



Sustainable Rural Development in the North Andes

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ABSTRACT

The development of rural areas in mountainous regions of South America has been subject of research and discussion, not only among the academics, but also – and above all – among politicians. The influence of global economic and social processes is likewise ensuring that South American rural mountainous areas are more likely to join up the global networks via which goods are distributed and traded. However, many difficulties and barriers have been met with on the way, and these will need to be dealt with at the local level. Since the 1980s, rural environment in South America has experienced major changes, and these changes have been brought about by the need to adjust political strategies to new global conditions of sustainable development. New strategies of development adopted by inhabitants and political elites have not always proved effective in the face of long-term neglect over the integration of local markets for small producers with their national and international counterparts, and this generates a situation in which local agricultural markets find themselves in circumstances of neglect and uncertainty. So, how can sustainable development strategy be performed in this situation?

1. INTRODUCTION

Assessment of the influence of rural development policies and strategies is a very difficult task. The different needs of recipients and the various, non-integrated projects being implemented by a large number of institutions do not favour the development of a cohesive development concept. At the same time, rural areas seek out new possibilities for development and investment in activities outside agriculture. Sectorial development programs, or those targeted at the creation of a palette of new possibilities for generating goods and services, change traditional models for life in the family and the whole rural community. However, their size and fragmentary nature (sometimes applied in just small parts of an

administrative unit) do not allow for full insight into effectiveness. Beyond that, it is typical for a certain degree of success with the first year (at best the first few years) of implementation of a project to be followed by a wind-down as further support from outside dwindles, experts pull out, organisers move on to another region and local inhabitants find themselves unable or unwilling to proceed with project work.

The states in South America have taken up a range of different strategies to encourage the development of their rural sectors. Some are more advanced than others in this respect – e.g. Mexico (Skoczek, 2013), while others waited for a general improvement in the state of the economy post-2010 to introduce programs and strategies by which living conditions in rural areas might be improved. The latter

group includes Peru, in which the burden of helping peripheral rural regions had hitherto fallen squarely on NGOs. While governmental programs addressed to the raising of production are more and more effective, the shaping of mechanisms for inter-sectoral action and activity bringing together different central and regional institutions is not so. This truth has been demonstrated many times in the course of interviews, as interviewees speak of the difficulties farmers continue to encounter. In rural development programs, the emphasis is on education, health protection, increased agricultural output, the development of rural infrastructure, improved living (including sanitary) conditions and social development.

Policy pursued by central and regional government is dominated by a clientelist approach to project management and the assignment of resources. The central government funds undertakings as regards road, telecommunications and water-supply infrastructure. Education is also within the remit. From the point of view of rural regions, this activity can only be judged inadequate. The achievement of public objectives is not directed at (and nor does it in practice work for) increased production assets. All that happens – and then only in a certain sense – is support for the strengthening of community assets, by way of subsidies for rural regions (Córdova-Aguilar - *Nuevo Plan*, 2013). Programs enhancing production-related assets are implemented thanks to an understanding between three parties: individual farmers, the regional authorities and the central authorities.

2. THEORY AND METHODOLOGY

The most important policy task for the regional and central authorities is to meet the demand for food in the poorest areas. The region under consideration is Peru's poorest, notwithstanding rather favourable environmental conditions. Furthermore, the effects of the action taken have not been cohesive, with effectiveness first and foremost depending on political conditioning and local relations with the authorities, as well as the support of defined interest groups.

The consequence of all of this was for one of the objectives of the work carried out to be a determination of the degree to which inhabitants engage in activity outside agriculture, in this way augmenting the income a family receives from farming itself. It was assumed that the residents of Frias – having limited land resources at their disposal – would seek to supplement their income from farming by way of other work.

In poor regions, where difficult management conditions have a particular influence on the level of agricultural output – and thereby on the standard of living of society – the concept of "environmental security" would seem to be attractive, as causes and

consequences of underdevelopment are discussed. The relationships (linkages) between degradation of the environment and environmental security are connected by issues relating to the environment for human life and socio-political questions. They should therefore be the subject of multidisciplinary analyses.

