Climate & Development Knowledge Network

INSIDE STORIES on climate compatible development

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Key messages

- Climate change is expected to increase the incidence of droughts and floods in Bolivia, threatening the availability of water for both human consumption and agriculture.
- Bolivia's Law of Mother Earth promotes the indigenous concept of 'living well', which encourages the protection of natural resources. However, it does not provide indigenous people with a means of legal redress for developments that damage the environment; nor does it require their consent for development projects.
- Collaborations between indigenous groups and scientists can improve the understanding of climate change, lead to better adaptive strategies in Bolivia and provide useful experience from which other countries can learn.
- Implementing policies that encourage the use of indigenous knowledge will help manage the unavoidable consequences of climate change and protect vulnerable populations.

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Building resilience to climate change through indigenous knowledge: The case of Bolivia

Indigenous knowledge plays an important role in the way communities interact with their climate in many countries, particularly in Bolivia. It contributes to weather forecasting at the community level, and to the preservation of vital ecosystem functions that help to buffer communities against climate change impacts. However, the increasing incidence of extreme weather events and disasters is taking a toll. This situation calls for new partnerships between indigenous people and the scientific community – an area where Bolivia could lead the way.

Indigenous people have reported that traditional climatic indicators are no longer as reliable for predicting weather as in the past.[1] Some seasonal variations have become so unpredictable that traditional observations provide little protection against the impacts of severe weather on crops and livestock.[2] Yet, indigenous knowledge can be combined with scientific methods to allow vulnerable populations to better adapt to climate change, such as in the development of early warning systems and new planting techniques to increase resilience to extreme weather. Bolivia's *Ley de Derechos de la Madre Tierra* (Law of the Rights of Mother Earth) is one important tool for indigenous people that helps to protect natural and cultural resources. Such policies, combined with partnerships among scientists and indigenous communities, can also provide useful lessons to other countries and communities.

Bolivia is home to a diverse population, including 36 indigenous groups with a combined population of over 5 million people, or 62% of the country's population. They live throughout Bolivia's varied ecological zones, including the semi-arid Altiplano, the dry El Chaco region in the south-east, flood- and drought-prone valleys, and humid tropical jungles.[3] The effects of climate change in Bolivia are expected to include higher temperatures, glacial melt and extreme weather events. As of 2008, Zongo Glacier had lost almost 10% of its surface area and could completely disappear

CDKN helps developing countries to design and deliver climate compatible development. When decision-makers in government, business and civil society speak to us about their aims and needs, they often ask about 'best practice' in other countries or, indeed, mistakes to avoid. What are the leading innovations in integrating climate change planning with economic growth strategies and poverty reduction? What are the biggest challenges faced along the way: institutional, financial, political, technical? This paper is one of a series of policy briefs that explore the 'Inside stories on climate compatible development': briefing papers that aim to answer these questions.

Lowland family taking their cattle to pasture in Bolivia

by 2045.[4] This melting jeopardises the drinking water supply for the cities of La Paz and El Alto, as well as one source of irrigation water for Andean farmers.[5] Shorter rainy seasons are contributing to rapid desertification and dry riverbeds throughout the Altiplano, the Chaco and the inter-Andean valleys.[6] The Amazon has experienced both droughts and increased frequency and intensity of flooding, while the valleys and plains of Bolivia have experienced increased droughts and reduced crop yields.[7]

Indigenous people are disproportionately affected by climate change because they are heavily dependent on natural resources for their survival. They rely on about 22% of the earth's land but over 80% of its biodiversity, and have limited resources to combat climate risks.[8] Indigenous knowledge has been used to build climate resilience in Bolivia, but much of it is being lost. The Law of Mother Earth shows promise in protecting some of this knowledge, but it is just one approach among many that are needed to marry indigenous knowledge with broader research and policy-making trends.[9] Lessons from the interaction of indigenous people, scientists, policy-makers and international supporters in Bolivia illuminate how these different groups can support each other in creating the most climate-resilient outcomes.

