



Event Summary

Climate Change and Vulnerable Watersheds in the Andes:

A Decision-makers' Discussion on Governance and Institutional Capacity

May 21, 2015
Lima, Peru

Peru is highly vulnerable to climate change, with its impressive biodiversity making it susceptible to a range of climate impacts including glacial melt, droughts, and flooding. Water resources are particularly at risk, both for mountain communities engaging in traditional agriculture and for urban centers reliant on distant sources for their water needs. Since the 1970s glaciers in the Peruvian Andes have lost 40 percent of their surface area, and the loss is occurring at an accelerating rate. Glacial retreat leads to cascading effects downstream (on soil and water quality and loss of tourism); and overall effects of climate change, such as changes in rainfall patterns, are causing abrupt changes all over the country.

On May 21, 2015, the seventh seminar of the Wilson Center-USAID Climate Change Adaptation Series was held in Lima, Peru. The seminar, by bringing together diverse stakeholders in the climate discussion already underway in the country, aimed to improve governance and institutional capacity surrounding climate change adaptation at the municipal, regional, and national level. Within this frame, water resources management, green infrastructure, ecosystems management, population dynamics, and current



Peruvian adaptation initiatives (both local and national) were highlighted.

International Perspectives: Water Resources Challenges in Arid Cities

Following opening remarks by the Wilson Center’s Cynthia Arnson and USAID/Peru’s Ted Gehr, the first session featured three presenters from Los Angeles, California, offering a somewhat parallel and informative case for Lima in terms of urbanization, water resources, innovative infrastructure, and climate change adaptation. *Hadley Arnold*, Director of the Arid Lands Institute at Woodbury University in Burbank, California, presented on “Designing Sponge Cities”—creating innovative designs for urban areas which take into account limited water supplies. She emphasized the powerful climate adaptive capacity of design. The cases of Los Angeles and Lima, Arnold pointed out, have much in common. With a changing global water cycle due to climate change, already arid zones are getting dryer, while wet locations get wetter. Arid locations such as Los Angeles and Lima are experiencing more severe water stress, longer drought periods, and infrequent but intense rainfall. Both L.A. and Lima depend on water that comes from mountain sources (snowmelt and glaciers), which have been rapidly diminishing over the past decades. For example, the snowpack in the watershed serving Los Angeles is currently at 8 percent of its long-term average. Arnold also discussed the link between water resources and energy, a relationship that runs in both directions: hydroelectric power sources are diminished when reservoirs are too low, and many sources require a great deal of energy to transport water to end users. As much as 20 percent of the Los Angeles area’s energy is used to deliver water and 30 percent of the water supply is used by the energy sector. For all of these reasons, Arnold emphasized the need for cities such as Los Angeles and Lima to make the most of their water resources through designs that conserve water, recover “grey” water (gently used water that has not come in contact with sewage), and capture storm water. Addressing water resource challenges requires a multidisciplinary approach to urban planning that includes incentives for conservation, streamlines governance, and dissolves traditional policymaking silos.

Deborah Weintraub, Deputy City Engineer for the City of Los Angeles, discussed the “Infrastructure of Green Urbanism.” Also focusing on the city of Los Angeles as an example of a complex, arid city, Weintraub focused on the need to improve the city’s ability to adapt to a changing climate with better water use practices and drought resilience. Weintraub first explained the complexities of geography and governance in the city—Los Angeles County contains 88 municipalities, with some services provided by