Since resources of land are finite, people apply various techniques to raise their productivity. However, measures of this kind have their limits, and overuse of land is unsustainable and capable of leading to impoverishment of livelihood. Ultimately, the effect is either to worsen rural poverty or (sometimes and) to make it necessary for alternative livelihoods to be sought, primarily by means of emigration, or a switch to non-farming activity in the same place. But irrespective of, or in connection with, the achievement of the sustainable use of local resources and opportunities, alternative livelihoods may lead to sustainable development and the supporting of the agricultural sector.

In this situation, is it possible to speak of the safeguarding of the basic means of existence in areas peripherally located vis-à-vis the center and largely inaccessible (thanks to roads being absent or in a poor state)? The safeguarding of existence that leads to an appropriate quality of life may be defined as a set of features both quantitative (like income per inhabitant) and qualitative (security, good neighbourly relations, mutual trust, and interest in the wellbeing of the community as a whole). Any assessment of this state will mainly be achieved through direct study, with account being taken of the cultural and social contexts, as well as the shaping and development of the given community.

3. RESULTS AND DISCUSSION

3.1. A geographical characterisation of the region under study

The research was carried out in the Frías district of Peru's Sierra de Piura. This is in the southern part of Ayabaca province, in the *depertamencia* of Piura. The district covers 567.8 km², though size is less of a relevant factor to the present considerations than topography. Lying on the west side of the Andes, this is an area of slopes, Andean valleys and Andean plateaus, at altitudes ranging from just 400 m a.s.l. to as much as 3360 m. The huge altitudinal range noted above is associated with exceptional disparities in both existing standards of living and opportunities for development. The study described here used questionnaires given to the inhabitants of localities at different altitudes, the aim being to determine how (or how strongly) opportunities – as well as strategies people adopted to "get by" or develop – might be related to elevation above sea level.

The south-western part of the Peruvian Andes within the department of Piura is just 4 degrees of latitude south of the Equator – a factor that ensures rather constant temperatures, as well as limited amplitudes of temperature through either 24-hour or annual periods.

Environmental conditions are also such that this is a biodiverse area even by South American standards, in which conditions also favour the cultivation of a great many tropical crop plants. Within the overall area of the district equal to 47,800 ha, there are some 18,700 ha under cultivation. However, only around half (8,200 ha) of the arable land here is irrigated, which means that the dry season can be associated with shortages of water – to the extent that irrigation is a must if efficiency and output in farming are to be raised. Some 22,400 ha of land comprises pasture, this being an important element where the development of livestock (mainly dairy-cattle) raising is concerned. Just 3,400 ha of the district remains forest-covered.



Fig. 1. Localization of the Frias District.

As has been noted, Frías is a rather small district, but one whose varied natural conditions allow for a clear division into four distinct micro-regions. These correspond primarily to the vegetational zones existing at different altitudes up the mountains, but they also denote differing potentials for development, as well as living conditions.

The regions or zones in question are the *Yunga*, *Quechua*, *Jalca* and *Páramo*, and each features

different orographic conditions, microclimate, soil type and water regime (Czerny, Cordova 2014). They may also be associated with different types of agricultural output adjusted to prevailing conditions.

Yunga zone/region extends between 400 and 1000 m. a.s.l. The *Quechua* zone characterises altitudes in the range 1000 to 2,300 m a.s.l. The *Jalca* or *Jalquilla* altitudinal zone follows, at altitudes of 2,300-3,100 m a.s.l., and the most-elevated is *Páramo*, which is present above 3,100 m – which is to say to a maximum altitude of 3,360 m a.s.l. in the case of Frías district.

Historically, Frías was always associated with the Piura Valley, since the economy – as well as the social and cultural relations – in this whole area of the northern Andes have been orientated towards the coast. Roads laid out along river valleys have served to facilitate contacts of this kind, and valleys have been used to bring goods to the Pacific coast. In the reverse direction, people originating at the coast have come to the Sierra de Piura, with a view to settling the fertile mountain valleys. Today, Frías district has 114 settlements (*caseríos* and *centros poblados*) distributed in line with the topographic conditions, with the highest population densities present in the Yapatera Valley.

A total of some 23,000 people live here, of which 2,300 are classified as town-dwellers, while other people form the rural population.

