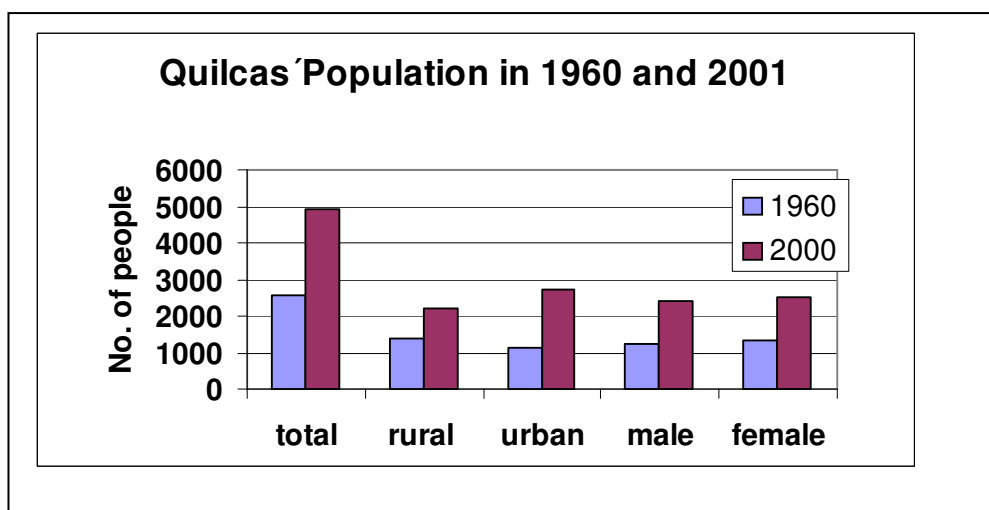


## The last 40 years, Changes in Land use in Quilcas, a community in the Mantaro Valley in Central Peru<sup>1</sup>.

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Dramatic loss in land accessibility on the one hand, and the doubling of the population (Graph 1) on the other has led a process of adjustment and changes in land use by the Quilcas community members during the last 40 years which have been documented.



The community Quilcas is located North East of the city of Huancayo in the Mantaro Valley Dept of Junín, in the Central Andes of Peru<sup>6</sup>. Its territory occupies a narrow strip 30 km long in an East West direction where the western lowland plains reach the Mantaro River at an altitude of 3200 m. The wider eastern boundary is the Galciers of the Huaytapallana mountain over 5,500 m. The main feature is the significant changes in adapted crops and carrying capacity as one moves from the lower zone to the higher, ones. Andean culture has adjusted to the climatic variability by adapting an array of crops and diversity within the crops which are grown in the varying ecological zones, with a strategy of covering the entire array of niches. In the Andes agriculture goes hand in hand animal husbandry which provides manure, meat and wool in each of the production zones. Three distinct agro-ecological zones are recognised by community members: Low, (3200-3300), Intermediate (3400-3800) and High(3800- 4800).

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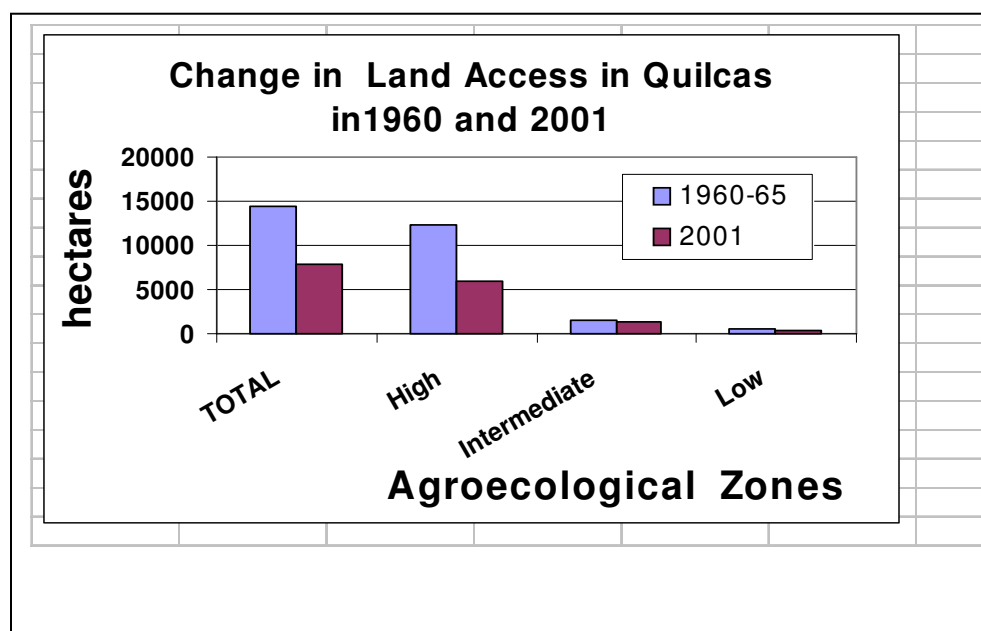
<sup>2</sup>Grupo Yanapai Casilla, <sup>3</sup>Grupo Yanapai Casilla, <sup>4</sup>Grupo Yanapai Casilla, <sup>5</sup>Grupo Yanapai Casilla

