

A wealth of Andean biodiversity

The Andes are rich in biodiversity, but the growing conditions are harsh and constrained by altitude, which means that there are a limited number of food crops that communities in different locations are able to grow. To overcome this constraint, Andean people have always had to be strategic to ensure that they have enough food, and enough of the right kinds of food. Instead of fighting the restrictions that their location and climate impose on food production, they have become specialists and traders – growing many different types of the crops that they can grow, and growing enough to trade the excess with other Andean communities who can grow different crops.

While this system has been in use for thousands of years, it was recently threatened by neo-liberal policies that sought to pull the Andean communities into the cash economy. Since the 1950s the Peruvian government, international finance institutions such as the World Bank, and multinational agricultural companies have promoted the use of new, foreign technologies for agricultural production – such as genetically engineered crops – and have introduced new technologies in storage, transport and organisation geared towards creating an export economy. Since 1995, some areas have been pushed into providing for the national

urban demand, and others for the export market.

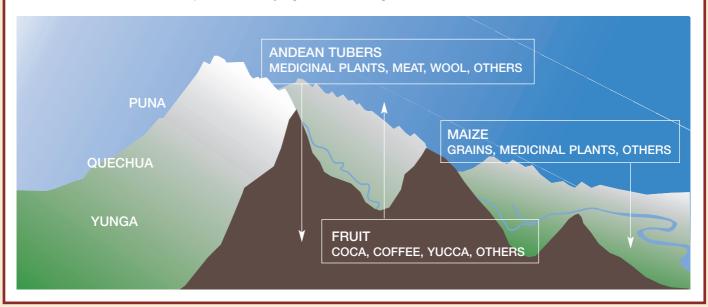
Rural households in the Department of Cusco, in the southern Andes, were groomed to supply the national urban market, with predictable results. Farmers already worked hard to produce enough food for their own communities and some extra to trade. Now they had to increase considerably the volume of food production, using the land that had once fed their households. Farmers became slaves to the market, producing exotic crops such as barley to supply beer manufacturers as well as commercial varieties of native crops that required high inputs of fertiliser and pesticides and that displaced more useful and desirable native crops, which survived only in particularly isolated areas. At the same time, the cost of these inputs increased continually, while the price that their new products fetched declined. The new varieties and crops were farmed more intensively, and required much more time from the farmers. Not only were labour-intensive inputs required to produce them in these inappropriate conditions, but there was also the need to produce tubers, grains, fruits and vegetables whose appearance was acceptable to urban consumers (for example large tubers with no marks at all from pests or disease, and with even colour). The widespread use of pesticides destroyed local biodiversity, and short rotation cycles combined with artificial fertiliser diminished soil fertility.



The Lares valley

The Lares Valley is about 3,600km² and is located in the southeastern Andes. The 19,600 people living in the valley are Quechua, and are spread over about 50 communities. The valley has three agro-ecological zones: the *yunga*, below 2300masl, the *quechua*, between 2300 and 3500masl, and the *puna*, above 3500masl. Each week a market is held in the village of Lares, in the middle *quechua* zone, and women travel from the other two zones in order to trade the products that they can grow but the other two zones cannot. There is some overlap of course, but *yunga* women

bring up their fruit, coffee, yucca and coca, *quechua* women contribute corn, pulses and vegetables, and *puna* women bring down Andean tubers, potatoes and meat. Anyone can participate, and can trade any amount of any crop. Each week at this one market – there are three others – the *yunga* zone contributes about 2400kg of food, while the *quechua* and *puna* zones provide about 3300kg. Altogether they trade more than five tonnes of food per week – more than 15 times the volume distributed by the National Programme of Food Assistance.



• enabling local, autonomous control

of production and consumption -

women over key decisions that affect

both local livelihoods and ecological

and more specifically control by

processes.

market in

A marketing triumph

To try to mitigate the damage that these policies had on the local economy President Fujimori introduced social assistance programmes, including a National Programme of Food Assistance that distributed food. But these programmes only deepened the communities' problems. They were still trying to produce for the urban market, and could no longer grow or buy the food that they needed for their own consumption. These programmes and the changed production pattern had another even more devastating result: between 1996 and 1998 malnutrition rates for children under five in rural areas went up from 37.8 per cent to 47.7 per cent. The high-altitude regions suffered most, including the departments of Huancavelica, Pasco, Apurimac, Ayacucho and Cusco.

