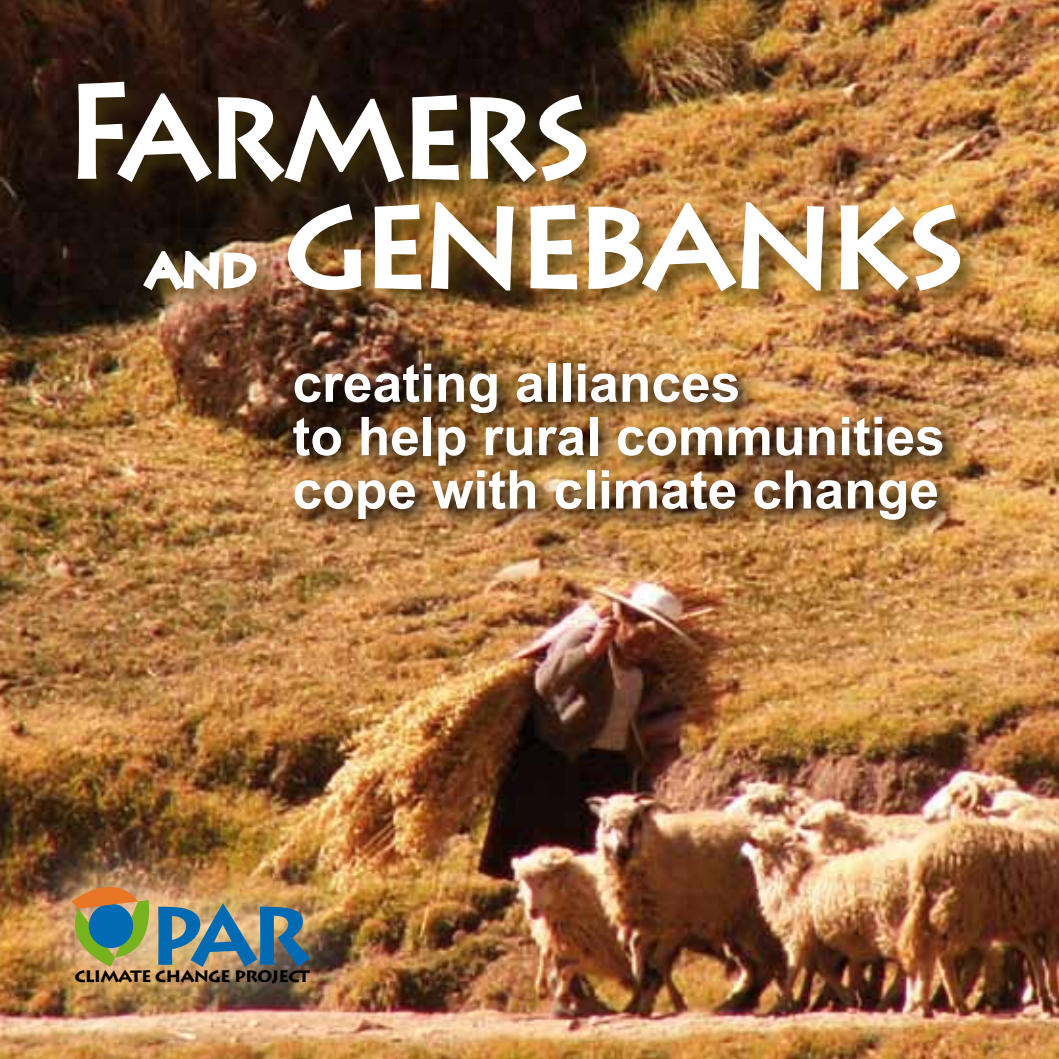
# FARMERS AND GENEBANKS

creating alliances
to help rural communities
cope with climate change



PAR
CLIMATE CHANGE PROJECT

## Farmers first

The focus of the work was on the needs and concerns of the indigenous communities and their farmers. The emphasis was on creating an environment in which farmers could identify what they felt would be most useful to meet the challenges they faced, knowing that their own traditional knowledge and materials remained under their control.

A first step was the collective development of an agreement on collaboration. This Free Prior and Informed Consent Agreement[1] (FPIC) was modeled on approaches developed by the International Society of Ethnobiology and signed by community representatives and the genebank. One of the key aspects of the project will be to review how well this approach worked.

The activities undertaken by communities and genebanks have included workshops and discussion sessions which provided the information needed by communities and genebanks on the types of crop materials maintained and the ways in which they were managed. The discussions led to an exploration of the needs for new materials with different characteristics. Agrobiodiversity fairs created a collective awareness of the wealth of materials that existed in the communities. Introductory discussions involving farmers and genebank managers provided all partners with opportunities to learn about each other's points of view and ways of working and the functions of a genebank.

## Recognizing gender perspectives

A second part of the project explored the role that gender dynamics play in the management of materials by rural indigenous communities, so as to take account of the ways in which gender roles affected each community's ability to adapt to climate change and preserve agrobiodiversity. Women and men complement each other in agrobiodiversity management, so ensuring gender balance in the discussions and plans associated with the work was essential. In Bolivia, women hold the important roles of choosing the germplasm that is destined to become seed, processing the harvest, and preparing the food, while men are more concerned with production activities.