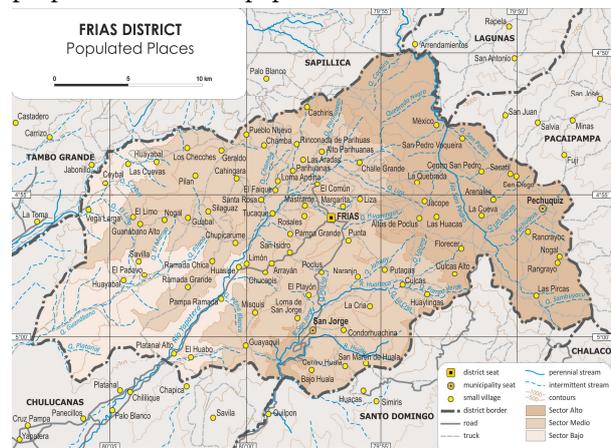


Fig. 2. Settlement in Frias district.

A matter of some importance for the study presented here is the demographic statistic that more than half (c. 52%) of the district's inhabitants are men, in contrast to the population structure by gender of the national population, in which women prevail.

The index reflects enhanced emigration of women – as opposed to men - from the region. In line with census data from the 11th *Censo Nacional de Población* and the 6th *de Vivienda del año 2007*, there are 6100 occupationally-active people here, or some 26.3% of the district's inhabitants. Among these (in the 15-64 year age group), there are 82.1% of rural residents, with only 47.8% of people included in this group having had primary school education.

From the point of view of the labour market, this is therefore a very under-qualified population, in other words an example of low-level human capital. This further denotes that, alongside those whose usual work is on their own fields, there are also contracted

agricultural workers (*peones*) doing physical work, as well as a certain number of people employed in services. Overall, though, this is overwhelmingly a district of village-dwellers in which farm production to meet one's own needs is the dominant activity.

Table 1. The occupationally active population of Frías district.

Urban and rural areas, gender and circumstances as regards economic activity	TOTAL	Age structure (population of school- or productive age)				
		6 - 14	15 - 29	30 - 44	45 - 64	Over 65
Distrito FRÍAS	19,257	5,897	5,184	3,631	3,061	1,484
Occupationally active	6,052	160	2,054	1,804	1,497	537
Employed	5,742	136	1,888	1,732	1,461	525
Unemployed	310	24	166	72	36	12
Other	13,205	5,737	3,130	1,827	1,564	947
Men	9,899	3,053	2,792	1,752	1,548	754
Occupationally active	5,059	129	1,736	1,458	1,265	471
Employed	4,799	113	1,599	1,394	1,234	459
Unemployed and others	4,840	2,924	1,056	294	283	283
Women	9,358	2,844	2,392	1,879	1,513	730
Occupationally active	993	31	318	346	232	66
Employed	943	23	289	338	227	66
Unemployed	50	8	29	8	5	
Other	8,365	2,813	2,074	1,533	1,281	664

Source: INEI - Censos Nacionales 2007: XI de Población y VI de Vivienda.

3.2. Natural resources and productive activity

Traditionally, the *Quechua* and *Jalquilla* altitudinal and vegetational zones (which are characterised by the highest annual precipitation totals, especially in late December and early January) supplied all parts of the district with water. However, in recent years careless human activity has reduced capacity to retain water. The felling of trees to supply wood for fuel and construction is ongoing, a further goal being to increase the area of cultivated fields. Fires set artificially destroy forests, as well as the scrub that surrounds them, and in this way forests hold back less water than they used to, while a lack of appropriate retention facilities only serves to intensify the problem. Primitive channels and water pipelines made from boards or tree-trunks ensure that losses of water in the course of its transfer to villages and fields are very great. Irrigation by means of ditches – the most popular method – also gives rise to large losses of water.

Other techniques are not made use of on account of the high costs, this reflecting the fact that agriculture here is merely self-supplying, i.e. on a subsistence level with hardly any additional income raised. These data show that 41% of agricultural land is suitable for crop cultivation. Most of this is in the *Quechua Baja* and *Yunga* zones. Less than half of the cultivated land is irrigated, hence the dominance of seasonal (rainy-season) farming. Pastureland is

primarily located in the *Páramo* zone. Forests – which account for 13% of the area – are mainly present on the *Jalquilla* slopes, as well as in the *Yunga Baja* zone. While agriculture is the most important occupation for inhabitants, deposits of sand and gypsum in Frías district are also exploited.

Table 2. Structure to the use of land in the Frías district.

