

## Climate change, vulnerability, social conflicts and human displacement in the Andes: The case of Huaytapallana glacier

## Cambio climático, vulnerabilidad, conflictos sociales y desplazamiento humano en los Andes: El caso del glaciar Huaytapallana

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### Abstract

The objective of this review was to identify the links between Climate Change, Vulnerability, Social Conflicts and Human Displacement in the Andes. The different factors that influence the vulnerability of people and communities are analyzed, such as the diversity of the impacts of climate change, the retreat of glaciers, the loss of biological diversity, health, agricultural production and scenarios with the presence of water scarcity. Adaptive behaviors are observed in the inhabitants of Andean communities, but they are not sufficient, because in many occasions people are forced to migrate to other cities. Five ways of responding to climate risks or hazards are suggested: 1) reduction and control of global warming, 2) adaptation to conditions resulting from climate change, 3) resistance, 4) mitigation, and 5) involuntary displacement. Finally, it concludes by stating that there is an intricate link between global warming, climate change, vulnerability and social conflicts, and that migration is a product of climate change.

*Key words: climate change; social conflicts; migration.*

### Resumen

El objetivo de esta revisión fue de, identificar los vínculos entre el Cambio Climático, Vulnerabilidad, Conflictos Sociales y Desplazamiento Humano en los Andes. Se analizan los diferentes factores que influyen la vulnerabilidad de las personas y comunidades, como la diversidad de los impactos del cambio climático, el retroceso de los glaciares, la pérdida de diversidad biológica, la salud, la producción agrícola y los escenarios con presencia de escasez de agua. Se observan comportamientos adaptativos en los pobladores de las comunidades andinas, pero no son suficientes, debido a que en muchas ocasiones las personas se ven obligadas a migrar a otras ciudades. Se sugieren 5 maneras de responder a los riesgos o peligros

climáticos, 1) la reducción y control del calentamiento global, 2) Adaptación a las condiciones resultantes del cambio climático, 3) resistencia, 4) Mitigación y 5) Desplazamiento involuntario. Finalmente, se concluye afirmando que existe un vínculo intrincado entre el calentamiento global, el cambio climático, la vulnerabilidad y los conflictos sociales, del mismo modo se precisa que las migraciones son producto del cambio climático.

*Palabras clave: cambio climático; conflictos sociales; migración.*

The Andean region, particularly Peru, have been ranked the third most vulnerable region to climate change in the world (Trigoso 2008); moreover, in spite of the economic growth of the last fifteen years, more than one-third of the population lives in poverty, enhancing its vulnerability to such diverse impacts of climate change as glacier retreat, loss of biological diversity, health, agricultural production, and water scarcity. At the present, 65 percent of social conflicts are related to environmental issues, according to various studies.

Over the last six decades, Peru as a tropical country has experienced significant changes in precipitation and temperature levels, leading to increased glacier retreat and flooding (Foresight Report 2011). The increase of environmental risks and hazards, while global, will have more local impact, particularly in the coastal desert and Andean peasant communities (Blaikie and Cannon 2003).

In coastal and arid zones, 80 percent of fresh water comes from andean glaciers, lakes, and rivers. During the last ten years on the coast, irrigated agriculture has increased, since most of this production is for export. This production includes fruits, flowers, asparagus, and so on, demanding more water than livestock production. Lately, there have been reports on water scarcity and consequent social conflicts between large, medium, and small producers. It is predicted that water will become even more scarce in the next ten years, and conflicts and involuntary migration to the jungle and large cities will increase accordingly. Global warming is also affecting small water sources at less than 5,000 meters above sea level. These springs are crucial for domestic animals, as well as for human consumption since 90 percent of rural populations do not have domestic drinking water connections.

It has been recorded that adaptative mechanisms as well as resilience are some of the main responses of Andean rural populations to climate change as it happens in other areas (Birkmann 2010). However, populations living below the poverty line (less than U.S.\$2 per day) are more vulnerable and therefore more likely to migrate involuntarily to either the coast or the rainforest (Trigoso 2008).