[1] The FPIC documents for this project can be accessed at: http://agrobiodiversityplatform.org/climatechange/abd_and_cc_project_fpic/

For the last two years, the Platform for Agrobiodiversity Research (PAR) has worked with indigenous communities and with genebanks in Sarawak, Malaysia and Cochabamba, Bolivia.

The aim of the work has been to improve access by communities to the crop varieties maintained in genebanks that could help adaptation to climate change.

Here we outline some of the results from this work, highlight some of the key issues, and share some of the lessons learned from the two countries.

Photo: Paul Bordoni/PAR

# Malaysia

## The communities

In Sarawak, the work focused on rice cultivation, and was carried out in the villages of Gahat and Skrang, two different localities in Serian and Sri Aman. These two communities include both Ibans and Bidayuhs, the largest indigenous groups in Sarawak. Cultivating rice is central to the livelihoods of both groups and an integral part of their cultural identity. They often grow hill padi on slopes as steep as 45° and practice rotational farming, using predominantly traditional practices and traditional varieties.

Photo: Paul Bordoni/PAR

Hill padi farmers in Iban and Bidayuh usually plant four to ten different rice varieties for different reasons and uses. One objective of using many varieties is to reduce the risk of diseases and of crop failure. On the gentler slopes and in association with rice, the farmers cultivate other crops, including Job's Tears, cucumber, pumpkin, maize, long beans, brinjal, water gourds, and other fruits and vegetables. Farmers plant extra crops in between as "catch crops" to secure a food basket at harvest time and to reduce problems from crop loss. These practices ensure maintenance of high levels of diversity in the farms and minimize the use of pesticides.

## Management of crop diversity

Over 150 hill rice varieties are grown by the communities, 38% of which are traditional heirloom varieties. Most of the seed is saved by farmers from year to year. In fact, selling seeds is a taboo practice and seeds can only be bartered and exchanged. When the need arises, seeds are exchanged principally within the

Photo: Paul Bordoni/PAR

community members as a gift, provided to relatives in need, and bestowed on special occasions, such as a marriage.

On a yearly basis, 1-3 gantang[2] of seed belonging to each of the following eight varieties (Biris, Wangi, Lawi, Epos, Mamut, Pusu, Rotan, and Chantik) are exchanged; this represents about 2% of the total annual seed use of the village. Bario, Wangi, Rotan and Mamut are traditional varieties which are considered to be high quality rice varieties that command premium prices in the market. These varieties have medium slender grains and remain soft even when cold after cooking.

Photo: Paul Bordoni/PAR

## Community Needs

Eighty participants from Gahat village and the Long Houses in Skrang attended a workshop organized at the genebank of Semongok Agriculture Research Centre in Sarawak. This was an occasion for many farmers to learn about the existence and functions of a genebank. The gathering also served as an active forum where farmers could express their needs, discuss climate change, and explore the possibilities of working with other farmers and the genebank.

[2] 1 gantang is approx. 2.9kg



During the workshop, the participants requested padi seeds that possessed pest and disease tolerance, strong stems to prevent lodging, drought tolerance, rain resistance, and good grain quality. Adaptability with respect to planting time was also important. There was a preference for rice that tasted good and remained soft when cold. Modern varieties from the Malaysian Agricultural Research and Development Institute (MARDI) and the International Rice Research Institute (IRRI), bred for high yield, were considered tasteless and hard when cold, and often did not meet farmer requirements.


Farmers from both communities were well aware of the need to find materials adapted to changing conditions and asked for seeds of new varieties that would possess the traits they wished for. They were interested in knowing more about the genebank, what it did, how it could be used, and whether it could help them. They were particularly interested in the possibility of obtaining traditional varieties.

# Bolivia

## The communities

In Bolivia, the work focused on potato cultivation and was carried out in Morochata and Colomi, two communities located in the Cochabamba Department in central Bolivia. Potato is the main crop in this region, both for household consumption and sale in local markets. Native potato varieties are important for household food security and commercial and improved cultivars are for income generation.

Farmers in Morochata are able to cultivate crops at distinct microclimates due to a regional altitude range of 2750 to 4250 meters and can grow four crops of potatoes per year. The diversity of native potatoes is not as large as in Colomi and the area is known for being especially important for commercial potato production, including a few native varieties and other improved potatoes. Other crops, though less profitable and mainly used for household consumption, include maize, beans, wheat, oats, barley, oca, and the pepper tree or locoto (*Capsicum pubescens*).

Colomi, located in northeast Cochabamba with an altitude range of 1000 to 4,800 meters, is a zone of many different microclimates and high levels of agrobiodiversity. In Puna, the mountainous area, the climate is cold and wet, in contrast to the subtropical zones (Yungas). Like Morochata, potato production dominates the agricultural market in Colomi. About 50 native potato cultivars are grown, although only five are put on the market. In addition to the potato, Puna crop production is diversified with crops such as bean, pea, oca, barley, oats, papaliza, wheat, tarwi, isaño, and cherry.