Out of this social crisis emerged a local solution: the appearance of *chalayplasa*, a network of Andean markets based mainly on bartering. Indigenous social and management systems combined to enable communities to grow, trade, and consume the foods that they wanted. An action research programme studied the

the Lares Valley in order to understand this new phenomenon and learn more about how local food systems were being supported and sustained. It generated new evidence on the importance of Andean barter markets for: • giving some of the poorest social groups in the Andes better food security and nutrition; · conserving agricultural biodiversity (genetic, 2003- act W species, ecosystem) through the growing and exchange of native food crops in barter markets; * IP IZ ZITE EW · maintaining ecosystem services and landscape features in different agrobarter markets locations ecological zones; and

blue arrows:

people's trips to barter market places

A participatory research methodology

The research highlighted here was an integral part of ANDES and IIED's joint programme on Sustaining Local Food Systems, Agricultural Biodiversity and Livelihoods. Participatory Action Research (PAR) was key to creating an intercultural dialogue. The active participation of the people of the Lares Valley in describing and translating their reality into quantifiable data was particularly valuable.

The research assumes that the Andean agro-ecosystem is a complex social and ecological system. The aim was to consider the agro-system as a whole, starting from the point of view that in a subsistence context, a household's capacity to produce food is related to how well they can:

- (a) conserve agricultural biodiversity;
- (b) maintain soil fertility for agriculture; and
- (c) maintain pest control and pollination processes.

The research analysed not only households but also the agro-ecosystem, which comprises the Lares River basin and Lares District. It includes several agro-ecological zones and constitutes an integrated economic and social system of culturally divergent communities. Three communities were selected in the puna and quechua agro-ecological zones, based on their distance to the main road and whether they had links with the city of Calca in the Incas' Sacred Valley and the city of Quillabamba in the Amazon forest. In the quechua zone the communities of Qachin, Choquecancha, and Lares Ayllu were chosen. In the puna zone the chosen communities were Pampacorral, Wakawasi and Qochayog. In each community, three families were selected to study local livelihoods. The households were randomly selected through a community assembly based on their willingness to participate (after a survey showed that all households participated in the barter markets).

The research took place in four phases:

(a) local food system analysis and agro-ecosystem characterisation;

- (b) description and interpretation of the emergence, functioning and flow of food through the barter markets:
- (c) assessment of the status of agro-ecosystem functions; and $% \left(1\right) =\left(1\right) \left(1\right$
 - (d) interpretation of the role of the barter market.

The selected households were followed through all their daily agricultural activities for three months. An openended questionnaire was complemented by the reflections of women from the *quechua* and *puna* zones using a deliberative focus group technique during three workshops. A land inventory was made during fieldtrips to the Choquecancha and Qachin communities, and experienced local peasants developed an inventory of wild and domesticated species and explained how they accessed and used them. The results were further complemented with a spatial analysis of the food production and access zones produced during a focus group workshop with women who use the barter markets and who identified the borders of the zones on a topographic map (1:85,000).

To analyse the emergence of the *chalayplasa* – a new institution but based on traditions of reciprocity – a focus group drew up a chronology of the appearance and expansion of the Lares Valley barter markets. Focus group members included bartering *yunga* women and *quechua* and *puna* women who attend the markets. They described in depth the factors that had caused the barter markets' proliferation and how the markets currently work, including the products, varieties and exchange equivalencies for different food items. The Lares barter market was analysed in detail because it convenes more regularly than the other three in Qachin, Choquecancha and Wakawasi. An *in situ* survey was carried out with 49 bartering *yunga* women based on produce composition, volume, origin, and seasonal variability. To



complement these results 196 *in situ* semi-structured interviews were conducted with *quechua* and *puna* peasants who frequently visit the four markets. Among the most important questions asked were (a) Why do they participate in the *chalayplasa*? (b) How often do they participate? (c) What products do they exchange? and (d) What do they think about the importance of bartering?

