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Rural development and small farmers: the case of peasants in the Puno, Peru area

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PEASANTS IN THE PUNO, PERU AREA

Iowa State University

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Rural development and small farmers:

the case of peasants in the

Puno, Peru area

by

Faustino Ccama

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Major: Economics

Approved:

Signature was redacted for privacy.

In Charge of Major Work ~~W~~

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For the Major Department

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For the Graduate College

Iowa State University
Ames, Iowa

1981

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CHAPTER I.

INTRODUCTION

The explicit policy of transferring resources for rural and agricultural development is a recent and limited phenomenon. Interest in helping the poorest of the poor, small farmers, near landless farmers or peasants, has been rare and difficult.

The common denominator of small farmers, particularly of peasants, is their limited resources, poor health, low income, lack of education, in other words, rural poverty.

Poverty, particularly in the rural areas is an acute problem that all developing countries must face. However, economists have been reluctant to study the problem of rural poverty. Mubyarto (62) states:

As far as I am concerned there are as yet only two economists - Gunnar Myrdal and J. K. Galbraith - who dare to address poverty and rural poverty. As a result, Gunnar Myrdal has been called a sociologist and Galbraith a journalist.

However, Newsweek magazine (2, p. 66) points out that "the Swedish academy seems to be encouraging the dismal science to move out of the classroom to address the agonizing problems of the real world" such as the problem of the poor in less developed countries (LDCs).

The 1971 Nobel Prize in Economics was awarded to Sir Arthur Lewis and Theodore W. Schultz, both economic development specialists. Their contribution has been in studying the mechanisms of economic development in LDCs.

Statement of Research Problem

Studies about peasant communities and rural development from the economic point of view are, in general, lacking. Georgescu-Roegen (33, p. 59), talking about peasant economies, concludes:

Thus, the agrarian economy has to this day remained a reality without a theory. And the topical interest of a sound economic policy in countries with a peasant overpopulation calls for such a theory as at no other time in history....

Little is known about peasant economies and their major problems; in most cases it has been left to the anthropological field.

The area of this study is the rural region of Puno in Peru. The Puno area is part of the southern region of the Peruvian Andes and will be described in greater detail in Chapters III and IV.

One of the fundamental problems in this area is that the production of food is scarce, even though the largest share of the population are farmers. Peasants do not produce enough food for the regional consumption and sometimes they have to import from other areas, particularly for urban consumption. According to Figueroa (26), this is one of the poorest areas in Peru. He describes the economy of peasant communities - the case of the southern sierra of Peru - in his study.

The rural sierra, particularly the southern rural sierra, continues to be the more depressed region of the country, wherein lives 40 percent of the Peruvian population.

Malnutrition strikes the hardest in this area. The Swedish International Development Study (86, p. 53, Appendix) concluded that this

entire area suffers nutritional deficiencies; peasants and workers who have three or less hectares of land are the ones most affected by malnutrition. Another study done by the Inter-American Committee for Agricultural Development (12) states that nutritional problems become acute for mini-farm peasants.

The peasants in question suffer from malnutrition not only because their food intake does not have protein values and the amount of vitamins and minerals required, but because it does not provide enough calories. On the other hand, acute hunger is not infrequent in the entire region; even geophagy occurred not long ago in the southern area of Peru as a consequence of drought.

Programs of research and extension geared toward rural development and toward increasing the peasants' production of basic foods will benefit them not only by reducing their malnutrition, but it may also help to improve their income. Most of all, the creation and introduction of appropriate technologies will help peasants to increase their production.

In the area of the present study, people, particularly peasants, are the poorest of the poor of the Peruvian society. Schultz (80) thinks that peasants are poor but efficient. Other authors hypothesize that peasants are risk averse, maximizing their subsistence rather than profits as a commercial farm might do. Professor Earl Heady mentions that peasants need more demonstrations before they will adopt new technologies, otherwise early adoption proves to be too risky for them. It is easy to see that at such low income levels, peasants do not have enough resources to play risky games.