Photo: Paul Bordoni/PAR

Photo: Paul Bordoni/PAR

# Management of crop diversity

A survey conducted amongst the community members of Colomi and Morochata showed that wealthier families manage about three traditional varieties per family and are mostly dedicated to commercial variety production, while middle class families manage about seven varieties per family, and the poorest often grow over twenty. Fifty varieties are grown between the two regions. Local systems of seed supply in the communities are currently fostered by weekly fairs. Farmers attend these local fairs to sell and buy seed, although there are other provisioning mechanisms such as bartering seed with seed, or seed with work. However, when weather problems such as frost, heavy hailstorms, or prolonged drought occur, the crops and seed needed to start the next crop year are lost and are then exacerbated by the community's reduced capacity to respond to self-sufficiency in terms of seed. Native cultivars grown in small quantities by only a few farmers are the most vulnerable to climate disasters.

Photo: PROINPA

Photos: Paul Bordoni/PAR

To date, there have been few scientific trials to explore fully the value of traditional varieties of potato compared to improved varieties. Some observations indicate that native potatoes demonstrate few agricultural advantages over improved varieties. In general, the native varieties perform less well in terms of productivity, are susceptible to biotic and abiotic stresses, make great demands on soil, have a long (180 days or more) cycle, and tend to have no market. However, despite these productivity concerns, more than a thousand varieties of native potato in the Andean area of Bolivia are still being cultivated. This suggests that rural families, in line with their nutritional and economic requirements, have a need to satisfy a biocultural identity that strengthens social relations and traditions.

# Community Needs

Representatives from the communities and genebank took part in a workshop where characteristics and limitations in the current range of potato varieties were outlined and the role of the genebank described. The workshop participants discussed ways of facilitating access to the potato varieties kept in the genebank. Farmers at the workshop asked for old varieties they want to rescue and reintroduce, for varieties from other areas, and for new improved varieties with improved performance. Farmers also asked the genebank to provide high quality seed for further multiplication and distribution.

The main climatic issues in the region's potato cultivation are hail, drought, frost, and water logging, all of which increase the incidence of late blight (*Phytophthora infestans*) and other pests and diseases. In other instances, water is scarce, so farmers look for varieties able to perform well in dry conditions. Other problems that communities identify are pests that affect the harvested potatoes in storage, late blight, nematodes, soil fungi, bacteria, low soil fertility, seed quality, and, in some cases a lack of manure. Farmers participating in PAR workshops noted a reduced diversity of native and of bitter varieties of potatoes.

Chuño is a freeze-dried potato product traditionally made by Quechua and Aymara communities of Bolivia and Peru, in the highlands (*altiplano*). Problems in the production of Chuño result from a sun that is stronger and a cold that is milder than in the past. Highland farmers recalled that a single night of exposure was once sufficient to prepare Chuño. However, in 2010, while the potatoes were left to freeze for an entire week, the weather was insufficiently cold to produce the desired effect.

# Conclusions

Farmers of all four different indigenous communities maintain a substantial range of traditional varieties of their main staple crop, and are aware of the changes occurring in their production environment. They are conscious of the need to use crop diversity to help cope with climate change, recognize the importance of maintaining traditional varieties that provide adaptability, and are clear about the specific characteristics they are looking for in new materials. Characteristics sought for are associated not only with production needs under changing conditions but also with culture and with landscape management.

While these farmers currently have access to various mechanisms that support the flow of materials and access to new materials, the indigenous farmers of the two countries had contrasting levels of exposure to and knowledge of genebanks. A positive effort by genebanks is needed if they wish to explore ways of supporting community needs.

The Free Prior and Informed Consent Agreement provided an important formal mechanism to show respect for farmers and thus build relationships based on mutual trust.

A number of activities which can help communities to access material in genebanks were identified:

- The existence of local farmer groups or associations which can make requests of priority varieties to genebanks;

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- The development of established and agreed procedures for seed multiplication and distribution backed by local authorities;
- Support to farmers to maintain the quality of seed during and after multiplication;
- Support to farmer groups to help evaluate causes for loss of traditional varieties, especially those associated with climate change;
- Regular visits by farmers to genebanks to help identify materials of interest to the communities; and,
- The development of agreed procedures for production of materials by genebanks which have the support and approval of the communities.

Another genebank service of potential value would seem to be the “Seed Hotel Service,” also known as “Participatory Heirloom Gene Banking.” The pressures of climate change and urban migration have resulted in the loss of heirloom varieties at the household level, where farmers are only able to maintain seed viability for one year. By collaborating with genebanks, which can conserve seeds for ten to 50 years, households who need to overcome abiotic stresses with new plant varieties, or are temporarily moving to find employment outside of agriculture, can preserve seed varieties that would otherwise be lost forever. This would enable farmers to experiment with new introductions without the risk of losing traditional, well-adapted varieties. The communities would be directly involved in this service, becoming the genebank’s collection, regeneration and multiplication units.

*Text prepared by Paul Bordoni with assistance from Ximena Cadima, Nicole Demers, Ashley Eberhart, Toby Hodgkin, Sara Hutchinson and Teo Gien Kheng.*

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