<sup>6</sup>Between 11° 52'34" and 11°57'40" S.L. and 75°10'40" and 75°16'20" W.L.

The field team of Yanapai and different groups of community members who constructed 6 maps, during 8 workshops carried out this land use study. The Ministry of Agriculture uses a map, which they sell to communities to delineate community boundaries. This map is on a scale of 1/25000 and this was the basic tool on which new information was superimposed. Areas of land use were calculated from this map. The maps for 1960 were constructed from memory with the aid of 1960 aerial photographs. The present land use maps, and the soil maps were constructed by reconnaissance of the area. Community records were used for additional information. The Geographical Information System (GIS) technology was not used,<sup>1</sup>. Community leaders constructed map with their vision of the future.

The most significant change is the loss of over 54.8% of the total land area, which from reconstructed maps covered 14340 ha. in 1960 and is now down to 6487 ha. Land has been lost in all three agroecological zones, the greatest loss (51%) occurring in the high zone known as "Puna".

Graph 2



The loss of water for irrigation was a shocking, and significant loss in wild flora and fauna recognised and documented by members raise concern. The loss soil productivity, and incidence of insect pests and diseases on their crops were perceived but hard to document

### **THE HIGH AGROECOLOGICAL ZONE OR "PUNA".**

This area which is communally owned, is too high for most crops and almost exclusively used for pasture, except for a steep area where native potatoes are grown in sectoral fallow system.

[1] There may be slight errors in the methods utilised to calculate area.

Each sector is redistributed yearly to the 250 members of the community to plant native potato varieties who still use complex and labour intensive traditional technology, where each family plants about 20 different native varieties on average. It is in the domain of each family to manage the seed which is done along family ties and other networks so that families manage a constellation of different varieties altogether 149 different varieties were recorded among 20 families studied.