FRÍAS district	Area (ha)	%
Total area	45,804	100.0
<i>Area under cultivation</i>	<i>18,715</i>	<i>40.8</i>
Area irrigated	8,208	43.9
Area not irrigated	10,507	56.1
<i>Other agricultural</i>	<i>27,089</i>	<i>59.2</i>
Natural pastureland	22,360	82.5
Tended pastureland	3,499	15.6
Meadows	18,861	84.4
Forest and scrub	3,490	12.9
Other	1,239	4.6

Source: Author's own elaboration on the basis of data from III CENAGRO, 1994.

Data from the agricultural census show that 70% of the occupationally-active population in Frías district is involved in crop cultivation or livestock rearing. Bearing in mind that the latter activity is a supplementary one on farms, it is reasonable to state that the district's inhabitants are farmers. Furthermore, it is subsistence agriculture that prevails, a side effect of

this being the exceptional diversity of cultivation in structural terms.



Fig. 3. Landscape of Costa.



Fig. 4. Landscape of Quechua.



Fig. 5. Landscape of Quechua.



Fig. 6. Landscape of Quechua.

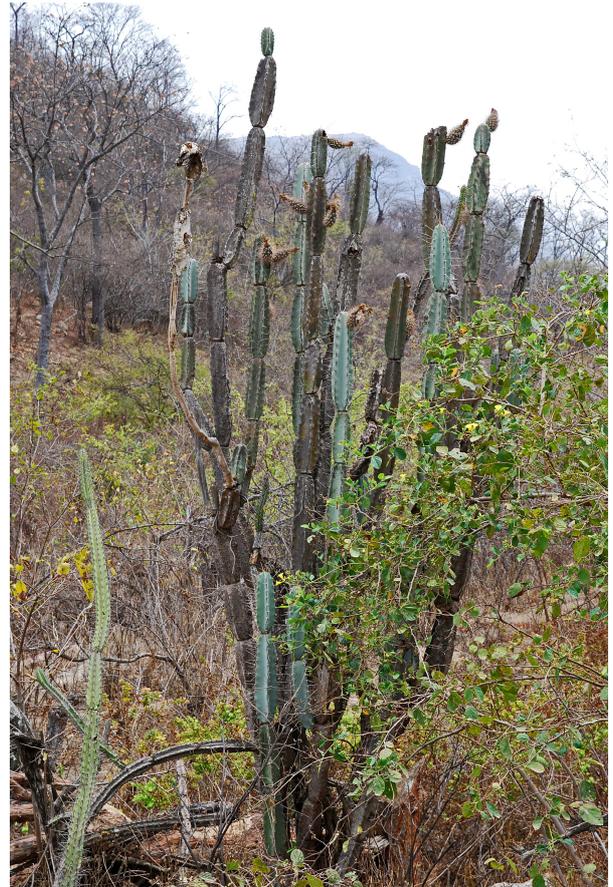


Fig. 7. Landscape of Yunga.



Fig. 8. Paramo landscape.

Thus, the economic base in Frías district comprises crop-growing and livestock rearing, with the latter mostly supplementing the former, and with a wide diversity of crops (first and foremost food crops) grown with a view to farmers meeting the needs of their own families. The corollary of this is the very limited commercialisation of crop-growing, and a failure of local producers to compete in any way for the urban (e.g. Piura or Lima) markets, against the farmers operating along the coast. Means and techniques of cultivation are traditional, verging on primitive, and this fact combines with the prevalence of food crops to obstruct the development of agriculture, notwithstanding relatively

favourable environmental conditions for this type of economic activity.

The Act known as *Ley Orgánica de Gobiernos Locales* encourages local authorities to take steps to promote development and draw up *Planes y Programas de Desarrollo Económico*. In line with the current policy of the Peruvian government, the tools local authorities make use of should assist with the locating of markets for local products, as well as make clear the benefits arising out of regulations on economic activity at local level. In the case of Frías, this manifests itself in hope for the support of agricultural modernisation, this being understood as the promotion of commercial crops (rather than the ones traditional for the region) – including avocado, peaches, beans, agaves and sugar cane. The programme in question also takes in forest management and the promotion of different forms of forest use. Farmers are also encouraged to recommence with the cultivation of local crops known and used in the pre-Columbian period, as well as medicinal plants.