Objectives of Study

The general objective of this study is to describe the peasant economy and its relation to rural development. The study will identify and discuss the socio-economic characteristics of peasants' problems that are most pressing - production and consumption, and technologies used in farming by peasants. More specifically, the objectives are:

a) Describe the general economic characteristics of peasant economies by determining and measuring some of the socio-economic variables of peasant families, i.e. age of head of family, number of members, level of their formal education, etc.

b) Quantify the production of livestock, i.e. sheep, cattle, donkeys and the main crops of peasants such as potatoes, quinoa and barley.

c) Describe the present technology used by peasants and small farmers. Present an inventory of the tools used by peasant families in farming and their origin.

d) Discuss consumption in peasant communities by measuring a food basket and budget share for the average peasant household.

e) Establish peasant differentiation between peasant-villages or peasant-communities and within some of the communities.

f) Review the appropriate instruments for rural development and infer policy implications.

Organization of the Remainder of the Thesis

In the next two chapters we will review the basic literature on rural development and previous studies on peasants in the Puno area. In Chapter IV, we will present the methodology used, a descriptive information regarding the area of survey and types of data used in this study. The general socio-economic characteristics of peasant communities, agricultural production, technologies used, inventories of tools, and consumption will be described in Chapter V. We will present the statistical and economic results about peasant differentiation using multivariate analysis in Chapter VI. Finally, the thesis will include a summary of the most important empirical results and the major conclusions and policy implications in Chapter VII.

CHAPTER II.

REVIEW OF LITERATURE ON RURAL DEVELOPMENT

In this chapter, we present a basic review of literature on rural development with emphasis in Latin America. We will define the concept of rural development, discuss the causes of mass poverty and enumerate the characteristics of the rural poor and describe the different systems under which peasants operate. The integrated rural development approach is presented as a possible alternative to rural development. Previous studies indicate that mass participation is one of the most important elements in rural development. The current thinking on appropriate technologies as well as other elements of rural development are also presented. Finally, the social variables of rural development such as health, nutrition, etc. are briefly summarized.

The discussion of the instruments of rural development as well as the macro policies to effect economic and rural development is delayed until Chapter VII. Also, the policy implications for economic and rural development are included in the last chapter.

The objective of the present survey is to review some basic literature about rural development. It will present the different lines of thinking about how to reach the poorest people.

Concept of Rural Development

There is no unique definition of rural development that is accepted by everyone; the tendency is toward seeing rural development as an interdisciplinary field. Mubyarto (62) thinks that cooperative action among different disciplines is necessary to study the problem of poverty. de Janvry (16) suggests that agricultural poverty cannot be separated from other sectors of the economy and the world economic system. If this approach is taken, poverty should be analyzed in its historical context and in the paradigm of "class conflict."

One of the most accepted definitions of rural development follows Uma Lele's (48, p. 20) statement: "...improving living standards of the mass of the low-income population residing in rural areas and making the process of their development self-sustaining." For the World Bank (96), the main objective of rural development is to reduce poverty by increasing production, productivity and employment. These objectives will, hopefully, increase income and achieve the minimum levels of food, shelter, education and health.

To me, rural development is the study of poverty, its causes and ways to overcome them in order to help people who are in a state of absolute poverty. The World Bank (96) considers a person to be in a state of absolute poverty if his annual income is \$50 or less.

Absolute poverty is present in all continents but particularly in the following countries: India, Indonesia, Bangladesh and Pakistan. If 85 percent of the population in absolute poverty is living in the

rural areas of developing countries, this is 73 percent of the total population in LDCs. Given these data it is possible to infer that the majority of the very poor live in the rural areas of LDCs (41, p. 59).

Condé et al. (13, p. 30) outlines the following socioeconomic characteristics of rural regions in LDCs:

- 1) A per capita income, generally less than half that of the national level or less than \$100.
- 2) Lack or shortage of basic services such as public health, education, drinking water, etc.
- 3) Inadequate or critical food supply and nutritional status.
- 4) Widespread subsistence economy model: nomadic way of life, archaic cultural and pastoral practices, low agricultural productivity, under-employment.
- 5) Excessive birth rate, death rate and morbidity; low life expectancy.
- 6) Drift of the rural population to the towns and migration of young peasants.
- 7) High proportion of children under 16 (notably those of school age) and of women of child-bearing age.
- 8) Low motivation of the rural population due to its cultural, social and economic isolation.