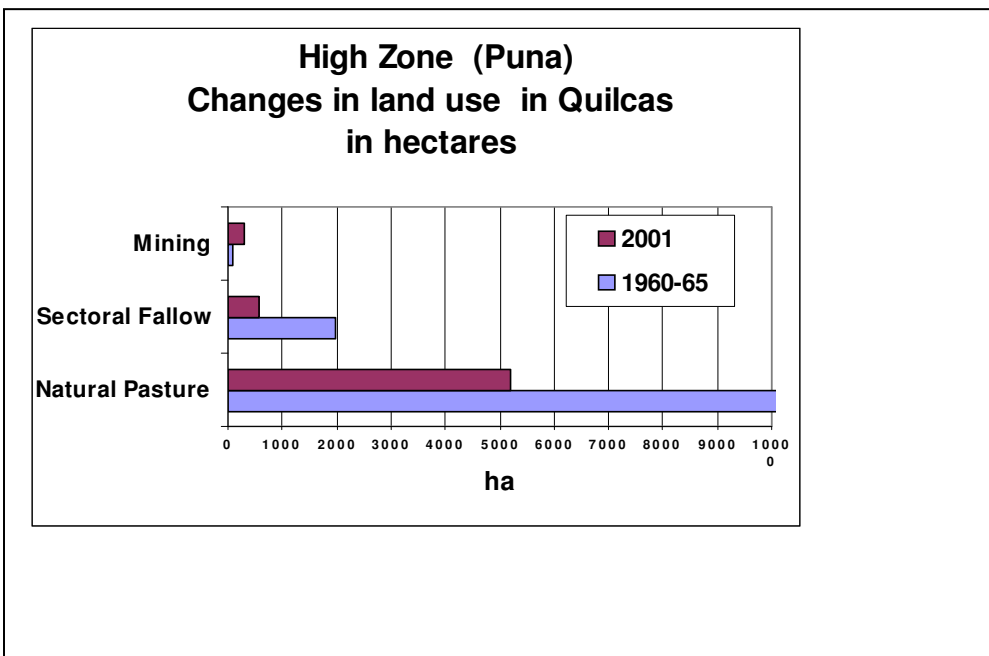
In the 1960's there were 9 sectors, "turnos",<sup>2</sup> thus potatoes were planted once every nine years on the same land, whereas in 2001 there are only 5 sectors. Until the early 60s most potatoes including the native ones were grown in the intermediate zone. When the sectoral fallow system collapsed in the intermediate zone, and the community moved its native potato cultivation to the "Puna. This has made land which formerly was only used by herders accessible to members of the community who live in the intermediate and low zones. The remaining 10 200 ha in the high zone is permanent natural pastures used in 1960 by 33 highland herders called "estancieros". Records in 1962 show 7843 animals, (sheep, llamas, cattle and horses). In contrast the latest communal inventory shows 10 104 animals with 57 households registered as "estancieros". In the 1960's no women figured as "estancieros", now 20% of them are women.

The huge land loss is mainly due to the "Proyecto especial de titulación de tierras" a law promulgated in 1997 where each community had to have its land titles re-inscribed, and pasture land which was shared with the community of Rangra and San Pedro de Saño was subdivided by bureaucrats who did not physically check out the area. Further land was lost in litigation with neighbouring communities, and finally owing to a surprise appearance of 16<sup>th</sup> century land title where a family appropriated over 360 ha of communal land. Most community members still consider this allocation illegal, however, this family has the necessary land titles. The extent of land loss was brought home with the mapping exercise carried out by members of the community, who had not realised how serious it was. The gradual deterioration of pasture quality and concomitant animal quality, areas of soil erosion is a problem mentioned most frequently by community members.

In 1960 the few deep shaft copper mines which transported minerals by llamas to the San Jerónimo train station had little impact. In the year 2001 the open shaft talcum mine which has opened a new road and destroyed 300 ha of pastures, polluting the rivers, threatening pastoral life with explosions, miners harrassing female shepherds, is deeply disturbing to the community, especially when the community leaders discovered that 3000 further hectares are under claim. Community members informed us that the copper mines which have been closed for 25 years have been reopened for further exploitation.

<sup>2</sup>turnos in Spanish, are called “Laymis” in Quechua, and “aynokas” in Aymara.

Changes in the use of the Puna are summarised in graph 3.



