be in the vicinity of \$413 million annually by the year 2050, exclusive of the loss of biodiversity and ecosystems (UNECLAC 2009).

RESOURCES

APPENDIX I: CLIMATE CHANGE AND CONFLICT ASSESSMENT FRAMEWORK (CCCAF)

Phase I: Identification of Country Study Areas

Through official documents, secondary literature, and expert interviews, develop a list of subnational regions or communities in conflict-prone areas that have experienced extreme climate variability (e.g., droughts, floods, unseasonal temperature fluctuations).

Where possible, identify instances of conflict within these areas that may have had direct or indirect linkages to climate variability.

Phase II: Profile of the Study Areas

Analyze the linkages among economic, social, and environmental factors through the collection of qualitative baseline and trend data (include quantitative data, when available). Information collection will be guided by the Qualitative Profile, which follows Phase VII below.

Compile background information on the areas' weather and climate patterns and predicted future changes in climate.

Develop a preliminary assessment of potential political, economic, social, cultural, and historical cleavages that may contribute to instability or conflict.

Develop a preliminary assessment of the governance capacity and resiliency mechanisms of existing political, economic, social, and cultural institutions.

Identify the key concerns, grievances, and tensions that may be present. The profile should focus on the local unit of analysis but incorporate national, regional, and international influences.

Phase III: Analysis of Critical Climate Change Concerns

Identify which underlying issues, sectors, and resources potentially influenced by climate change are critical to stability. How are they critical? Who is affected when these are threatened? Who is affected when these are well managed? What have been and what could be the potential consequences?

Assess the impact of governance, with special attention to environmental governance,¹ on the identified issues, sectors, and resources. What mitigating or exacerbating role does it play?

1. Environmental governance is defined as the traditions and institutions by which power, responsibility, and authority over natural resources are exercised.

Phase IV: Assess the Impact of Climate-Related Events

Confirm with selected communities the nature and characteristics of a specific climate-related event or specific period of climate variability.

Investigate the responses applied to the recent climate-related event in the study areas. What range of response options did affected people and communities consider? What responses were applied? Who did affected people and communities reach out to for help? Were resilience-building strategies used? What were the results of those strategies?

What role did social, human, physical, financial, and natural capital assets play in exacerbating the potential for conflict or mitigating conflict/building resilience?

Assess why results were linked to improved resilience versus conflict potential. How did core grievances and social/institutional resilience play a role?

Phase V: Perspectives of the Affected Populations and Communities

Identify stakeholders interested in and affected by the climate-related event(s).

Collect information about the stakeholders' concerns, core grievances, and points of conflict; degree affected by the climate-related event(s); their response capacity; their perceptions of the social and institutional responses to the climate-related event(s); the means and resources for violent conflict; and the social, human, physical, financial, and natural capital assets that mitigated or prevented conflict.

Seek to identify the indicators of resilience versus conflict potential and the indicators of vulnerability to conflict.

Phase VI: Generate Future Scenarios

Develop scenarios based on the potential impact of similar climate-related events on the affected people or communities based on predicted future climate change patterns. What might be windows of vulnerability and opportunity?

Phase VII: Complete Final Report

Identify lessons learned, best practices, programmatic gaps, and target areas and opportunities to improve the provision and coordination of interventions that can address climate change and climate-related conflicts in vulnerable regions or communities.

Provide a comprehensive assessment of the case study areas that explains the impacts of climate variability, core grievances and drivers of conflict, mitigating factors and windows of opportunity, projected future climate vulnerability, and the links between climate change and potential conflict or climate change and adaptive resilience.

Incorporate scenarios that suggest areas of future vulnerability to conflict and recommend potential ways in which international development assistance could make a positive contribution toward filling current programmatic gaps. The primary focus of recommendations will be on approaches and responses that are within USAID's manageable interest. This will include mapping existing Mission and Agency programs and priorities against potential climate-related causes of conflict in order to identify gaps and possible areas of intervention.

A broader set of recommendations for local, national, and international stakeholders in government, civil society, and the private sector will be included in an expanded and publicly available version of the report.

QUALITATIVE PROFILE

[Enviro-Sustainability Profile](#)

Land and Agriculture

What is the size of the land area under study?

Approximately what percentage is employed for agriculture?

What kind and level of inputs are used by farmers, if any (e.g., irrigation, fertilizer, pesticides)?

What is known and what is perceived by the inhabitants about the degree of land degradation?

What is the type of land on which people are farming (hilly, flat, forested) and what techniques are they using?

What is the average size of farming plots?

What is the state of land tenure (practices and ownership) including differences between men and women, and what is the general predicted trend for land ownership rights and plot sizes in the future?