A descriptive evaluation of the agro-ecosystem functions based on social perceptions was conducted covering the period from the beginning of the presidential term of Alan García (1980) until the middle term of Alejandro Toledo (2003). It included economic aspects such as an analysis of the history of price changes in the commercial sales of both potatoes and maize in the cash economy, as well as commercial production inputs and agro-industrial food items.

To show the role of *chalayplasa* in conserving agricultural biodiversity, soil quality, and pest control and pollination processes, household strategies for food procurement were evaluated, including subsistence production, cash purchases, traditional means of reciprocity, and new barter markets. This interpretation was discussed and reinterpreted with social representatives, politicians and technicians in a workshop with all the focus groups and in an inter-institutional workshop between the local people, local and regional political authorities, and scientists involved in the research. The results were then used to evaluate the importance of the physical evidence collected from plots.

Conservation of agricultural biodiversity

The data collected from various sources about types and varieties of crops grown was used to estimate households' 'minimum mean richness', in other words how many

different types and varieties of produce they grow and consume. By comparing the produce that is traded in the markets with the produce used in households, it was possible to show to what extent markets were households' main (in some cases only) source of many local and traditional varieties.

Maintenance of agricultural soil fertility

Soil samples were analysed from each of the nine communities. In each case three plots were selected showing the different phases of agricultural management: soil under cultivation, soil under fallow, and soil never cultivated because of poor quality. Three soil samples were collected for each plot and analysed to estimate the richness of 'indicator species' – those species known to show evidence of good soil condition. The contribution of barter markets to the conservation of soil fertility was estimated by recording how many indicator species were present in plots growing crops traded in the <code>chalayplasa</code> compared to all plots.

Existence of pest control and pollination processes

A sample of insects was collected in each agro-ecological zone and then classified as pollinators, pest controllers, or pests. This enabled researchers to compare the abundance and diversity of useful insects on plots growing native crops and being farmed in a traditional way (for example rotating crops and avoiding artificial fertilisers and pesticides).



Emergence of chalayplasa

The barter market – and specifically the chalayplasa network in Lares – appear to have emerged in connection with ancient traditions of the production and supply of coca (Erythroxylum sp.) for highland consumption. Coca consumption and direct use by the highland population has been largely determined by its exchange for quechua and puna food products. In some cases puna and quechua farmers travelled to yunga areas to exchange their coca for yunga food products. Coca salesmen obtained potatoes, maize and meat for their temporary workers from highland farmers during coca harvesting. Muleteers and llama ranchers from the quechua and puna zones also travelled to the lowlands to make a variety of exchanges for a range of goods and services, from transport to agriculture and livestock products such as wool and meat.

Since the 1970s, however, two main factors have helped weaken these patterns: (a) the institutionalisation of 'local development' assistance programmes that aim to get local produce into the cash economy through more intensive farming practices and (b) the prohibition on the free trade of coca through the Law on the Repression of the Illicit Drug Trade (DL N°22095/78), which makes the state the only institution allowed to trade coca leaves (internally as well as externally) through the National Coca Company (ENACO). Because it was impossible to continually intensify production methods, households instead participated in the cash economy but kept their 'non-currency' economic system going at the same time.

In 1973 the first market appeared in the lower valley, in Lowaqay. Local women describe the emergence of the chalayplasa as a strategy to procure food directly derived from ancient forms of coca-food exchanges between people from different altitudes. After that new markets began to appear further up the mountains. In 1978, and following the construction of a road into the upper watershed, markets were also established in Pirki and Yerbabuenayog. People from the Choquecancha and Qachin communities - on opposite sides of the valley – attended these markets. The number of organised yunga women attending the markets slowly increased, and then stabilised with about 40 of them attending each weekly market. In 1982, the progressive advance of the road into the highlands enabled bartering women to set up three new markets, in Lares Ayllu, Choquecancha and Qachin in the quechua zone. These markets still exist. In 2003, a new market in Wakawasi in the puna zone appeared as a result of the construction of a new road. The expansion of the barter market network drives the institutionalisation of food exchange strategies among people from different ecological tiers.

President Alan Garcia (1980–90) tried to encourage people in the region to buy more of their food, a state strategy that continues to this day. But the women who participate in the markets say that there is a constant increase in the proportion of each household's food that comes from the barter markets. Today, participants describe barter markets as the second best way to procure food, after subsistence farming.



