



For the inhabitants of the Andes 'living with biodiversity' is more than just an attitude of mind. It is a state of being that indicates the way material, social and spiritual life is reproduced. What the people are able to produce through farming depends on the way they care for their crops and for *Pachamama* or Mother Earth.

Living with biodiversity in the Andes

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Many professionals see biological and cultural diversity as an obstacle to improving production in rural communities. This is probably why many development efforts include the diffusion of monocultures and high-yielding agrochemical dependent varieties. Such an approach, however, drastically modifies traditional diversified agro-ecosystems. The long-term consequence is genetic erosion and the deterioration of natural resources. Ultimately this can lead to a reduction in opportunities for ensuring local self-sufficiency in food.

Farmers in the Andean region, however, regard diversifying agriculture and living with Mother Nature as the best way to safeguard their food supply and way of life. Rather than fight nature, they strive to adapt to its dynamics. Their culture symbolises living with biodiversity and *Pachamama*. Rituals expressing gratitude are ways of manifesting this outlook. Unfortunately, those responsible for promoting rural development rarely consider this perspective.

It would seem logical to adapt the conventional view of rural development and harmonise it with the farmers' perspective. Why not let the farmers guide their own development for they know their needs, aspirations, resources, natural surroundings and culture best.

For over 10 years, the University of Cochabamba Agroecological Programme (AGRUCO) has been conducting participatory research in rural Bolivian communities. The methods of supporting development in these sectors include revaluing, revitalising and strengthening local knowledge and Andean culture.

Diversity in the Andes

Belén de Urmiri is an indigenous community located on the high plains of the Department of Potosí where the altitude varies from 3,650 to 4,250 metres above sea level. The climate is dry and cold. Annual precipitation does not exceed 400 mm and the average temperature is around 11°C. Fluctuating altitude and topography produces countless micro-climatic variations and these form the basis of agricultural diversification.

There is a remarkable diversity in agricultural varieties. The eight main species grown are potatoes (*Solanum ssp.*), *papalisa* (*Ullucus tuberosus*), *oca* (*Oxalis tuberosa*), *mashwa* (*Tropaeolum tuberosum*), quinoa (*Chenopodium quinoa*), barley (*Hordeum vulgare*), wheat (*Triticum aestivum*) and beans (*Vicia faba*). These eight species comprise over 93 local varieties of which nearly 95% are original Andean crops. The great variety of crops in the Andes cannot simply be attributed to ecological diversity. Andean farmers have been continuously experimenting with their species, particularly with the indigenous varieties.

In quantitative terms, a family in Belén de Urmiri cultivates at least six to eight crops a year. These six crops consist of up to 40 varieties. Potatoes can be found in about 27 varieties, making it possibly the crop with the greatest diversity of varieties and species. This proves that the diversification of both species and varieties is a constant feature of Andean agriculture. It is a practice with many advantages.

On the one hand, diversification en-

ables the efficient use of ecological diversity and is an adequate way of dealing with the agroclimatic risks that vary greatly from one planting season to another. On the other hand, it allows for rotation and combining crops. Farmers can diversify their diet using at least a mix of tubers (potatoes, *oca*, *papalisa* or *mashwa*), cereals (quinoa, barley and wheat) and legumes (beans). The variety in diet is further enlarged through different types of consumption and cooking of the assorted varieties of the same crop.

Reciprocal growing methods

Andean agriculture actually depends on a concept like the *reciprocal* growing methods, which include a continuous dialogue between all forms of life. In other words, everything takes care of everything else: humans grow plants and, in turn, are tended by the plants. The inhabitants of the Andean highlands depend on this reciprocity between all forms of life; from humans, plants and animals to hills, rocks and rivers. It is a type of non-compulsory giving and receiving that involves growing and taking care. Development is therefore seen as 'all being united to live well and better'.

Putting your heart into it

This dynamic cultivated biodiversity also reflects the idea of 'complementarity', another important concept in traditional Andean life. The farmers aim to balance between cultivated biodiversity and other resources, such as soil, climate and labour. The idea is to achieve multiple agro-economic, ecological, economic, culinary and socio-cultural objectives.

The way households use crop varieties is dynamic and depends on the family's decision to keep and take care of these varieties. Some farmers clearly avoid growing particular varieties, while others in the community are happy to cultivate them. As Demecio Poma, of the community of Japo K'asa stated: "I got the varieties I grow from my parents. They are old crops and have done well thus far. The *pituhuayaca* is the only one that doesn't want to thrive. Probably I am not putting my heart into it."

