



# Climate Change Course Research Focus

*A case of environmental justice*

## Public Health Consequences of Climate Change on the Indigenous Populations of the Andean Altiplano

Charlotte Wagner



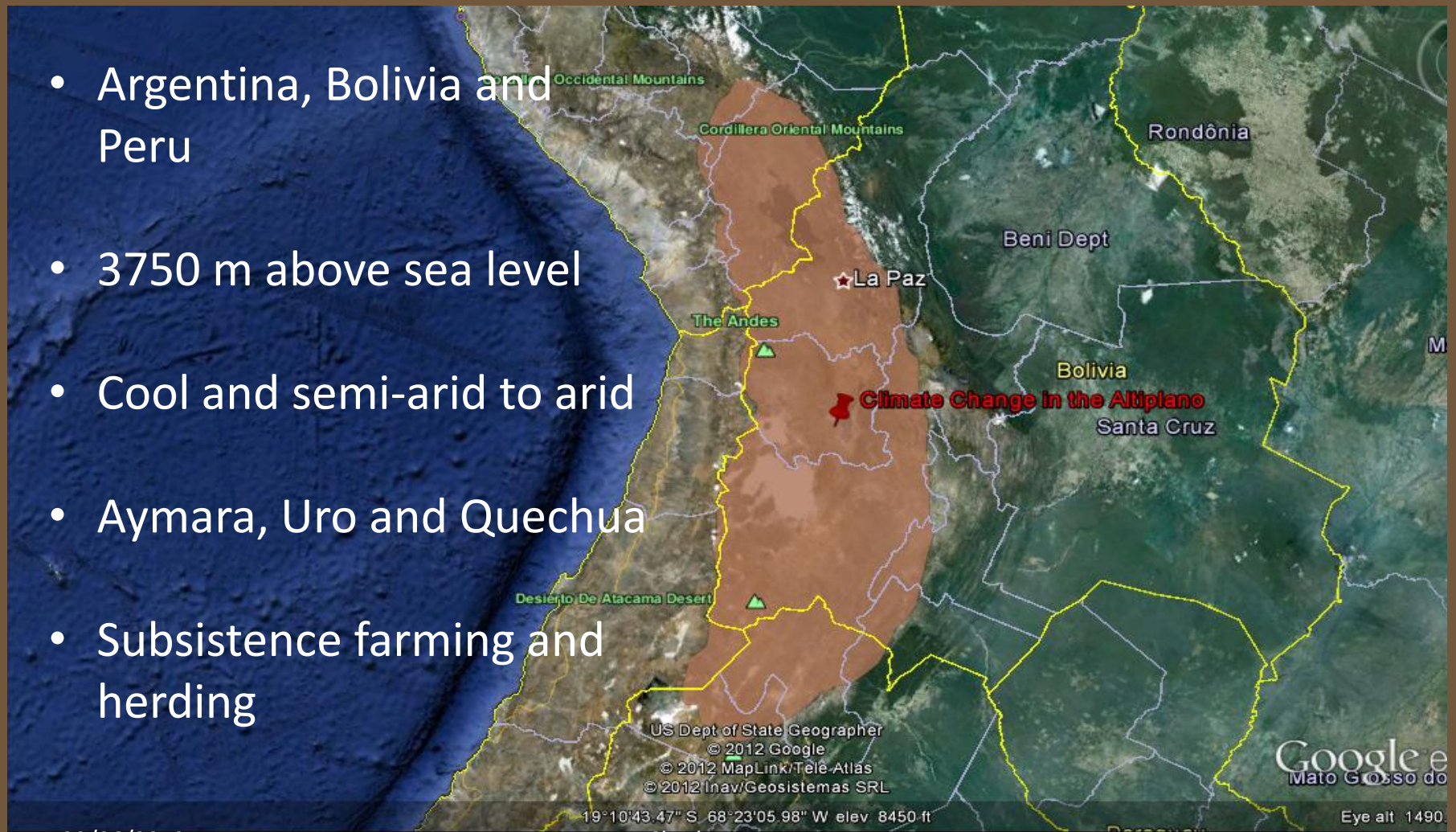
**CYPRUS INTERNATIONAL INSTITUTE  
FOR ENVIRONMENTAL AND PUBLIC HEALTH**



**IN ASSOCIATION WITH  
HARVARD SCHOOL OF PUBLIC HEALTH**

# I. The altiplano

- Argentina, Bolivia and Peru
- 3750 m above sea level
- Cool and semi-arid to arid
- Aymara, Uro and Quechua
- Subsistence farming and herding



US Dept of State Geographer  
© 2012 Google  
© 2012 MapLink/Tele-Atlas  
© 2012 Inav/Geosistemas SRL

Google e  
Mato Grosso do

19°10'43.47" S, 68°23'05.98" W elev 8450 ft

Eye alt 1490

# Table of Contents



- I. Introduction
- II. Research Focus
- III. Why is it important?
- IV. Historic climate changes
- V. Current Climate changes
- VI. Impacts on indigenous
- VII. Mitigation
- VIII. Bibliography