What are some of the challenges with respect to soil conditions (e.g., erosion, salinization, and desertification)?

Is climate change contributing to land degradation? If so, how?

Land and Forests

To what extent is the area forested?

What is the historical and future trend of forested areas in the area under study?

Is there a high or low rate of dependency on fuel wood or biomass?

Is climate change a factor in the condition and sustainability of forested areas?

Water Sources and Availability

Where do the communities receive water from (e.g., well, collection, pipe)?

Are there any sustainability concerns in relation to water withdrawal?

Will current water withdrawal practices be affected by climate change? If so, how?

Water Use

What are the primary uses of water (e.g., agriculture, domestic, industrial, hydropower diversion)?

Which uses withdraw the most water?

Are there any planned projects, changes in population, or other factors that might change the current water usage?

Water Quality

How do communities and health officials perceive the quality of water?

Is it known to be relatively clean or contaminated?

If polluted, what are the sources/causes?

What water-borne diseases are endemic to the area?

How will climate change affect water quality?

Energy

What sources of energy are used and at what levels (e.g., biomass, hydroelectric, fossil fuels, biofuels, solar)?

Where do the energy sources originate from (e.g., local forest or ground cover, public or private electricity agency)?

What sectors consume the most energy (e.g., household, agriculture, industry, transportation)?

Is climate change affecting current or future sources of energy?

Is climate change anticipated to change energy demand in the study area?

Natural Hazards

Are there local or national authorities responsible for monitoring and responding to hazards (e.g., earthquakes, droughts, floods)? What is their response capacity?

What are the most serious natural hazards likely to occur in the area under study?

How frequently do natural hazards occur and what is their average level of intensity?

How prepared are communities to respond to a hazard event?

Is climate change contributing to the frequency or severity of natural hazards?

[Econo-Environmental Profile](#)

General Economic Indicators

What is the estimated level of income for the average family in the area under study?

Is the area's income more, less, or similar to the country's GNI or GDP per capita?

Is the region experiencing economic growth, stagnation, or loss?

What is the level of employment/unemployment?

Is the informal sector critical to livelihoods?

What factors are contributing to economic stability or instability?

Sectoral Breakdown

What economic sectors employ people and what is their relative importance to the local economy (e.g., agriculture, mining, manufacturing, construction, trade, public administration)?

To what extent are key economic sectors of the economy susceptible to climate change (positive or negative)?

What economic roles do women play in the economy versus men?

Are certain economic sectors dominated by specific ethnic groups?

Do divisions of labor result in instability or tensions?

Are there economic opportunities for youths?

If not, do they remain without jobs, migrate, etc.?

Does the area produce any important exports for the country?

To what extent are these exports providing stability to the local economy?

How critical is the natural resource base to any export sector?

Socio-Environmental Profile

Livelihoods

What is the estimated total population of the area?

How rural versus urban is the area under study?

Is the population growing, decreasing, or remaining stable?

Are there obvious forces affecting the demographic profile (e.g., migration, health, economic decline, conflict)?

What is the relationship between arable land and historical, current, and future population?

What is the age distribution of the population?

What ethnic or tribal groups live in the area?

Is there a history of grievance among these groups?

Are there internally displaced persons or refugees inhabiting the region?

In what numbers and from where?

What is the prevalence of female-headed households?

Education

What is the literacy rate for the area and to what extent is it functional?

What is the level of primary and secondary enrollment?

What are the differences by gender for literacy and enrollment rates?

How many teachers work in the area under study, serving how many students?

How does the area compare in relation to the country as a whole?

Food Security

Is the area known for chronic or severe undernourishment and periodic food shortages?

How does the area compare to the country as a whole?

What are the primary items of consumption (e.g., cereals, fruits, vegetables, meats, other)?

Has this changed recently?

What food items are grown locally?

Does the area have access to markets where local or regional food products are sold and traded?

Does the community or do individual households have a food reserve?

Is climate change affecting food security?

Health

What health care facilities does the area under study have access to?

How easy is it to reach a doctor or health center?

What are the primary diseases endemic to the area (e.g., malaria, cholera, TB)?

To what extent is HIV/AIDS prevalence a concern, and what is the general level of awareness?

How does access to health care compare with the rest of the country?

Do inhabitants have access to an improved water source?

Are there any sanitation facilities in the area?

Are changes in the climate contributing to new health problems or exacerbating the prevalence of existing diseases?