the county, with others handled at the municipal level. Historically, the city had a problem not only with periodic drought but also with flooding, leading to the diverting of the Los Angeles River into concrete channels, a key element of infrastructure that enabled the development of modern Los Angeles. In light of the city's current need to create a more reliable local water supply, engineers are now reconsidering the Los Angeles River and the vast amount of usable water it currently flushes into the ocean. Local water capture from the river and from treated wastewater could help lessen the city's dependence on water imported from the state's drought-stricken interior. Over past decades, although the population of the city has grown, its water use has remained fairly stable, thanks to education and technologies like low-flow toilets, but there is still a long way to go to make the city's water use sustainable. Weintraub shared some of the city's recent plans to further decrease water use and increase quality: the Integrated Resources Plan for Water begun in 2006, and One Water L.A., a plan focused on further integrating the issues of water supply, treatment, and quality to increase resilience to climate change, including improving infrastructure and integrating related efforts of city departments for sanitation, water, and power. Local solutions to increasing conservation are an important part of the state's overall effort to reduce water consumption by 20 percent. Some specific projects include the construction of cisterns and infiltration galleries to manage flooding, capture storm water, and reducing the need for urban irrigation with the use of drought-tolerant vegetation. Efforts to "unpave" parts of the city, including areas of the Los Angeles River, are also underway as a method to reduce runoff and improve groundwater recharge. Revitalization of greenspaces in the city is being undertaken with water resources in mind; for example, the revitalization of Echo Lake Park includes wetlands areas to naturally filter water along with other systems to improve water quality. Many of the infrastructure projects will have added benefits for the community, such as new recreation spaces, but will require community support to succeed over the long term.

Peter Arnold, Research Director for the Arid Lands Institute, presented the "Drylands' Resilience Initiative: A New Tool for City Design in Drylands," in particular, the importance of HAZEL, a "21st century divining instrument." HAZEL is a highly accurate and dynamic geospatial model that can survey a vast range of land, and, using a multi-criteria approach, help enable decision making to replenish groundwater resources. It considers soil type, infiltration capacity and constrains, and storm water runoff of the territory examined. HAZEL can be used to integrate metrics and draft site specific proposals and scenarios for better water management. Arnold described how HAZEL can be an important decision-making tool for dry cities in the face of climate uncertainty, complex land use, and

limited budgets. Using the right tools, Arnold argued, can allow for strategically placed investments, reduce the amount of energy needed (and greenhouse gases produced) to pump and transport water, and save money. He also emphasized the need for good water management to be integrated with public policy decision making at all levels. This means in practice: considering hydrologic characteristics for zoning; considering how watersheds work across boundaries; making changes to building codes to incorporate water harvesting elements; and improving collaboration between planners and local government on water issues.

The three international experts engaged in a dynamic discussion with the audience, which included representatives from municipal and regional governments in Peru, representatives of government ministries such as the Ministerio de Economía y Finanzas and the Ministerio del Ambiente, civil society groups, international conservation organizations, and development organizations. Among the topics discussed were:

- **How to finance adaptation measures?** Suggestions included bond measures and taxes, and innovative approaches to funding (as in the technology sphere). Participants also noted the importance of building public support for a culture of adaptation.
- **Adaptation for watersheds outside urban areas.** Recognizing that agriculture is a heavy user of water resources, the issue of water rights and water usage can be a difficult subject politically. While downstream users (often in urban areas) benefit from upstream conservation, there are currently few incentives in place to encourage upstream users to consume fewer water resources. Especially for large-scale agriculture, data collection and technology can help ensure more efficient water use, and conservation.
- **The decision-making process among stakeholders.** Key terms such as adaptation need to become part of normal conversation among planners, in the same way that awareness of the need for “sustainability” has become common. The issue of climate change gains greater attention in light of disasters and extreme conditions (such as the drought in California), but adaptation needs to become a more embedded aspect of long-term planning. As with any topic, policymakers will need access to concise information and recommendations.
- **Why has the United States been so slow to take action on climate change,**

when it has access to sophisticated technology and economic resources?

Panelists cited a history of cheap fossil fuels and the deep cultural affinity for having green lawns and landscapes throughout the United States. The American West is incompatible with the green landscapers of the East, and the public (especially in arid zones) must begin to embrace “brown is beautiful.” Although it is difficult to change long-held perceptions and habits, the impacts of climate change are spurring people to adapt.

- **Impact of political structures on adaptation.** In many areas, the structure and timing of local government elections can impact the continuity of projects.
- **A right to water?** Although water is seen as a right by many in the United States (and elsewhere), it is a utility—infrastructure, management, and energy are needed to bring potable water to the tap. Although water services are publically managed, there are ways to integrate new technology and private investment into service provision.
- **How to engage the public and meet conservation goals?** Engagement with the public should take place on multiple fronts and include use of media (television, print, and social) to offer information about conservation goals and their necessity. Social media has been used to “name and shame” individuals who violate restrictions. Education is also an important tool, including education for residential uses about their resource use and ways they can conserve. For example, 60 percent of urban water use is for landscaping; this in an area that can be greatly reduced.