# III. The injustice of Climate Change

- One of the poorest regions of the world, and Bolivia one of the poorest countries
- the resource rich area and its population were exploited over centuries (colonialism)
- No profit of industrialisation but most suffering (western imperialism)



Bolivia only emits 0.04 % of global greenhouse gases, and this in the cities not the country side



Is of scientific interest but also a question of





# III. Historic Climate change

- Last glacial: 7° C colder (18 000yrs BC)
  - 5 to 10 m higher lake levels
- Early Holocene: 3.5°C warmer
  - First settlements (Tiwanaku population)
- “little” ice age (1100 AD)
  - Decline of this Tiwanaku population
- Since, glaciers have decreased, with interruptions

# IV. Current climate change

Difficult to model due to the complex topography



- Warming of  $0.1^{\circ}\text{C}/\text{decade}$  during the past 60 years
- $4.5$  to  $5^{\circ}\text{C}$  for the next decades
- Longer dry spells, wetter, but shorter austral summers
- More extreme weather events such as floods, droughts, hail storms
- More extreme El Nino events with longer droughts



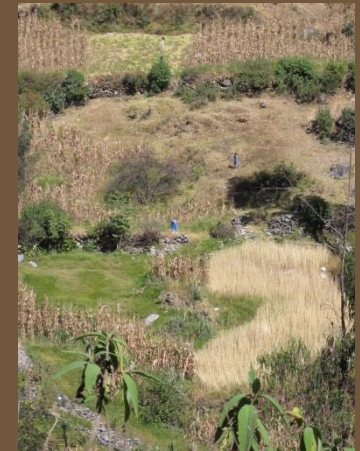
# V. Impacts on indigenous populations

- Shorter wet periods, more extreme weather events
    - Less ability to apply experience and traditional forecast methods
    - Less ability to use traditional farming methods effectively
  - Increased flood events
    - increases in vector borne disease
1. Less food security
  2. less access to health care due to decreased capital
  3. More vector borne disease
  4. Higher child mortality



# VI. Predictors of ability to absorb shock

- Household age
- Age of adults
- Off-farm income
- Access to markets
- Drought resistant cattle



➤ more adaptability to agricultural losses, better access to weather forecasts



# VII. Mitigation

- Better forecasts and practices through participatory approaches
  - Exchange between scientist and farmers
  - Research together of local indicators and scientific indicators
  - Peer assistance of farmer with best disaster resistant farming practice
- Better accessibility of small scale capital

# VII. Mitigation goals

- Better forecasts due to local indicators
- Better accessibility of forecasts for farmers  
(use of scientific knowledge)
- More adapted farming practices



Higher resilience against climate shocks  
of indigenous population



Thank you for your attention

*Pictures: from my travels on the altiplano in Peru, Bolivia and Argentina, all rights reserved*

# VIII. Bibliography

- Binford, MW et al. (1997). Climate Variation and the Rise and Fall of an Andean Civilization. *Quaternary Research* 47, 2, 235-248.
- Githeko, A. (2000). Climate change and vector-borne diseases: a regional analysis. *Bulletin of the World Health Organisation* 78, 9.
- Messerli, B. et al. (1993). Climate change and natural resource dynamics of the Atacama altiplano during the last 18000 years: a preliminary synthesis. *Mountain research and development* 3, 2, 117-127.
- Oxfam international (2009). Bolivia: climate change, poverty and adaptation. Retrieved June 21, 2012 from Oxfam.org
- Preston, D. et al (2003). Grazing and Environmental Change on the Tarija Altiplano, Bolivia. *Mountain Research and Development* 23, 2, 141-148.
- Renner, JM (1971). Indian settlements of the altiplano: Indications of Change. *New Zealand Journal of geography* 51, 1, 22-26.
- Robledo, C. et al. (2004). Increasing the Resilience of Hillside Communities in Bolivia: Has Vulnerability to Climate Change Been Reduced as a Result of Previous Sustainable Development Cooperation? *Mountain Research and Development* , 24, 1, 14-18.
- Solomon, S. et al. (2007). Contribution of Working Group 1 to the Fourth Assessment Report. International Panel on Climate Change Retrieved June 27, 2012 from www.ipcc.ch
- Valdivia, C., et al. (2000). Peasant households strategies in the Andes and potential users of climate forecasts: el Niño of 1997-1998. Tampa: Presentation at 2000 American Agricultural economics association annual Meeting.
- Valdivia, C., et al. (2010). Adapting to Climate Change in Andean Ecosystems: Landscapes, Capitals, and Perceptions Shaping Rural Livelihood Strategies and Linking Knowledge Systems. *Annals Of The Association Of American Geographers*, 100(4), 818-834.
- Vuille, M (2008). Climate change and tropical Andean glaciers: past, present, and future. *Earth-Science review* 89, 3-4, 79-96.
- Warner, K. et al. (2010). Adaptations to climate change: linking disaster risk reduction and insurance. Geneva: United Nations International Strategy for Disaster Reduction Secretariat.
- Winters, C. (2012). Impact of Climate Change on the poor in Bolivia. *Global Majority E-Journal* 3, 1, 33-43.