The need to preserve Bolivia's indigenous knowledge

Over generations of observing their environment, Bolivia's indigenous people have developed a unique body of knowledge that is helping them adapt to the effects of climate change through weather predictions and coping practices.[10] The Chipaya people, for example, monitor the wind, clouds, frosts and other signals to predict the weather and improve agricultural practices.[11] Andean villagers forecast the timing and quantity of rains based on observations of the Pleiades constellation immediately after the winter solstice.[12] If the star cluster is large and bright, farmers predict substantial rainfalls; if the stars are small and dim, however, farmers delay planting their most important crop – potatoes. This ancient form of forecasting is now used to identify El Niño years, in which there is less precipitation. Scientific evidence substantiates this traditional forecasting technique; the amount of cloud cover

Bolivia's indigenous people have developed a unique body of knowledge that is helping them adapt to climate change.

affects the size and brightness of the Pleiades, giving an indication of the severity of El Niño conditions. By delaying planting for four to six weeks in El Niño years, farmers can reduce their risk of crop losses due to low soil moisture. Additionally, Bolivia's rural Aymara people build small dams to harvest and store rainwater in the mountains and pampas.[13] The technology will be of limited use if rainfall declines in the highlands, as one climate change model predicts.[14]

Indigenous knowledge is at risk of disappearing, however. Fewer people are learning it, and its value for climate science is not widely recognised.[15] For instance, young indigenous people in Bolivia no longer know how to construct the terraced fields, artificial ponds and canals that protected the Tiwanaku and Titicaca area from extreme weather.[16] Similarly, a system of canals constructed by the Moxos people to reduce flooding in the Beni Plains has been abandoned. To avoid losses such as these, elders in the Aymara community hold regular training sessions to share their knowledge with younger generations.[17] Another problem is the failure of climate scientists to recognise the value of indigenous knowledge.[18] If they do use it, they treat it simply as data. Divorced from historical perspective or local context, the information is merged into existing programmes without allowing indigenous knowledge holders to provide any explanation.[19]

Earth rights: The promise of Bolivia's Law of Mother Earth

Bolivia's Law of Mother Earth aims to protect the country's natural resources

Adaptation plans are strongest if they bring together indigenous knowledge holders and social and natural scientists.

and establishes 11 rights of Mother Earth. This Law, which was a high priority for Bolivia's indigenous people, grants nature the same rights as humans. It requires that developers remedy any environmental harm caused by infrastructure and other projects, bans the use of genetically modified crops, and gives preference to indigenous people for redistributed agrarian lands. The inclusion in the Law of the Aymara concept of 'living well', which promotes living in harmony with nature,[20] was influenced by the importance of the Mother Earth deity *Pachamama* to indigenous groups.[21] Indigenous people also have the right to be informed about development projects that affect them.

While this is a promising start, Bolivia's Law of Mother Earth needs additional measures to more effectively protect the forests and farmlands that indigenous people's livelihoods depend on, but which are threatened by climate change. There are no mechanisms to enforce the rights of Bolivian citizens enshrined in the Law.[22] Indigenous people have no legal standing to protest against government actions that destroy natural resources, such as the construction of a highway through the rainforest; the Law requires only that they must be informed and not that they actively consent. As the Bolivian economy continues to depend heavily on extractive industries,[23] it seems unlikely that the Law will allow indigenous people to challenge large government-sponsored mining and energy projects.

The ban on genetically modified crops has raised concerns about the lack of consultation with indigenous farmers; some farmers have fought against the ban because they depend heavily on genetically modified seeds, especially soybeans.[24]

Key lessons and recommendations

Countries considering similar laws can gain useful insights from Bolivia's Law of Mother Earth. Specific government actions, outlined below, can give indigenous peoples the ability to protect their natural resources.

Encourage partnerships between scientists and indigenous knowledge holders

Bolivia's experience suggests that adaptation plans and earth rights laws are strongest if they bring together indigenous knowledge holders and social and natural scientists. However, difficulties in communication can arise when scientists and indigenous peoples try to work together, so efforts are needed to build an open dialogue between the two communities. In the past, some scientists have viewed indigenous knowledge as a rigid set of traditions unable to be integrated with innovations, rather than a flexible and diverse toolkit of local knowledge.[25] For instance, indigenous people may consider a range of social and environmental factors that scientists would normally exclude.[26] Some scientists are reluctant to use indigenous knowledge because traditional techniques fail to predict the complexities of climate change – which is also putting modern science to the test. Improved cooperation could

increase indigenous people's trust of modern scientific forecasts and allow climate scientists to fine-tune climate predictions by ground-truthing some of the models by monitoring micro-climates.[27] It would also allow farmers to play an active role in contributing and disseminating information based on their local ecological observations, as well as incorporating community concerns.[28]