An action strategy adopted ensures that the local authorities are interested in supporting organised groups of local farmers seeking to compete with their products, at least on the regional (northern Peruvian) market. The organisers of the first alliances of producers that have come into existence (*i.a.* of coffee and maize) are seeking to build up a network of small-scale producers that have so far transferred production surpluses on to the market in Piura. This is not of course output entirely earmarked for the market, but is rather an *ad hoc* affair whose scale depends on the yield in the given year. The choice of an appropriate strategy for development in an environment so tough from the points of view of accessibility and investment possibilities requires linkage between mechanisms for local governance and a policy for natural-resources management, agricultural production and agribusiness, the improvement of rural infrastructure, the organising of small-scale producers into a network and appropriate risk management extending to consider variables of a climate that stands in the way of the traditional model of development long pursued in this region.

Also of importance for the dynamic development of agriculture are matters of land ownership. Farmland within the district belongs to the farmers, but the ownership structure is dominated by a *minifundio* system of small plots covering between 1.5 and 5 ha (according to information obtained during interviews carried out in 2012 and 2013). The limited level of output achievable from small fields makes it impossible to achieve any larger surpluses that could be earmarked for sale. For this reason also, it is important that farmers should join together into alliances of producers, in order that they might jointly sell products and negotiate the prices thereof. Our research shows that thus far it is "middle-men" travelling out to the villages

who buy directly from individual farmers, in this way ensuring that (in the case of maize, for example) the product is sold at a price below the cost of production.

Table 3. Frías district. Agricultural output in the years 2007-2008.

Crops	Area (ha)	Production (kg/ha)
Single-year cultivation	4,617	-
Maize	2,374	1,200
Wheat	786	2,000
Peas	490	1,200
Hard maize	349	2,000
Barley	204	2,000
Beans of the <i>bayo</i> variety	190	800
Beans of the <i>canario</i> variety	70	900
Oca	50	1,500
Manioc	30	2,000
Rice	27	2,000
Olluco	16	1,500
Potatoes	12	4,000
Garlic	11	2,500
Broad beans	08	1,500
Multi-year cultivation	5,910	-
Sugar cane	420	10,000
Bananas	412	650
Coffee	151	300
Avocado	11	300
Cherimoya	11	300
Granadilla	10	300
Peaches	40	-
Cultivated pasture	4,855	3,000
TOTAL	10,527	-

Source: *Región Agraria Piura - Sede de Agencia Frías, 2008, en Plan de Desarrollo Local Concertado 2011-2021:17.*

Differences in forms of agricultural management, and in crop structure, are very much dependent on environmental conditions here, and first and foremost on the altitudinal zone of climate and vegetation within the district, in which people live and are active.

Thus, in the *Yunga* zone extending up to 800 m a.s.l., 85% of those of productive age are apparently (according to the questionnaires) at work on their own farms, which should be regarded as characterising subsistence agriculture. On only 12% of these farms are any livestock (cattle or pigs) being raised. As many of 54% of respondents declared that the level of production is so low – and so variable from year to year – that they are under constant pressure of shortages, and even of threats to the life and health of their families. In their opinions, this pressure – and social vulnerability – is attributable to limited output (mentioned by 23.5%), a lack of technical backup (7.7% of respondents) or a simple lack of interest in work that requires so many measures to be taken and so much commitment and sacrifice.

From the set of crops referred to it is possible to conclude that there is a quite wide diversity of cultures (including culinary cultures) in the small local communities spread out across the mountains, notwithstanding very similar conditions of the natural environment. While in Huasipe it is cultivation of the purple-coloured *sarandaja* bean that prevails, there is hardly any growing of bananas there, though this is such a universal food plant in tropical regions. A major role is also played by the cultivation of other plants characteristic of the tropical zone, i.e. cocoa, cherimoya, mangos and so on.

Table 4. Cultivation structure (%) on subsistence farms in the lower altitudinal zone of climate and vegetation.