Characteristics of the Rural Poor

Some characteristics of the rural poor, particularly for the landless, mentioned by the World Bank (96, p. 21) are:

- a) They depend primarily on farming and rearing some animals for their livelihood or subsistence.

b) The poorest groups of the agricultural sector depend on non-agricultural activities as well as agricultural.

c) The poor are present in a variety of climatic and ecological conditions. They are present on fertile lands, arid regions, etc. as well as in densely populated areas.

d) Natural disasters such as flood, drought, hail and other natural disasters have contributed to poverty, creating entire areas of absolute poverty.

e) Small and fragmented land tenure systems are present in areas of poverty; where traditional agriculture is practiced with low-yielding production.

f) Particularly in poorer countries, tenants' incomes are lower than those of small operator-owners; also, sharecropper income is low.

Causes or Nature of Mass Poverty

Galbraith (31) reviews the following causes of poverty:

- a) The community or country is "naturally poor."
- b) The poor nature of a government and the economic system.
- c) The lack of capital for development.
- d) The intrinsic ethnic tendency.
- e) The terms of trade are against the poorer countries.

According to Galbraith, the most common explanation of poverty at all levels of professional sophistication is that a country or area is "naturally poor" meaning it has poor factor endowments such as

rocky and arid lands, and few mineral resources. Since there are a lot of people struggling for such limited resources, they have little to divide among themselves; so they are poor.

He writes as the next common explanation of poverty that the economic system and nature of government is inadequate, i.e., "The people are poor because they have not perceived the advantages of free enterprise...or they are poor because they are exploited; the surplus they produce is appropriated by predatory landlords or capitalists."

Galbraith (31, p. 17) mentions that the American diagnosis of rural poverty in developing countries was that: "Poverty was seen to be the result of a shortage of capital, an absence of technical skills... but poverty is both a cause and a consequence of what Gunnar Myrdal has called the soft state."

The explanation of poverty by intrinsic ethnic tendency is as follows: "Englishmen are or used to be more industrious than the Irish," etc. One believer of this explanation of poverty was Marshall (55, p. 724). Adolf Hitler also believed in a superior race.

Another explanation of poverty is related to climate of latitude. Marshall (55) wrote that cultural development took place in warm climate, but the ruler belonged to a race that has come recently from a cooler climate.

All the previous explanations were formulated by the developed countries. One explanation of poverty that comes from less developed countries is by Galbraith (31, p.17) who summarize the argument this way: "The legacy of colonialism is the most important.

Colonial rule deliberately enforced industrial backwardness for reasons of commercial interest, destroyed self-confidence, created habits of dependency" (21).

The last cause of poverty given by Galbraith is that the terms of trade are against the poorer countries. These countries are producers of raw materials and agricultural products; on the contrary the developed countries are producers of industrial goods. This view is held particularly by Raul Prebisch.

Lipton (50, p. 13) thinks the main cause of rural poverty is the conflict between urban and rural classes. Because the urban population has been winning this conflict, the poor people stay poor. In his own words:

The most important class conflict in the poor countries of the world today is not between labour and capital. Nor is it between foreign and national interests. It is between the rural classes and the urban classes. The rural sector contains most of the poverty, and most of the low-cost sources of potential advance; but the urban sector contains most of the articulateness, organization and power. So the urban classes have been able to "win" most of the rounds of the struggle with the countryside; but in so doing they have made the development process needlessly slow and unfair.

In my opinion, the generation of mass poverty in rural areas of Latin America is not by accident, but is the consequence of conquest, colonialism and internal class conflicts. The Instituto Interamericano de Ciencias Agrícolas (IICA) thinks that poverty in this area is due to the land tenure system and developmental model adopted (43, p. 3).

The majority of the rural poor in Latin American countries are ethnically Indian, Mestizo or black. The white Spaniard's descendant

has been the rich landowner, politician, military man or priest but not a peasant.

The struggle of social classes during the war's conquest was between the Spaniards and the natives. The Spaniards won. Since then, the Indians, many of them dying, were reduced to slave-like situations. The South American Indian population during the conquest was large, and as a labor force, it was undesirable to exterminate them all. This slave-like situation was institutionalized during the colonial times. With independence and the emergence of the new Latin American countries, the status of the native Americans and the now numerous Mestizos and blacks remained basically the same, in some cases worsening, causing peasant movements (4, p. 85).