The Andean region has lost between 30 to 40 percent of its glacier since 1970 (Becker 2007, Altamirano 2013). The glacier regulates stream flow and seasonal variations during the dry season from June to November.

**Figure 1***Research Site*

My study in the central sierra Huaytapallana glacier (declared as Natural Reserve by the peruvian Ministry of Environment) has demonstrated that 35 percent of the glacier has been lost in the last forty years. It also has been reported by the UNDP study (PRAA, Adaptation to Climate Change) that in the coming fifty years all of the glacier will melt. Forty years ago in summer and winter the mountain of Huaytapallana was completely covered by glacier ice. I personally witnessed the beauty of the mountain when I became part of a British research team in the area. Huaytapallana glacier (5677 meters above the sea level) provides fresh water to a watershead call Shullcas where around 25,000 indigenous and peasant population lives as well as to the city of Huancayo with 480000 inhabitants.

As with the reserve of Huaytapallana, there are others having the same social conflicts as a result of water scarcity and stress. In addition to glacier retreat, mining companies located in more than 4,000 meters above sea level, where most glaciers are, are contaminating the water with mercury that is widely used to separate gold and other minerals from rocks and solid soil. This is the case of Huaytapallana reserve, where at least three companies are exploiting minerals and the rest have concessions from the central government to explore and later exploit. Of approximately 265 social conflicts, 65 percent are related to the environment, with mineral, gas, and oil exploration the most numerous.<sup>1</sup> Two years ago a conflict between the native population and police in the northern peruvian rain forest resulted in twenty-seven deaths—five natives and twenty-two police. Global warming not only affects sea-level rise, health,

<sup>1</sup> *Report of Defensoria del Pueblo, an independent advocate for the rights of people, similar to an ombudsman.*

biodiversity, and agriculture—resulting in more destructive hurricanes, tornados, and rain—but also increases glacier retreat. This in turn affects the availability of water, essential for human subsistence in tropical zones. It is predicted that in the next ten years, glaciers less than 5,000 meters above sea level will disappear. Most of our indigenous communities live between 3,000 and 4,500 meters above sea level. As global warming is unstoppable, so is glacier retreat, according to projections made by the National Authority of Water, Arnao Morales (2010), and the National Geographic Society.

These studies predict that in approximately eighty years all Peruvian glaciers will be melted. Consequently, water stress will become even more acute and forced migration will be more common mainly for vulnerable rural poor people. It has been said that in the year 2050, the economic cost of climate change will reach 20 percent of the Peruvian GNP, since the government will have to invest in adaptation mitigation and projects to prevent hazards and protect food security, agriculture and prevent possible illnesses as predicted by the Banco Central de Reserva del Peru in 2008. In sum, there are five ways to respond to climate hazards both in the Andes and in the amazon rain forest located to the eastern side of the andes.

(1) *Global warming reduction and control.* As it stands, this alternative is almost a utopian dream since rich and emerging countries will not comply, as it may harm their economic growth and competitiveness (see Altamirano 2013, chap. 3). International agreements and summits with participation of the U.S., Canada, Japan, Australia, and the BRICS countries (Brazil, Russia, India, China, and South Africa) have consistently responded negatively to the request that tropical and poor countries reduce carbon dioxide emissions. This situation emerged in december 2014 during the climate summit UN Conference of Partners (COP 20) held in Lima Peru. However at the end, all 194 attending countries reached some common agreements to be submitted next year in Paris when COP 21 will take place. As we know such summit will replace the 1995 Kioto Protocol.

(2) *Adaptation to conditions resulting from global warming.* Most poor and tropical countries such as Peru are implementing or are about to implement this response. However, it has proven to be expensive and requires international aid from wealthier countries. African sub-Saharan countries are among the most affected and are the poorest in the world.

(3) *Resilience.* The impacts of climate change for many inhabitants of poor countries are another challenge; therefore, resilience is part of their everyday lives. These situations create individual, family, and group resistance to adverse situations. Resilience includes internal organization and hierarchy to support external hazards. This historical capacity partially explains why these populations tend to remain in their own communities.