Crop	Locality			
	Cuevas	Huasipe	San Jorge	Misquiz
Sugar cane	6.3	10.5	0	1.2
Maize	34.9	21.1	26.2	47.7
Bananas	11.1	0	9.8	3.5
Peas	3.2	0	11.5	11.6
Beans	15.9	13.1	14.8	12.8
Manioc	9.5	2.6	0	5.8
Lima beans	1.6	0	0	1.2
Avocado	0	5.3	0	3.5
Various legumes	0	2.6	0	0
Cherimoya	0	5.3	0	0
Cocoa	0	5.3	0	0
Coffee	0	5.3	3.3	3.5
Rice	0	5.3	0	0
Hyacinth beans	0	5.3	0	0
Chancaca lub <i>chiancaca</i> from <i>náhuatl</i>	0	2.6	0	0
Wheat	0	0	6.6	0
Oca	0	0	1.5	0
Oranges	0	0	1.6	0
Cattle raising	0	0	8.2	0
Cereal cultivation	0	0	0	4.7
No answer	7.9	15.7	16.4	4.7

Source: survey research carried out in December 2012, within the framework of project NCN 2012/04/M/HS4/00317

In the case of the *Quechua* zone, the crop structure is even more varied, though the dominants are maize, peas and other legumes. Indeed, these are the plants that form the basic component of the diet among inhabitants of the Andes. In each case, any surplus production does encourage farmers to attempt to sell. However, the trade in harvested crops takes place with the involvement of "middle men", who take advantage of farmers' lack of knowledge regarding prices in urban areas, offering sums that often fail to cover the costs of production. The cultivation of other plants is dispersed to the point where sale on the market

is not an option. Rather, these crops augment the diets of local inhabitants, with cultivation techniques remaining very primitive, and harvests irregular.

In the case of the *Jalca* and *Páramo* altitudinal zones of climate and vegetation, the very severe climate and poor soils ensure that far fewer crops than at lower altitudes are grown. It is obviously the plants that are more tolerant of a cool climate that can be cultivated. In any case, the yields achievable at such elevations are limited and – in the course of interviews – residents of the village of Mejico emphasised the occurrence of food shortages. For all of the inhabitants of Frías district, including those living in the highest altitudinal zones, it is rice that is the most prized food product in the daily diet. However, incomes from agriculture are so low, and other sources of upkeep so limited, that respondents and interviewees complained of regular difficulties with keeping supplied in rice.

In the district under study, livestock rearing is an activity that supplements crop-growing. However, it is only in the *Jalca* and *Páramo* zones that this play any more major role. Here the harvesting of wool from raised sheep may represent an important element of local livelihoods. However, a side effect of the consequent increase in numbers of sheep in recent years has been – as local farmers themselves concede – overuse of pastureland, with a resultant decline in the quality of grazing available for the animals.

In the case of Frías peasant families, the livestock possessed on a given farm represent very significant assets. The raising of stock was always considered in these terms, which is why the crop structure on a given farm always extends to small areas of pasture being retained, so that cattle or sheep may be kept on them, or pigs (and more rarely goats). Pigs are raised out on fields, by roads or in outbuildings. It was emphasised repeatedly during interviews that livestock represented a kind of "savings account" capable of being exchanged for cash when this is needed to educate children, or to buy medicines in the case of illness, as well as agricultural implements or clothing. Inhabitants of the district sell livestock rather often – a process that is favoured by demand on the part of the coastal cities, as well as activity among intermediaries who deliberately visit villages in search of animals. The Sierra de Piura is thus treated as a main supplier of animals for slaughter as regards the *Costa* (coastal) market, even though there is a lack of large livestock-rearing farms here, with output almost entirely based around small family farms. In the case of the inhabitants of the *Yunga* zone, the key product arising out of livestock rearing is cheese. Certain villages like Cuevas have specialised in this kind of production, and a market is found for them by intermediaries who visit the farmers regularly with a view to taking their output back to the cities. However, Cuevas represents the only case (from among 15 villages studied) in which the sale

of cheeses has come to represent such an important asset for inhabitants. Further, the processing and production work is a matter for women, who also join together in negotiating prices with the “middle-men”.

One of the more interesting phenomena when it comes to the activity of village-dwellers in Frías district (but also other districts of Piura province) is the breeding of cocks for fighting. An adult bird of this kind which has already won fights may fetch 200-250 soles

(i.e. \$70-80) on the local market. This is a very large sum by the standards of a region where monthly incomes of the populace most often fail to exceed 100 soles. Cock fighting is in fact illegal, though those visiting farms with a view to making enquiries could very easily come across cockerels chained to fences or stakes and clearly made ready for fighting. An exception here would be the coolest altitudinal zone, from which the birds were absent.