Thus, spiritual empathy must exist between the people and the crops they grow. This idea is known as *Ispalla* and can also be conceptualised as the 'small God of seeds' or 'the Spirit of food'. The Andean cosmivision, combined with mixed cropping, provides the basis for food and life security. By living with biodiversity the inhabitants of the Andes seek to reproduce their lives not only socially but also spiritually.

Three souls of potatoes

According to the inhabitants of the Andean highlands potatoes have three different souls.

They believe these souls dwell in the different parts of the potato. The *axayu* resides in the stem and guides the plant's growth. The *janayu* dwells in the stalks and influences germination. Finally, the *ispiritu* is believed to be the potato's main soul and resides in the tubers. The farmers say that without three souls, the potato would not spring forth from the earth. Each soul guides the plant's growth and takes care of the crop.

The farmers are as conscious of the souls of the potatoes as they are of their physical appearance. The farmers commu-

nicate with the soul through various rituals, such as the *P'aquma* or potato's birthday, for example, which is celebrated during carnival. During this ritual the souls of the potatoes and Pachamama are asked to watch over the potato crop.

In this sense potatoes provide not only material food but also spiritual sustenance. Both are considered indispensable for the reproduction of life.

Communities and students

AGRUCO supports the communities in the revitalisation, conservation and on-site improvement of their biodiversity. It aims to enhance food and life security in the communities within the framework of endogenous development. After an extensive process of research AGRUCO has come to the conclusion that spirituality is always present in Andean technology and society. The region has its own cosmivision and culture, in which social, material and spiritual aspects are inseparable from each other and from the reproduction of life.

Today, however, Andean culture is being overwhelmed by outside influences that seriously threaten life security. AGRUCO decided, therefore, that instead of merely transmitting concepts and new technologies, it would provide support to the communities and help them to revalue their own knowledge. This effort implies strengthening Andean culture and cosmivision.

AGRUCO has launched several research projects based on an intercultural dialogue and participatory research, involving both professionals and students. Postgraduate students get involved in community life by paying regular visits; five days a week over a period of about 10 months. Throughout this period the students live in a community and participate in production activities and ritual festivities. They try to communicate with the farmers in their native language in order to understand the community's way of life and cosmivision. They record their experiences in research papers or reports.

These studies yield information for those studying agroecology, sustainable development and the revaluation of Andean knowledge at the Faculty of Agronomy, Universidad Mayor de San Simón (UMSS). In fact, teaching at the university helps AGRUCO's technicians share their research

and fieldwork experiences. In addition to classroom instruction, undergraduate students participate in productive activities and festivals within the communities. The aim is to raise general awareness among future professionals about the importance of local knowledge and Andean culture.

Endogenous development

Research results have revealed ways of supporting self-sustaining development in rural communities. The communities, with the help of the technicians, define small local projects for the so-called Self-Management and Sustainable Development Integral Community Programme (PICADS). After co-ordination with other communities and regional organisations, these projects are submitted to the corresponding municipality. If approved, the communally designed plans become part of the annual operating activities of the municipality.

Another experiment has taken place in Ayllu Majassaya Mujili. In this area the communities are now managing an on-site seed bank containing over 45 varieties of native potato seeds. This supply includes seeds of some varieties that are no longer grown, or are gradually disappearing. The system entails working with the farmers to multiply the seeds of one or more varieties. After the harvest, seeds are re-deposited in the bank. In this way the biodiversity of potatoes is sustained and revitalised.

Moreover, a fund has been established to multiply seeds in communal plots and this provides another source of seeds that are managed by the farmers themselves. Other local experiments to improve potato seeds include selecting plants, hand-picking tuber seeds and storing seeds under diffuse light in special greenhouses. These experiments also include western practices like multiplying potato seeds from rooted cuttings taken from the sprouts. This is a complex practice and helps free potato tubers from disease.

Thus far the communities have achieved encouraging results. Promoting endogenous development seems possible if local skills and potential are taken into account. AGRUCO's experience also suggests that revaluing local knowledge and culture can be achieved by combining support to communities with research and with the training of students.



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Photo: AGRUCO

A family in Japo celebrates *P'aquma* or birthday of potatoes, which includes a dialogue with the 'three souls of the potatoes'