National Perspectives: Vulnerable Watersheds in Peru

Following the comparative and international perspectives, the remainder of the conference featured Peruvians who offered a broad perspective on the climate change adaptation challenges and initiatives in their own country. Peruvian experts highlighted the ways that the country’s diverse ecology is affected by climate change and pointed out the variety of water management issues across the country. In addition to national experts, the conference featured officials from Piura who shared their local and regional experience with decision makers in Lima.

Víctor Guevara, Director General for the Directorate of Construction, Sanitation Policy,

and Regulation of the Ministry of Construction, Sanitation, and Housing (Vivienda), emphasized that many of the problems brought to the forefront by climate change are systemic and require long-term solutions, such as improving the quality and coverage of services. Guevara recognized that urban and rural zones face very different challenges but that addressing them will require good infrastructure and institutional capacity. Water and energy needs often go hand-in-hand, and conserving both requires a combination of sustainable construction, practical policies, and changes in public attitudes. In addition to strengthening institutional capacity and providing better access to water services for both urban and rural Peruvians, the relations between upstream and downstream users need to be strengthened, along with a greater sense of connection between the city and the watershed that provides its water. Water treatment and sanitation services can also play an important role in managing water resources. Capturing more grey water for re-use can reduce the stress on water resources. In addition, water service fees can be used to promote better conservation upstream, by providing users payments for ecosystems services (including conservation activities) in rural zones. Pilot projects in assessing fees for ecosystems' services are already underway in Peru, and could be scaled up and used to inspire similar programs in other locations.

Miguel Saravia, Executive Director for the Andean Ecoregion Consortium for Sustainable Development (CONDESAN), spoke about the need for integrated watershed management to provide for water and food security in Peru and around the world. Saravia stated that despite the challenges of climate change, it is possible to meet water needs into the next century, but this will require more efficient use of and more equitable access to water resources. Throughout history, humans have adapted to their environment—Saravia cited the terraced agriculture of the Incas in Peru—and adaptation will remain key to meeting needs in the face of a changing climate. He focused on the key strategic importance of watersheds and their ecosystems for water, food, and energy resources, as well as for tourism which provides economic benefits. Ecosystems must be valued both as natural and human resources. This is particularly important in Peru in light of the fact that the Andes are the most populated mountains in the world. The social impacts of watershed and ecosystems management policies on mountain communities with strong ties to the land are important to consider, especially since these historically isolated communities are often left out of higher level decision making. It is important to generate greater political will for investment in long term, sustainable ecosystems management. In addition, decision makers need to have or build: information systems and research; confidence and trust between actors; greater social participation from local communities; greater

management capacity (especially at the local level); multi-sectoral integration; and social and technological innovation.

Following Saravia's presentation, members of the audience focused on issues of financing and scaling. Participants noted that there is not an overall lack of funding for adaptation projects in Peru; rather, the problem lies often in the focus of the funding. Even with current levels of financial resources, better management could lead to more effective outcomes. Participants also highlighted the complex geography of Peru as especially challenging for increasing the scale of projects. Promising projects that emerge at the micro level might not prove scalable to the macro level. Scaling initiatives must take into account factors such as population dynamics, management tools, availability of information, funding, and traditional knowledge and practice.

Following these national perspectives, three speakers from the city and region of Piura, located in Northwestern Peru, brought in the subnational experience in adaptation. First to speak was *Ronald Ruiz*, President of the Hydrologic Resources Council for the Chira Watershed-Piura, and representative of the regional government of Piura. Ruiz emphasized the role of the El Niño phenomenon in shaping the weather patterns of Piura and how climate change is intensifying these patterns. Flooding is the biggest challenge for the region, and recent inundations have caused loss of life as well as costly infrastructure damage, including the collapse of roads and bridges. Piura does have a regional strategy for climate change adaptation, with a goal of reducing the area's vulnerability to climate change by 2021 through more integrated management and a focus on ecosystems. The plan seeks to involve representatives of regional and municipal governments, to strengthen capacities, and integrate climate change challenges and opportunities unto development plans. The plan would include better management of energy and water resources, as well as technical cooperation for climate change adaptation and mitigation efforts. In addition to highlighting some of the specific actions undertaken at the regional level, Ruiz identified several necessities for further progress. Among these were: exchanging experiences with other nearby regions facing similar challenges; obtaining logistical support for education and events; and training new regional and local authorities to explain the relationship between climate change and public policy.