Table 5. Percentage crop structure in the *Quechua* altitudinal zone of climate and vegetation.

Crop	Study villages located within the <i>Quechua</i> altitudinal zone							
	Tucaque	Chanba	Culcas	Frías	Comun	Geraldo	Silahua	Guanabano
Sugar cane	23.8	9.5	2.6	0	32	9.6	15.3	0
Maize	11.3	25.7	19.3	0	0	34.6	33.8	34.8
Bananas	17.5	2.7	0	0	0	1.9	4.6	1.1
Avocado	2.5	0	0	0	0	0	3.1	0
Oranges	2.5	0	0	0	0	0	3.1	0
Hyacinth beans	3.8	0	0	0	0	0	0	17.4
Peas	3.8	12.2	14.9	16.7	12	13.5	15.3	11.9
Wheat	3.8	4.1	22.8	16.7	4	5.8	9.2	0
Coffee	1.3	2.7	0	0	0	0	1.5	0
Beans	5	17.6	15.8	0	24	11.5	7.6	13
Pasture	1.3	0	0	0	4	0	0	0
Manioc	2.5	10.8	0	0	0	7.7	0	3.3
Greenhouse cultivation	1.3	0	0	0	0	0	0	0
Sweet potatoes	6.3	4.1	1.8	0	0	0	0	0
Potatoes	1.3	5.4	9.6	16.7	0	0	0	1.1
Rice	1.3	0	0	0	0	0	0	3.3
Barley	0	0	0.9	16.7	0	0	0	0
Carrots	1.3	0	0	0	0	0	0	0
Onions	1.3	0	0	0	0	0	0	0
Garlic	1.3	0	0	0	0	0	0	0
<i>Acacia macracantha</i>	1.3	0	0	0	0	0	0	0
Various legumes	0	0	0	0	4	0	3.1	2.2
Cheese	0	0	0	0	0	0	1.5	0
Mango	0	0	0	0	0	0	1.5	1.1
<i>Chancaca</i> or <i>chiancaca</i> from <i>náhuatl</i>	0	0	0	0	4	0	1.5	0
Eucalyptus	0	0	0	0	0	0	0	1.1
Livestock	0	0	0	0	12	1.9	1.5	0
No answer	6.3	5.4	12.3	61.1	4	13.5	0	9.7

Source: survey research carried out in December 2012, within the framework of project NCN 2012/04/M/HS4/00317.

Like crop-growing, the rearing of livestock here also continues to assume traditional forms, which is to say ones in which outlays of capital are low and applied technologies limited. Additional measures beyond the leading of livestock to pasture entail the purchase of medicines when animals succumb to illness. If this is neglected, both output and sales fall.

However, 80% of the cattle raised here are in fact rather disease-resistant hybrid races. Thus far, those who own livestock are apparently not associated together in any producers' organisations (as regards meat, milk or cheeses), this ensuring that buyers from the coast are able to get away with offering low prices, as there is no organised approach to price negotiations.

Livestock rearing also encounters major obstacles in the form of lack of knowledge and information on modern methods, on selling and other aspects. Farmers basically operate in isolation, and this of course raises costs and reduces incomes. To be added to this is a lack of information as regards possibilities and mechanisms when it comes to banks extending credit to small-scale producers.

An inadequate area of pastureland in turn ensures that animals at times graze in unsuitable places, e.g. close to landfill sites or places where wastewaters are discharged, as well as on the roadside. It is thus nothing unusual for stock (especially sheep) to fall ill with flatworm-induced fascioliasis. Even periodic water shortages hinder the development of livestock farming.

Table 6. Percentage crop structure in the *Jalca* and *Páramo* altitudinal zones of climate and vegetation.

Crop	Study villages located in the <i>Jalca</i> and <i>Páramo</i> altitudinal zones		
	Las Pircas	Pechuquí	Mejico
Maize	1	3.3	1.3
Wheat	25.1	14.8	25.3
Peas	5.2	6.6	18.7
Beans	1	1.6	0
Potatoes	20.8	19.7	8
Oca	17.7	11.5	6.7
Olluco	9.4	8.2	5.3
Barley	1	6.6	9.3
Haricot beans	3.1	9.8	5.3
Garlic	4.2	1.6	1.3
Manioc	1	0	0
Quinoa	2.1	0	0
Livestock	4.2	0	12
No answer	4.2	16.4	6.7

Source: survey research carried out in December 2012, within the framework of project NCN 2012/04/M/HS4/00317.