APPENDIX II: LIST OF PERSONS AND ORGANIZATIONS CONSULTED

Government of Peru

Victor Caballero
Chief, Office of Social Conflict Management
Presidency of the Council of Ministers (PCM), Prime
Minister's Office

Eduardo Durand
Director, Office of Cooperation and International
Negotiation
Ministry of the Environment (MINAM)

Rosa Morales
Director General, Climate Change, Desertification,
and Water Resources
Ministry of the Environment (MINAM)

Other Climate Change Staff
Specialists in REDD, Adaptation, and CDM
Ministry of the Environment (MINAM)

Ing. Oscar Felipe
Hydrology Engineer
National Meteorology and Hydrology Service
(SENAMHI)

Ing. Juan Arboleda
Hydrology Engineer
National Meteorology and Hydrology Service
(SENAMHI)

Iván Lanegra
Associate Defender for the Environment, Public
Services, and Indigenous People
Ombudsman's Office of Peru

Rolando Luque
Associate Defender for the Prevention of Social
Conflict and for Governability
Ombudsman's Office of Peru

Aurora Riva Patrón
Chief, Office of Strategic Development, International
Cooperation and Investments
Ombudsman's Office of Peru

Editha Mariela Rodríguez
Chief, Ombudsman's Office
Ancash Region

Representatives of the Municipal Government
Municipality of Carhauz, Ancash

Aníbal Díaz
Manager
Regional Environmental Authority of Arequipa
(ARMA)

Gladys Márquez
Conflict Specialist
Regional Environmental Authority of Arequipa
(ARMA)

Carlos Vargas
Appointee to Direct the Water Institute
Regional Government of Arequipa

Miguel Angel Manchego
Mayor, Condesuyos Province
Arequipa

Mario Eduardo Mena
Mayor, Caylloma District
Condesuyos Province
Arequipa

Bernardo Carrazco
Mayor, Andaray District
Condesuyos Province
Arequipa

Tomas Wuile Ayñayanque
Mayor, Chichas District
Condesuyos Province
Arequipa

James Casquino
Mayor, Tanaquihua District
Condesuyos Province
Arequipa

Rufina Manchego
Mayor, Iray District
Condesuyos Province

Angel Ybarhuen
District Mayor
Condesuyos Province
Arequipa

Fermin Llerena
Mayor, Salamanca District
Condesuyos Province
Arequipa

Jose Luis Carbajal
Director General
Office of Social Management
Ministry of Energy and Mines (MEM)

Jorge Baitez
Director Water Resources, Conservation, and
Planning
National Water Authority (ANA)

Estrella Asenjo
Advisor to the General Secretary
National Water Authority (ANA)

Marta de Guadalupe Masana
Head of Risk Evaluation Studies Unit
National Institute of Civil Defense of Peru (INDECI)

Col. Rafael Campos
Advisor
National Institute of Civil Defense of Peru (INDECI)

Javier Roca Fabián
Director General
International Economic Affairs, Competition, and
Productivity
Ministry of Economy and Finance (MEF)

Civil Society Organizations in Peru

Juan Luis Dammert
Coordinator, Citizenship and Socio- Environmental
Issues
Environmental Rights Society of Peru

Ricardo Villanueva
Chief of Huascarán National Park
Huascarán National Park

Fidel Rodríguez
Municipalities Program
The Mountain Institute

Jorge Recharte
Director, Andean Project
The Mountain Institute

María Teresa Becerra
Responsible for Environmental Area
National Andean Community (CAN)

Dr. Karen Kraft and Staff
Executive Director
Association Specializing in Sustainable Development
(AEDES)

Víctor Sánchez
President
Citizens Movement on Climate Change (MOCICC)

Representative
Solidarity Forum Peru

Gaudencio Villavicencio
President, Water Users Board
Callejón de Huaylas
Junta de Usuarios del Callejón de Huaylas

Dante Cruz
Program Manager
ProParticipación
Ancash Region

Cesar Portocarrero
Former Head of Glaciology Unit
Ancash Region

Donors and Implementers

Bruce Abrams
Chief, Democratic Initiatives Office
USAID Peru

Martin McLaughlin
Economic Growth and Environment (EGE)
USAID Peru

Fernando Chávez
Economic Growth and Environment (EGE)
USAID Peru

Claudia Rohrhirsch
Program Manager, Democratic Initiatives Office
USAID Peru

Cornelia Scholvin-Virreira
Conflict Transformation
Advisor, GIZ
Institute for the Promotion of Water Development
(IPROGA)

Magdalena Guimac
Water Governance Project Coordinator
Institute for the Promotion of Water Management
(IPROGA)

José Luis López Follegati
Advisor
CARE Peru

David Ocaña
Coordinador Departamental Ancash
CARE Peru

Carlos Monge
Revenue Watch Institute, Latin America Regional
Coordinator
Revenue Watch/Propuesta Ciudadana