Raúl Romero, an engineer and representative of the regional government of Piura, focused on the experiences of the region of Piura in managing risk for public investment projects in the context of climate change. Romero began by describing in detail the geography of the Chira River watershed in Piura, with most of the population living in the

lower basin, nearest the coast and furthest from the source of the river. Although public investment projects in the watershed system and water services have increased over the past decades, there is still a need for better data in order to inform decision making and planning. Romero underscored the need for private as well as public investment in building resilience to climate change. He also emphasized the importance of planning for disaster management, so as not to lose the gains achieved in recent decades.

Jaime Gonzaga, Manager for Planning and Development for the municipality of Piura, emphasized, as had Ruiz, the major impacts El Niño weather has had on the city, including intense flooding and periods of damaging drought. In order to manage these fluctuations (which are likely to intensify in a changing climate), the city has improved storm water drainage to mitigate flooding and constructed a reservoir to help manage seasonal rains and provide potable water year-round. Gonzaga noted some of the broader impacts of climate change on his community, including the increased risk to agricultural communities and small businesses, the general vulnerability of infrastructure (especially buildings not constructed to withstand extreme weather), the high vulnerability of marginal populations, and public health impacts, particularly the spread of dengue. Gonzaga emphasized the need for better governance, including longer-term planning, strong institutional capacity for disaster management, and a more participatory process that engages the public.

The ensuing discussion brought out the need to mainstream climate change adaption as part of planning processes. Although climate change considerations are already incorporated in many public development projects, measures may not be fully implemented. Planning for climate change involves infrastructure as well as other resilience-building measures such as strengthening biodiversity and ecosystems and restoring natural areas (these kinds of initiatives are underway in the Los Angeles area). Commentators also indicated that some impacts of climate change could be positive and that communities need to be prepared to capitalize on these benefits in addition to preparing for climate change's more challenging consequences.

Population Dynamics and Climate Change:

Sandeep Bathala of the Wilson Center's Maternal Health Initiative discussed how population dynamics—population growth, urbanization, spatial distribution/migration, and age structure—can have a profound impact on the ability of a country or community to manage climate change challenges. These dynamics might create greater challenges for adaptation, or can themselves be considered adaptive measures. Migration and

urbanization, in particular, may be considered adaptation, as climate change impacts such as changes in precipitation may lead rural agricultural workers to seek new opportunities in urban areas as land becomes less suitable for farming. The issue of water resources is particularly important for rural Andean communities in Peru: climate change-related loss in glacier coverage in the mountains is occurring at a rapid pace and is already causing changes in the growing cycle. Bathala shared the video, “Weathering Change,” which included both rural and urban examples of families affected by climate change in Peru. (The video can be viewed at: <https://www.youtube.com/watch?v=hPy3pLBZvuE>) With the goal of reducing vulnerability and improving adaptive capacity, Bathala cited access to voluntary family planning services as an important tool for family and community resilience to climate change. In places where the desire for family planning services is still unmet, there may be an opportunity—through education and access—to give women greater control over their reproductive health and family planning needs and reduce stress on resources available to them.

Conclusions:

Climate change presents major challenges for Peru, both those already evident, such as glacial melt, and more severe changes to come. National, regional, and municipal officials in Peru are taking climate change and the need for adaptation seriously, however, and decision makers are engaged in finding ways to incorporate adaptation planning into their overall development agendas. Major challenges still will be most effective, and the ability to implement long-term planning agendas that are outside the political cycle. Peru is using the resources at its disposal, including drawing on ancient adaptation knowledge and practices, to improve its outlook in a climate-uncertain future. This meeting highlighted the importance of bringing together diverse national and international stakeholders to share experiences and knowledge as a way of contributing to more robust and effective climate change adaptation projects and policies.

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