4. CONCLUSION

The district of Fria is peripheral (from the point of view of location and socio-economic problems), in the sense that it is located in the north-west of Peru. This article has only taken into account the agricultural sector, as the main shaper of the population's wellbeing and of the relation between economic activity and the natural conditions. Conclusions concerning the causes of peripherality and a lack of sustainability concern:

a). There is a total (or almost-total) lack of interest on the part of the regional and national authorities in the situation faced by people in peripheral regions. The state is simply absent from these areas.

b). The political situation has combined with the environmental conditions to lead to disintegration in a territory that was well-integrated historically by a

system of local linkages. This is now the result of the lack – or the very bad state – of roads. If precipitation is heavy, the roads in question are simply impassable – to the extent that farmers need to have reserves of food for as and when a period of this kind occurs. It is also nothing unusual for farmers to be held up by bandits, and have the goods or cash they are transporting stolen.

c). Only primitive cultivation techniques are made use of, with little resort to modern techniques, including certified seed, organic fertilisers, etc.

d). There is a lack of credit or technical-advisory programmes addressed to poor people in low-productivity peripheral areas. There is also a lack of training as regards the commercialisation of agricultural products.

e). There are no programmes to counteract or combat the degradation of soils.

f). There is a lack of strategies seeking to achieve the appropriate management of water resources, and hence favouring the development of more sustainable farming. The maintenance of the system of agricultural production is dependent on rain, but – thanks to the very tangible climatic change ongoing in this region – this is less and less regular. Rain may fail during the rainy season, while the dry seasons seem to be becoming hotter and hotter. Farmers also complain that plagues of pests that destroy crops are ever more in evidence.

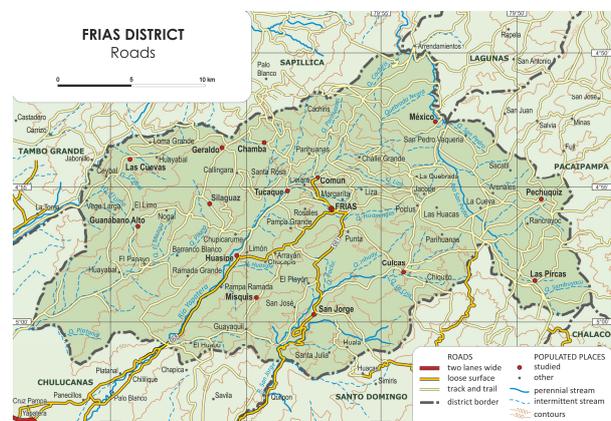


Fig. 9. Road system in Frias District.

The ecological problems lowering the region's productive potential are detailed as follows:

a). Forest fires are encouraged by farmers, though these are sufficient to destroy ecosystems in the upper parts of the Andes, whose streams and rivers represent accumulated water that flows down into the rural areas under study. The loss of tree stands and of low vegetation cover ensures that water for both consumption and agriculture is lacking in the dry season.

b). Land erosion is stimulated by excessively intensive agriculture, as well as by open-cast working of mineral resources.

c). The pollution of water is caused by sewage and refuse discharged into it by residents of the region living along all sections of rivers.

d). There is also pollution of soils and groundwater by way of the disposal of refuse in places not set aside for that purpose.

The problems of the production sector are summarised as follows:

a). There is nothing more than subsistence agriculture here, with output very much earmarked for own consumption.

b). Agricultural output is only to a very limited extent orientated towards the market. Only in years of surplus is part of the output – mainly of maize – earmarked for sale. This reflects a low level of efficiency. Farmers wanting to produce to sell would need to compete with producers along the coast, and in a situation with a limited offer, it is very difficult for them to draw benefit from their own crops.

c). The low productivity of agriculture also reflects a lack of water and a very poorly-developed system of land irrigation.

d). A serious hindrance to the development of commercial agriculture is the lack of access to credit, lack of skill in negotiating prices with "middle-men", and a failure to associate together on the part of farmers, who could theoretically have their collective interests represented as product prices are negotiated.

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