At present the Indians and Mestizos, taken together, are the majority of the population of many Latin American countries. However, they do not have the political power nor do they actively participate in politics. This is the situation, particularly in Guatemala, Ecuador, Peru and Bolivia.

In other countries, such as in Costa Rica, Colombia and Chile, the native Americans were almost exterminated. It is not rare to hear of Indian genocide, at present, particularly in Brazil and Guatemala (73, p. 17). Because of this clear conflict between a caste-like system, as Dew (17) calls it, the oligarchy was never interested in the well-being of the rural poor; rather they tried to maintain the status quo in order to stay in power.

The conflict between the rural peasant and the rich landowners or the oligarchy has been firmly documented in studies of peasant movements done by Landsberger (47), Huizer (40), Pearse (71), Handelman (36), and Feder (23).

Systems of Agrarian Exploitation

Ghai (34), in a publication of the International Labour Office (ILO), considers three kinds of agrarian systems:

- a) Peasant agriculture under systems of private land ownership.
- b) Communal farming.
- c) Transitional category.

In peasant agriculture under the system of private land ownership, such as in South Korea, Bangladesh and India, the individual family owns the land and other means of production.

Communal farming, as practiced in China, Cuba, Central Asian Republics of the Soviet Union, has the main characteristic of the land being owned collectively or socially.

The transitional category, as practiced in Tanzania, Guyana, and Egypt, is characterized by a mixture of private and collective ownership of land. In Tanzania and Guyana the collective and private ownership of land co-exist. This last category includes the system of cooperatives.

If the ILO approach is used to classify the Latin American system of agrarian exploitation, most of the countries would fall into the

category of peasant agriculture under the system of private ownership existing next to the huge hacienda and/or plantation systems. Many authors have described it as the minifundia and latifundia existing simultaneously.

The main characteristic of this system of exploitation based on private ownership is the unequal distribution of land, wealth and income; consequently, poverty is perpetuated particularly in the peasant agriculture. This system creates the very poor or marginal farmer who is in conflict with the plantation owner or the latifundia owner.

Paige (69) presents different typologies of agriculture and a theory of rural class conflict between the cultivator class and non-cultivator class.

Beckford (5, p. 14) describes the plantation system exists all over the world. His study also indicates that the majority of the world's plantations are located in Asia followed by the Caribbean and Latin America. Thirty-four percent of the world's plantations are located in the Caribbean and Latin America. Brazil has the largest number of plantations, 70,968,000, 79 percent of the plantations in the Caribbean and Latin America.

Beckford (5, p. 19) affirms that plantations can co-exist with peasant producers. "The peasant farmers are affected by the plantations in at least two ways: 1) competition for land and other resources and 2) the provision of wage work on the plantations to supplement their income from the main preoccupation of farming on their own account."

The social consequences of plantations to the peasant farmer are summarized by Jacoby cited by Beckford (5, p. 19), that plantations "...have always resulted in the social demotion of the indigenous cultivator to a landless worker who lives in complete social and economic dependence on the plantation."

The category of communal farming, as defined by ILO, applies only to Cuba among the Caribbean and Latin American countries.

The transitional category as used by ILO could apply to the Peruvian agrarian exploitation system. With the land reform, started in 1968, a large number of cooperatives have been created.

Integrated Approach to Rural Development, Planning and Administration

Integrated approach

The term "integrated" has been used loosely. Ruttan (79) thinks the integrated approach has been a reaction to the "green revolution" and its first round of effects. The "green revolution" projects, designed to increase production and productivity of certain crops, have had negative effects on the poorer farmer. That is, his income distribution has been adversely affected due to the fact that the new improved seed was not available to the poorer farmers. This is also known as the first round effect of the "green revolution."

Integrated approach is a comprehensive and multisectional effort by all the sectors involved in rural development to improve the living standards of the poor, with a deliberate transfer of funds for these objectives.

Integrated rural development includes the health, nutrition and educational sectors, besides the agricultural traditional sector. Condé et al. (13) mentions that this concept is relatively new and developed as a consequence of the incoherent and unsuitable, sometimes contradictory, projects proposed by LDCs. His position contrasts with Oliart (68) who writes that integrated approach has been introduced or popularized in Latin America by documents of the World Bank. He critically writes that the objective of integrated rural development is not compatible with removing the causes of the problem that it intends to solve. Oliart recommends land reform as a better alternative since it would bring institutional changes in the land tenure system.