Chalayplasa

Products are exchanged in the barter markets using socially agreed measurements. Some products are exchanged item by item, for example potato and manioc. Others are exchanged using local measurements of volume such as hawkt'ay and poqtoy, which refer to one or two handfuls of any product. Another exchange equivalency is the unay precio system, which is based on the amount of a given product whose original price has been socially maintained from the past. Sometimes a trade also involves generosity and expressions of solidarity, such as yapa, which is when an extra amount of a given product offered on top of the agreement, for example to a woman who is clearly in difficult circumstances, or who is unable to produce as much as other people, for example because of old age.



How does chalayplasa work?

Chalayplasa is a network of marketplaces in communities from the quechua and puna zones in the Lares Valley. Women are the main participants in these markets, where they exchange – without using currency – fruits from the yunga zone (lower valley areas corresponding to the Yanatile and La Convención forests) for grains, tubers and other products from the quechua and puna zones in the upper valley. Approximately 4,000 people from 31 communities from the middle and upper valley use the chalayplasa.

Surveys of women who participate in the chalayplasa reveal that about 3,300kg of food comes from the yunga forests, compared to 2400kg from the puna and quechua zones. Most foods from the middle and upper valley are starch-rich products (94 per cent) and legumes and meat (6 per cent). Potatoes account for almost half of the weight (47 per cent) of the starch-rich group, followed closely by maize (44 per cent), along with olluco (3 per cent), chuño and oca tubers (3 per cent), and quinua (1 per cent). Most of the food exchanged from the lower valley comprises fruits (87 per cent), starch (4 per cent), vegetables (4 per cent), coca (2 per cent), and legumes and meat (1 per cent).

Yunga women reveal that they bring to the market a range of fruits produced on their mixed-crop plots. These lands are mainly used for subsistence farming, with the production surpluses exchanged in the chalayplasa. Subjective assessments

during focus groups with women from the *quechua* and *puna* zones suggest that 35 per cent (*quechua*) and 38 per cent (*puna*) of the food available for household consumption comes from subsistence farming. Almost a third of the household's food comes from barter markets (30 per cent in the *quechua* zone and 29 per cent in the *puna* zone). Farmers bring their surpluses from subsistence farming to the markets, making them an efficient way to give farmers economically and ecologically sound options within their food system.

Some products from the lower valley such as manioc play a similar role in the household's diet to products from the middle and upper valley, such as potato. Even though these products are so similar, however, the women still set some aside to bring to the market and trade (even if there is no surplus of that crop). This satisfies families' desire for a diverse diet that has different flavours, textures and appearances – even though it means storing and transporting the products to market. Because the women come from such a range of altitudes the volume and diversity of produce in the barter markets is quite stable. The amount that women set aside to exchange in the chalayplasa depends on their weekly food requirements. Quechua and puna women use most of the food acquired in the barter markets for family consumption (approximately 95 per cent). The other 5 per cent is used for gifts and to exchange with friends and family for other goods and services.

Keeping agroecosystems healthy

The results of the agro-biodiversity conservation assessment show that quechua households conserve an important level of food crop richness. Many broadly distributed and common varieties are present, such as ch'ullpi, ch'uspi, owina, and paragay for maize and boli, beruntos, gompis, wayro and k'usi for potato. At the agro-ecosystem level there are about 53 maize varieties and 247 potato varieties, although not all households are able to conserve such diversity. Although these figures are not exact (due to farmers' resistance to counting conserved richness), these results show that barter markets directly contribute to agro-biodiversity conservation at the household and agro-ecosystem level. About 86 per cent of listed crops in the quechua zone are bartered, along with 100 per cent of recorded crops in the puna zone, while only 34 and 60 per cent of crops from both zones are sold in the cash economy. Maize varieties participating in the chalayplasa account for 80 per cent of maize richness at the household level, while for potatoes the figure is 60 per cent. In the cash economy, only 30 per cent of maize varieties and 23 per cent of potato varieties are eligible to be sold (that is they comply with certain parameters such as size, shape, and lack of pest infections or diseases). Even

though every crop that is sold may also be traded in the barter markets, the reverse is not true.

This research demonstrates that the collection of potato varieties traded in barter markets satisfies all the criteria that farmers desire. Commercial varieties only satisfy production and financial criteria, whereas native varieties also satisfy criteria linked to medicinal, cooking, exchange, social and cultural uses.