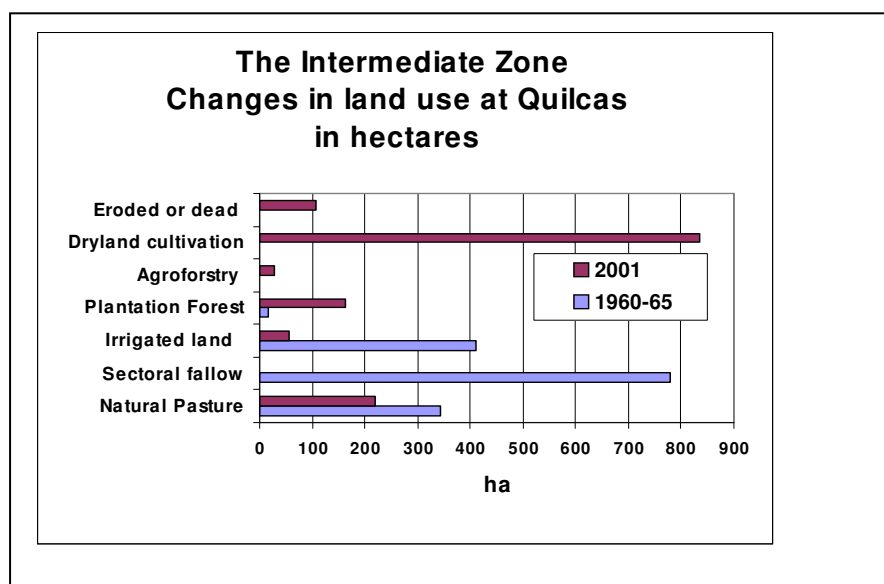
## THE INTERMEDIATE ZONE

This crucial production zone has also undergone significant changes. Community land has moved to private ownership. Colpar and Llacta are the two villages belonging to the community located in this area and where most food crops are grown: Andean tubers (potato, olluco, oca, mashua), cereals (barley, wheat, oats) legumes (faba beans, peas and tarhui) and for the last decade maize, which has been selected for this higher ecological niche. Potato is the most important crop, for food and for the market. Land for pasture is also important for the animals kept near the villages.

Although land loss is only 9%,<sup>3</sup> the disintegration of the communally regulated sectoral rotation system during the late 60's is a dramatic change. The communal sectoral systems encompassed 780 ha which is now managed by individual households. The ownership pattern is that families divide their land to all their children both male and female, and so there is a continues subdivision, which coalesces again as young couples marry and work both of their

farms together, which leads to the familiar pattern of many small and scattered fields. These fields are increasingly getting smaller as land gets further subdivided, so that it may be unable to provide a family with sufficient food to feed itself. Can the word sustainable be applied here. One consequence is the intensification and an increased use of agrochemicals which first appeared in the 1960's. The community members blame the overuse of fertilisers and pesticides for the current perceived loss of productivity as well as increasing problems with pests. Growing oca (*Tropaeolum tuberosum*) has been practically discontinued due to a new weevil which totally destroys the crop.

<sup>3</sup>from 1548ha down to 1411 ha owing to litigation lost to neighbouring communities. These changes are summarised in graph 4.