A group of Bolivian researchers from a wide variety of academic fields have created a process that integrates science and indigenous knowledge to improve the adaptive capacity of Andean farmers. First, farmers and researchers established an understanding of the changes that have occurred in weather patterns and agricultural yields, drawn from household surveys of livelihood strategies, meteorological data from the Altiplano, and community interviews about perceptions of climate change.[29] Next, researchers used existing global climate change models to reveal potential future impacts on agriculture. Finally, researchers shared this information with local indigenous communities to help create mitigation and adaptation strategies, and to encourage alternative practices. Other projects linking scientific and indigenous knowledge have reduced the vulnerability of Andean farmers by developing pest- and disease-resistant crop varieties, using organic production methods, promoting genetic diversity, and establishing timely responses to natural disasters through local seed production and distribution.[30]

Indigenous groups have asked the UNFCCC to host regular sessions on indigenous knowledge and its relevance to tackling climate change.

Create policies that improve adaptive capacity and indigenous people's status

National governments can institute policies and enact earth rights laws that encourage engagement, support the adaptive capacities of indigenous people, and improve their political status. The inclusion of indigenous people as joint decision-makers in local and national adaptation initiatives and natural resource laws – from design through to implementation – will help to ensure that their valuable knowledge informs these projects.[31] Government policies and programmes can support training in traditional practices for young people,[32] provide funding for adaptation efforts, help to preserve nomadic and semi-nomadic lifestyles, and promote diversity of domestic crops and animals.[33]

Encouraging environmentally sustainable economic development will also build indigenous people's resilience to climate change by improving their economic status. Increased income and access to resources enables vulnerable populations to better adapt to climate-related challenges and reduce weather-related losses.[34] Government investments in improved water infrastructure management and the promotion of certain adaptive indigenous agricultural techniques can serve the dual goals of climate resilience and economic development.

National governments can also increase indigenous participation in international climate negotiations. Through the United Nations Framework Convention on Climate Change (UNFCCC), the Bolivian Government has sought to strengthen the role of indigenous groups and refocus the debate on equity.[35] In its submissions

Indigenous woman harvesting quinoa

to the UNFCCC, Bolivia has also requested that the International Panel on Climate Change calculate the costs of adaptation as well as climate-related loss and damage, so that the world's most vulnerable populations can receive the financial and technical support they need to cope.[36] Therefore, both national governments and the UNFCCC should ensure that climate change policies at all levels reflect the input of indigenous people.

Promote the use of indigenous knowledge through international initiatives

Protection is needed to ensure that outsiders do not negatively impact indigenous rights. Indigenous communities are often fearful of outside intervention that aims to protect the environment (such as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation) for fear of losing autonomy.[37] The Anchorage Declaration, adopted by participants at the 2009 Indigenous Peoples' Global Summit on Climate Change, seeks to address these concerns. The Declaration encourages the UNFCCC to create formal methods that ensure the full and effective participation of indigenous groups in efforts to combat climate change.[38] Indigenous groups requested that the UNFCCC host regular sessions in which indigenous people could brief others on indigenous knowledge and its application to addressing climate change.

Box 1. The role of international initiatives

The international community can support projects that encourage the use of indigenous knowledge to build resilience to the negative impacts of climate change. International initiatives can help improve resilience by combining traditional methods that use the physical conditions of the land to effectively manage the impacts of extreme weather events, with modern approaches to sustainable natural resource use.

A project in Bolivia's Amazon that is financed by Oxfam and the Kenneth Lee Foundation demonstrates the role that international support can play in encouraging the use of indigenous knowledge. The project promotes the use of a centuries-old irrigation system to adapt to climate-related increases in annual flooding.[39] The system is composed of raised earth platforms elevated approximately two metres above the ground – higher than the flood waters that would otherwise wash away seeds and crops. The raised platforms are surrounded by canals that irrigate and provide nutrients to the crops during the dry season. Before modern farmers adopted this traditional irrigation system, they lost their crops every time the area flooded; in 2006–2007, floods affected about 120,000 people and resulted in US$200 million in damages.[40] As of 2009, 400 families had enrolled in the project, which helps build the irrigation system to improve plant survival. Nevertheless, challenges remain: many locals are sceptical about adopting these systems because of the physical effort needed to construct them and the financial uncertainties of farming in the area.

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