Results from both the soil quality assessment carried out during the fieldwork and the physicochemical analysis suggest that farming practices used in the landholdings visited in the *quechua* and *puna* areas would enable the soil quality to recover through different management practices. The concentration of organic matter and nitrogen was found to be high. And the traditional practice of allowing plots to rest for seven years helps it to recover; soils at the end of their rest period have a higher proportion of the species that are an indicator of high soil quality.

As it is possible for only one controlling species to be vital in biological pest control, the existence in the Lares Valley of a combination of natural enemies – like parasitic wasps, predator beetles, spiders and fleas – suggests the existence of active pest-control processes. The pollinator species distribution found among the



different altitudinal tiers suggests that they are directly associated with the dominant native vegetation. Considering that samples were collected after the harvest, the existence of a combination of species suggests that their survival is due to the presence in the agroecosystem of alternate populations with fluctuating prey and other food sources – such as seeds and organic material – that are found not only in the cultivated plots but also in borders and neighbouring areas with nondomesticated vegetation. The transition between border areas and the inside of landholdings is facilitated by crop association systems.

Data from the Third National Agricultural Census revealed than in 1993 pesticides and fungicides were used on approximately 4 per cent of the total cultivated area in the valley. Only 29 per cent of this 4 per cent corresponded to holdings smaller than 4ha; farmers had learned very quickly that the planned intensification with pesticide use that was being promoted simply was not viable in their farming system. Even when cultivation and management practices by farmers in the Lares Valley varied, the results show that farmers did not apply much fertiliser and pesticides, and that they conserved multi-cropping practices,

associations, and rotation cycles. These strategies help maintain a permanent heterogeneous mosaic of natural and agricultural areas that are farmed at different times, some more intensely than others. The agro-ecosystem managed as a complex and diverse whole creates the living conditions for a wide variety of organisms that would not exist in a simplified system. Farmers' local adaptive management practices thus ensure that genetic, species and ecosystem diversity are conserved and renewed. The resilience of linked social and ecological systems is enhanced as a result of this dynamic management of biodiversity by Andean indigenous peoples.

Our results suggest that participation in barter markets enables the farmers to keep their own technically complex processes alive. These dynamic processes are based on the rational use of physical, chemical and biological phenomena, not only on agricultural land but also on natural and semi-natural ecosystems in the wider landscape. As regulative institutions, barter markets help sustain local food systems and the ecosystems in which they are embedded. They do this by mediating activities that enhance the conservation of agricultural biodiversity, soil fertility, and local pest control and pollination processes at different spatio-temporal scales.





Principles behind the social systems

The household surveys from the puna and quechua zone show that everyone participates in the chalayplasa. The main factors behind its popularity are:

- There is no minimum amount of food required to participate in the chalayplasa; any amount can be exchanged.
- Exchanges are not based on the visual quality of products. The principal preference factor is flavour, which the native varieties on offer provide. The women also argue that low pesticide use results in a better flavour.
- Exchange is based on reciprocity and complementarity. It includes people whose productive capacity is lower, such as widows and older people, who may have fewer products and whose products may be smaller and visually less attractive. Proof of this is the persistent use of the ritual of yapa in adjusting the proportions of products exchanged.

Survey results on household participation show that the markets are based on principles of open access. Time constraints during certain months of the year (mainly during the growing season) mean that not every household visits a market every week. This is often the case in newly formed households

with small families, and also in households with mainly older people or people with physical disabilities. In these cases, traditions of reciprocity and solidarity ensure that these families have access to the barter markets by entrusting others with their goods or errands, locally called *encomiendas* or *encargos*. For these households, access to *chalayplasa* depends more on good relationships with neighbours and/or relatives than on the availability of time or on produce to trade.

The way chalayplasa works suggests that exchanges contain the following elements: (a) reciprocity based on friendship and kin relations between women from vunga, quechua and buna zones: (b) redistribution based on social participation norms and access strategies to the different altitudinal tiers by different agro-ecological zone communities; and (c) selfsufficiency based on subsistence farming by each household. Through chalayplasa, inter-family relations are maintained by doing errands for each other. Aside from constituting a material exchange network, they also represent a symbolic and effective exchange network. The chalayplasa are economic systems governed by a polycentric system of local institutions that manage the agroecosystem.