**Figure 2***Natural Landscape*

(4) *Mitigation*. This means the rational use of scarce local resources including traditional practices known by the people even before climate change became evident. Early warning and the utilization of social and cultural knowledge passed on by generations through oral traditions, the use of social media, and the role of school in fostering environmental awareness are significant tools to enhance capacities at the individual and societal levels.

(5) *Involuntary displacement*. This response, organized by affected populations, can be divided into two types: (a) planned and (b) unplanned. Displacement should be considered as an undesirable alternative, since populations by nature are reluctant to abandon their properties, culture, and local identity formed over centuries and even thousands of years. In the case of planned evacuation, this can be organized by the local, regional, or national government and sometimes with international aid, either governmental or nongovernmental.

In the case of unplanned displacement, as happens more often, affected populations make their own decisions in the absence of external aid; if the evacuation is organized by their own people, the challenges can be more risky and might entail the use of financial resources that are often scarce. If organized by individuals or families, it can be even riskier and with even fewer available resources. Involuntary displacement entails additional challenges, such as when, where, and how to evacuate. In most cases, there are two likely destinations: (a) refugee camps, and (b) cities or safer neighboring locales. These kinds of displacements entail family separations, uproot cultures, and are unpredictable in their outcomes since the

displaced become so vulnerable and dependent upon the will of the people at these destinations, whether local or international.

The effectiveness of the five types of responses will depend on many other factors beyond the dominion of the displaced, such as the level of organization, international law governing the internally displaced and refugees, and international dispositions and treaties. According to the IPCC (Intergovernmental Panel on Climate Change 2012), more than 50 million people are internally and internationally displaced in the world. This number surpasses the nonclimate-driven involuntary migrants in the world, who number about 40 million according to the United Nations Fund for Population Activities—25 million internally displaced and 15 million refugees.

### **Conclusion**

Finally, there is an intricate link between global warming, climate change, vulnerability, and social conflicts. Involuntary environmental migration is becoming the most likely consequence of climate change. It seems likely that in the future environmental human displacement will reshape the patterns of involuntary migration mainly in tropical and poor countries. Social vulnerability also has been linked to involuntary migration, as Anthony Oliver-Smith (2010) has concluded in several studies, including the Callejon de Huaylas in the Peruvian northern sierra and later in the southern Peruvian highlands. The great lesson of Hurricane Sandy in the U.S. northeast is to anticipate how climate change also will affect wealthier countries in the coastal areas where most of the population lives as a result of nonclimate-driven migration—in response to better occupational opportunities and family ties.

## References

- Altamirano, T. (2013). *Refugiados ambientales: Cambio climático y migración forzada*. Lima: Fondo Editorial PUCP.
- Banco Central de Reserva del Perú. (2008). *Impacto económico del cambio en el Perú*. Annual report, circulated internally.
- Becker, W. (2007). "In a Country like Peru 'World Water Day' Should Be a National Holiday." *Journal Perú*, March.
- Birkmann, J. (2010). "Adaptative Urban Governance". *Vulnerability, Risk, and Adaptation in Changing Climate*. Bonn, Germany: Institute for Environment and Human Security, United Nations University.
- Blaikie P., & T. Cannon. (2003). "Vulnerability Analysis and Disaster." In D. Flood, ed. New York: Routledge.
- Government Science Office, UK. (2011). *Foresight Report: Migration and Global Environmental Change*.
- "Intergovernmental Panel on Climate Change: Summary for Policy Makers." (2007). *Climate Change*, edited by H. L. Miller. New York: Cambridge University Press.
- Morales, A. (2010). "Deglaciación y disminución del recursos hídricos". Sociedad Geográfica de Lima.
- Oliver-Smith, A. (2010). *Linking Environmental Change, Migration, and Social Vulnerability*. Bonn, Germany: Institute for Environment and Human Security, United Nations University.
- Trigoso, E. (2008). "Climate Change Impacts and Adaptation in Perú: The Case of Puno and Piura". *Human Development Report*. United Nations Development Program.