

Bolivian Andes: Interplay between glacier melting and outmigration

Throughout the Bolivian Andes, climate change is impacting the pace of glacial retreat, as well as rainfall patterns, cloud cover and wind speed. These stressors add to existent drivers that have led to migration from rural to urban mountain areas, especially to the cities of La Paz and El Alto.

Dirk Hoffmann, Bolivian Mountain Institute – BMI, La Paz, Bolivia,
dirk.hoffmann@bolivian-mountains.org

Raoul Kaenzig, Institute of Geography, University of Neuchatel, Switzerland
raoul.kaenzig@unine.ch

Introduction

In the Bolivian Andes, more than 50 percent of the glacierized area has been lost in the last 40 years due to climate change. This may significantly decrease the amount of glacial meltwater available to streams and aquifers which are critical to ecosystems and farming communities in the region. In addition, the rural communities of this region are also threatened by economic uncertainty. As a response to these situations, many farmers have chosen both temporary and permanent migration to nearby urban centers as adaptation strategies.

By highlighting the numerous challenges and the complex interplay between climate, livelihood and migration, this case study sheds light how decisions to migrate are taken, by whom and where they are going. It also focuses on the role of climate change in those decisions.

The impacts of climate change on mountain farming

In the Andes, among the numerous impacts of climate change such as floods and the increasing unpredictability of frost and drought episodes, glacier retreat is already particularly visible and acute. An unknown number of low- and medium-altitude glaciers

have already disappeared, and projections indicate that many others are also likely to vanish over the next few decades.

Yet social science only gives marginal consideration to this phenomenon. Little research is being done to assess the socio-economic impacts of glacial retreat. Glacier melt contributes water for drinking, for irrigation and for the production of hydroelectricity. In addition, climate change impacts rainfall patterns, cloud cover, wind speed and other phenomena which remain poorly documented in the country's mountain regions. These changes are also intrinsically linked to natural climate variability, in particular frequent occurrences of El Niño Southern Oscillation (ENSO) events.



In La Paz, some neighborhoods suffer heavy erosions episodes leading to dramatic landslides (Photo R. Kaenzig).

Peasant farming and high-altitude herding systems are particularly vulnerable and face increasing threats because they are highly dependent on climate-sensitive resources such as water, soil, and biodiversity as well as the scarcity of farmland. The water scarcity is not only connected to reduced glacier melt, but also to water overuse, technical irrigation problems, social conflicts, and the lack of adequate water governance.

In addition, farmers from rural mountain communities deal with inherent risk factors due to their marginalization from economic and political centers and their limited access to basic services, such as education, health care, infrastructure and work opportunities, as well as their human desire to pursue an urban lifestyle. They often choose migration – both temporary and permanent – from among a range of livelihood strategies identified to cope with an assemblage of climate-related and socio-economic stressors.

While climatic variability and water scarcity alone may not directly drive migration, they are usually associated with other stressors that impact agricultural production and livelihood security. In fact, most of the migration events defined as either temporally restricted or *circular* – meaning that the respective regional migrants have double residency and maintain the agricultural activities in their areas of origin while working or studying in the nearby urban area.

It is often the most productive household members – 14- to 38-year-old men and women – who are migrating. Of these, few migrate abroad or even to other Bolivian regions. The most popular destinations for migrants from the regions included in the study were the urban areas of La Paz and El Alto, which themselves are above 3.500 m. Since the 1970s, El Alto has grown from a small town to a city of about 1 million with the influx of migrants who have left behind the land and water scarcity that has been worsened by climate change and seeking employment and educational opportunities in urban areas.



While young people tend to seek other job opportunities in the cities, many elder people are still living in rural areas (Photos R. Kaenzig).

Conclusions

Climate change cannot be regarded as a linear process, nor can the social consequences of its effects. In the foreseeable future, glacier-related drivers may interfere more substantially with migration. Melting glaciers may yield a short-term phase of water abundance but, in the longer run, lack of glacier melt may leave agriculture entirely dependent on rainwater and large numbers of people without a continuous source of fresh water, especially during the dry season.

This tipping point could well be reached in the Bolivian highlands in the coming decades, depending on future temperature and precipitation patterns, as well as conservation efforts in high-altitude watersheds and the construction of additional irrigation infrastructure. Despite wide recognition that rapid retreat of glaciers necessitates the

construction and strengthening of existing water reservoirs and dams, few measures have been undertaken in Bolivia.

As El Alto and La Paz remain major migration destinations in the highlands for rural people, their growing populations will continue to put pressure on basic environmental resources in already vulnerable sectors such as water and energy. La Paz has already experienced episodes of shortages, as in November and December 2016, when water was temporarily rationed in numerous neighborhoods. This contributes to the argument that the urban destinations of rural migrants should be more centrally embedded in policies regarding climate change adaptation.

References:

Kaenzig, R. 2016. Can glacial retreat lead to migration? A critical discussion of the impact of glacier shrinkage upon population mobility in the Bolivian Andes. *Population and Environment*. 36 (4). Pp. 480-496.

Hoffmann, D. & Requena, C. 2016. Escenarios socio-ecológicos frente al cambio climático en el Altiplano boliviano. In: Postigo, J.C. & Young, K.R. (eds.): *Naturaleza y Sociedad: Perspectivas socio-ecológicas sobre cambios globales en América Latina*. Lima: desco, IEP and INTE-PUCP.