Local governance for food security and ecological sustainability

A number of different communal institutions contribute to barter market governance. Women, households, and communities are the key elements, but women are the hub of the network, managing the local food systems at different levels and on different scales. They not only feed their family, but also manage the household budget and participate in both agricultural planning and chalayplasa management. Women's participation at many different levels ensures that the governance of local food systems can be adapted to the needs of the community and to dynamic ecological processes. The analysis of governance aspects suggests that barter markets are a genuine example of a popular economy. They emerged as a dynamic way to keep alive the productive self-management and decentralised governance of local livelihoods and biodiversity. Barter markets also strengthen social relationships. They ensure that families have a stable food supply over the short and long term through the management of: (a) risk, (b) uncertainty, and (c) ignorance linked to human subsistence and development in the Andes.

Chalayplasa's working principles are those governing the individual and collective activities of *quechua* communities: (a) *munay*, meaning 'to want', (b) *yachay*, meaning 'to learn', and (c) *yankay*, meaning 'to work'. These principles are applied by local people in order to adapt traditional norms and behaviours to new circumstances, resulting in genuinely local responses.

The barter markets in the Lares Valley are forms of non-monetary food procurement that have grown out of the Andean culture. Their consolidation is a household's key strategy to buffer imperfections of the cash economy while satisfying local food needs. Chalayplasa is a local response to both the loss of control and the increase in uncertainty of food markets. Barter markets allow farmers to keep on caring for processes associated with agro-ecosystem multi-functionality at different levels using conservation strategies and traditional agricultural practices. With the chalayplasa, local communities redefine their economic system and incorporate a combination of monetary and non-monetary forms of exchange that sustain fragile mountain ecosystems, biodiversity and culture.



How – and under what conditions – can diverse, localised food systems be sustained in the twenty-first century? Who gains and who loses when local food systems are strengthened? These are some of the questions examined by the Sustaining Local Food Systems, Agricultural Biodiversity and Livelihoods project.

This project combines a political ecology perspective on food systems and livelihoods with action research grounded in local practice. As such it seeks to bridge the gap between the academic orientation of political ecology and the largely activist focus of food sovereignty, human rights and environmental justice movements.

The decentralised management of agricultural biodiversity by farmers and their communities is increasingly seen as a prerequisite for sustaining food systems, livelihoods and environments. Although the international community does emphasise the need to involve farming and local communities more centrally in the management of agricultural biodiversity, there are huge gaps in knowledge and institutional constraints that limit national capacities to scale up these approaches. In order to help fill these gaps, this research seeks to analyse how and under what conditions can decentralised governance, farmer participation and capacity building promote the adaptive management of agricultural biodiversity in the context of localised food systems and livelihoods.

The project is working with partners in four different countries, India, Iran, Indonesia and Peru. The research adopts an international, action-oriented, interdisciplinary and case study approach that builds on the expertise of local resource users and national and international partners. Throughout, the emphasis is on doing research with, for and by people – rather than on people – for learning and change.

PERU

The action research facilitated by ANDES (Quechua-Aymara Association for Sustainable Livelihoods) and IIED emphasises participatory and people-centred processes in sustaining local food systems, diverse ecologies, livelihoods and culture.

INDONESIA

Working with a new foundation, FIELD – Farmers Initiatives in Ecological Literacy and Democracy – the project builds on the pioneering approach to farmer training, the Farmer Field School, and their work on community integrated pest management (CIPM), which depends heavily on both using functional biodiversity to control rice pests and co-ordinating action by farmers to sustain local livelihoods and change policies.

IRAN

Dialogues with partners identified in Iran have focused on a 'learning by doing' project aimed at reviving nomadic pastoralism and associated livelihoods and agricultural biodiversity. The Centre for Sustainable Development (CENESTA) is IIED's project partner in this endeayour.

INDIA

Local control over biodiversity important for food and agriculture in the drylands of Andhra Pradesh is the focus in India. IIED's partner is the Deccan Development Society, and joint work between local farming communities and women's collectives (sanghams) has grown out of village-level dialogues where farmers identified priorities and opportunities for this participatory action research.









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