Private Sector

Jaime Gálvez Delgado
Manager
Antamina Mining Fund

Academics

Jorge Yamamoto
Professor and Social Researcher
Catholic University of Peru (PUCP)

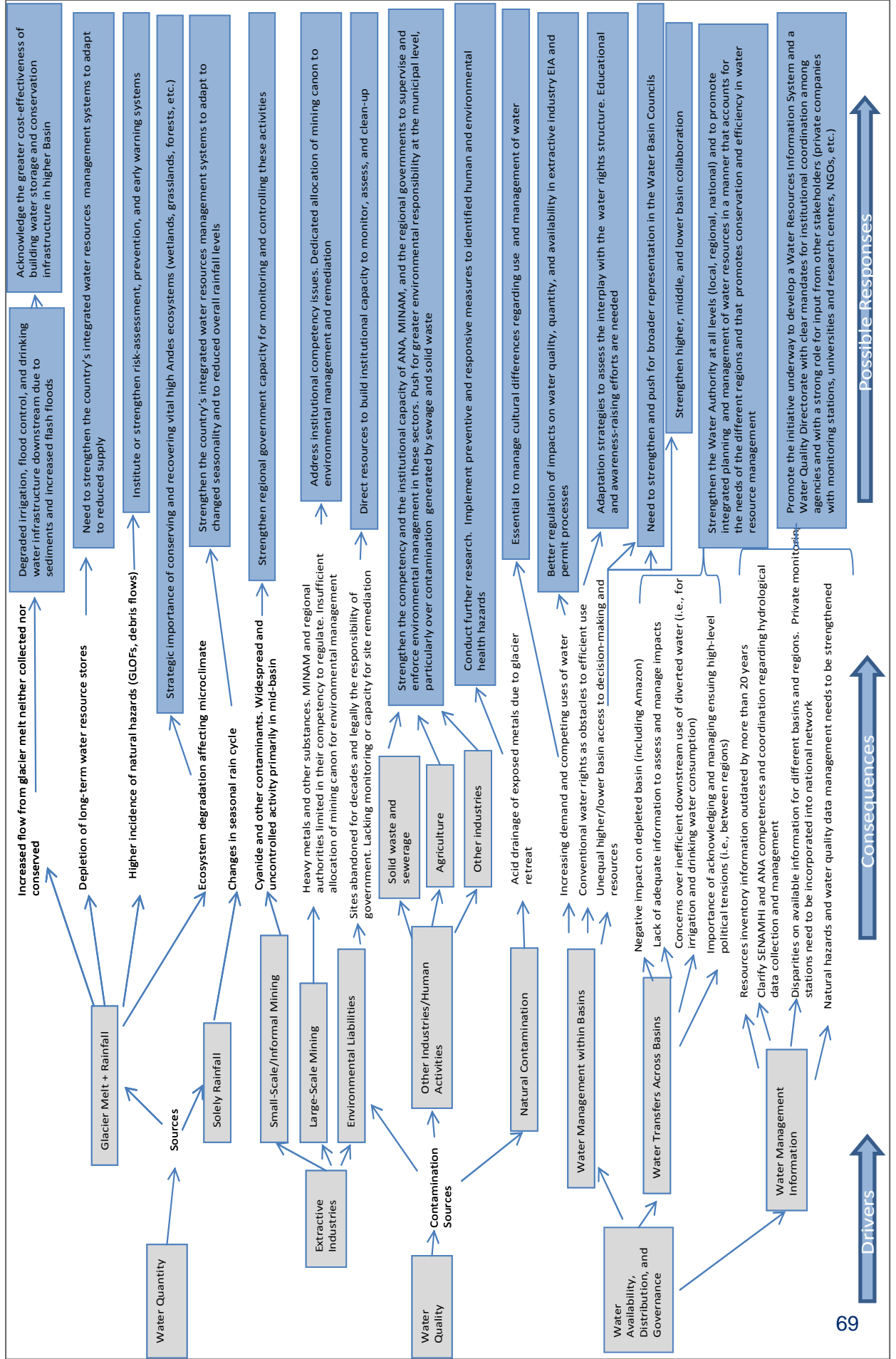
Edwin Julio Palomino
Dean, Faculty of Environmental Sciences
National University of Santiago Atúnez de Mayolo
(UNASAM)

Community Consultations

Mayors and approximately 40 Community Leaders
Chuquibamba, Condesuyos Province
Arequipa

Community President and Two Community Leaders
Canrey Chico, Ancash

APPENDIX III: CLIMATE CHANGE AND CONFLICT: THINKING ABOUT WATER MANAGEMENT ISSUES



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