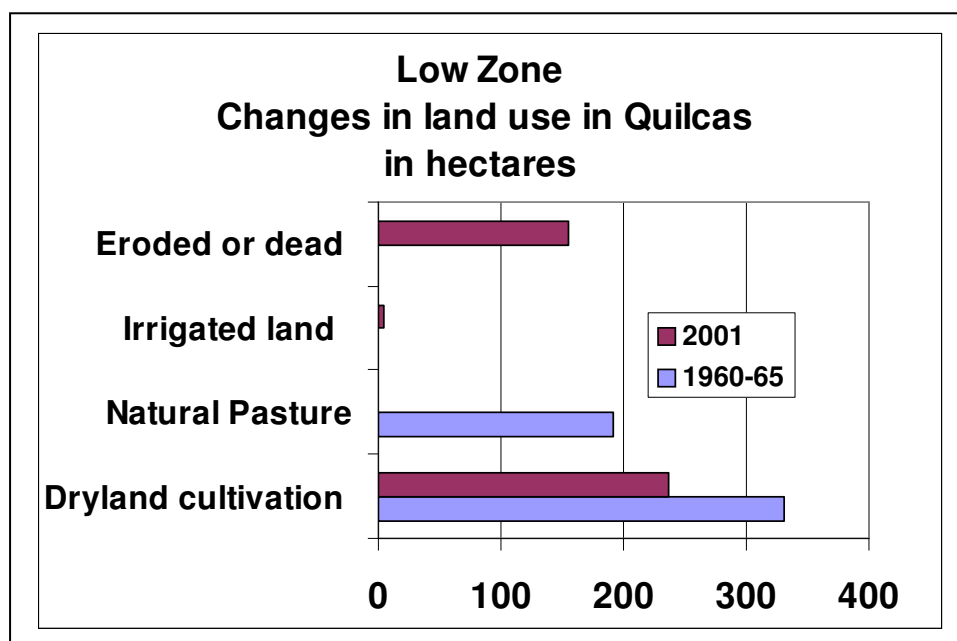


**The loss of water** in this zone for irrigation is alarming. In the 1960's the group in the workshop was able to map over 400 ha of irrigated fields which permitted double cropping each year. These have now dwindled to merely 57ha. The irrigation canals dried up, some dramatically during an earthquake in 1970, which were never repaired. Many water sources have also dried up; 20 "puquiales" or water sources in the 1960's have been reduced to two. The loss of natural pastures is partly a consequence of the loss of planting communally in sectors, and partly because of government sponsored forestation projects where the community planted 163 ha of eucalyptus in the past 40 years. Currently these trees are an important source of firewood, cash, and construction material, although the soil under the trees is eroding and suffering degradation on the steep slopes where the trees have been planted. The role of these eucalyptus plantations in the drying up water sources has not been determined. However in the last 5 years the community has switched from planting eucalyptus to native tree species, which are not as commercially desirable but make more ecological sense, especially replanting with Aliso (*Alnus jurullensis*) and Quinual (*Polilepis Incana*) where the leaves form humus rich in nitrogen. In the 1960 map there is no mention of eroded soils, but 160 ha of eroded soils are recognised for the 2001 map. The erosion process was probably already underway earlier as these are now bare rocky outcrops. When

and why this process happened remains a subject of further study. It should be mentioned that old fields are in “paterias” slow formation terraces, and in many section they are surrounded by native trees showing that over 60 years ago farmers invested in their future protecting the soil.

The town of Quilcas is located in the low and relatively flat agroecological zone It was founded by the Spanish who destroyed the original town, during the “reducciones” in the 16<sup>th</sup> century. Land in the low zone is owned privately and has been subdivided many times. Some families now only own as little as 3 rows in one field. Although all crops can be grown here, maize is grown almost exclusively, albeit, often intercropped with phaseolus beans, peas or faba beans. Because maize is so important and also due to it is closeness to the urban centres land in this sector is most valuable. Here the community again lost land to San Pedro de Saño and San Jerónimo in litigation, so that there are 127 very valuable hectares less in 2001 than in 1960, reducing the total area it from 523 ha to 237 ha. Furthermore there were 192 ha of pastures mapped in 1960 and none now. While in 1960 no areas of erosion were mapped, 154 ha of eroded (dead) land made up of bare hills and clay areas used for brick making have now been registered. The only positive aspect is 4 ha of irrigated land which were not there in 1960, (used to grow alfalfa for the market).

The changes in the Low zone are summarised in graph 5



A previous map executed by soil specialists from La Molina and Wageningen in 1998 painted a grim picture. This study pointed out the extreme vulnerability to erosion of 54% of the land which should be placed under protection. They classified only 10.4% as of moderate or low suitability for arable farming. They found all soils extremely acid. It is now known that native potatoes have a very high tolerance to acid soils which has been mostly lost by the “improved” varieties. Similarly when evaluating the pastures they found only 14.6 % with moderate or low suitability. This study was ignored by the farmers because of the wide gap between the actual use and the recommendations.: There was also a new land use map constructed by local soil scientists, which uses different criteria and comes a bit closer to the

communities use of the soil. These proposed use of land will be discussed with the community.

## **MAP OF THE FUTURE**

The community leaders constructed a map of the future where they mapped out areas for urgent action on pasture improvement, which means rotating land, and proposed far reaching ideas that would improve land management and restore soil fertility gradually. They also hoped to negotiate with the mines so as to get just compensation for their lost land. How this can be made compatible with the population growth, which in Quilcas has almost doubled from a population of 2557 to 4937 in the last 40 years, creating a greater demand on all resources, will be a challenge for the future. This challenge is greater when we consider that in the last decade communities have lost much of their source of power by a series of rules and laws promoting land privatisation, and munisipalization, the consequence is that government funds are diverted to the urban sectors.

This exercise so far has helped visualise the processes at play in the last 40 years., which comes at the right time as the process of building alliances is just beginning, but it has the potential of not only turning the downward spiral around, but serving as a model to other communities.