I do not see a conflict between the integrated rural development approach and land reform; particularly, if land reform precedes the integrated rural development or if they are implemented jointly.

Condé (13) affirms that the introduction of integrated approach does not change the definition of rural development since "the concept itself as it stands, suggests that rural development includes the development of agriculture, health institutions, human resources, education and training." He thinks that the use of the basic idea of the integrated development method is sound and highly desirable.

Planning

Frequently integrated rural development plans are described as "integrated" if they are "comprehensive" or multisectorial for a given area; but it is difficult to come with genuinely multisectorial plans (51).

LDCs are in a planning crisis since some countries adopt for four or five years that which, in practice, they forget in one or two years of budgetary planning. In other cases the Ministry of Finance may have the power to decide the priorities or the implementation of projects so the project in the original plan may never start, particularly if budgetary difficulties are present. In other countries, planners consider their work done once the general guidelines of national development have been embodied in the general plan (13).

Livingstone (51) considers three levels of planning:

- a) Primary-level; macro planning for economy-wide plan.
- b) Secondary-level planning; this is below the economy-wide plan and it is subdivided into two kinds.
 - i) area planning (if economy is divided spatially), or
 - ii) sectional planning (if economy is divided by sectors).
- c) Tertiary-level planning; project planning and implementation.

Livingstone (51) argues that a plan may be comprehensive, with an area of focus, planning machinery at local level, comprehensive resource assessment and multidisciplinary action and still not be "integrated."

He argues that the benefits of having integrated plans are:

[First], there is an absence of any well-defined rural or community development technologies around which professional capacity or resources can be organized or institutionalized.

[Secondly], rather than planning techniques, successful rural development has depended on specific stimuli, particularly on urban impact, technical innovations capable of generating substantial new income flows or institutional mobilization and development.

Belshaw (6) denies the absence of available techniques for rural development.

Livingstone (51) concludes that, in general, there is a lack of a coherent "set" of planning techniques which would justify the methodology of integrated rural development. In other words, not every plan denominated as integrated is useful; or we do not have a "science" of integrated approach.

Condé et al. (13) calls our attention to and says that the integrated rural development approach is just a strategy rather than "gradiose intentions."

Administration

For Ahmad (1), integrated rural development means a flow of financial and technical services to the rural sector. These services include roads, irrigation networks, storage facilities, health and educational facilities, appropriate institutions as well as rural industry, etc. The services provided to the rural areas are to be multidimensional and interdisciplinary.

The offering of all these facilities and services requires high technical skill, large sums of money, considerable planning and orientation and management abilities.

The problem of management and monitoring and evaluation is complex due to its magnitude. Goodman and Love (35) point out the lack of trained project managers of local extraction in LDCs, which is critical.

For Ahmad (1) the success of such a project, for example, depends to some extent on the personality and dynamism of the project manager, on whether or not he or she is able to induce all the participating agencies and organizations to play their role and contribute their best."

Some of Ahmad's (1) suggestions are the following:

a) Rather than providing many services as part of integrated rural development programs, only services that will be of value to society should be presented.

b) Civil servants cannot and should not make policy.

c) Rural development programs should have feedback with the central government.

d) A new ministry for coordinating rural development projects should be created rather than leaving this job to the Ministry of Agriculture.

Some of Ahmad's (1, p. 140) conclusions about integrated rural development are:

Rural development can take place without an integrated approach and is in fact doing so all the time in one way or another.

The term is a concept of administration: the planned supply of simultaneous services that enables a rural development programme to become operational.

Mass Participation

According to the study Strategies for Small Farmer Development presented by Morss et al. (60, p. 204) to US/AID, one of the key elements for successful small farm development projects was the farmers' participation and their positive actions.

Their participation in project decision-making (which appears more significant in the implementation stage than in the design phase);

Their willingness to contribute labor and money to the development effort.

In terms of policy, project designers can influence the success of projects by deliberately working to generate various types of small farmer involvement and resource commitment to project activities.

Morss' et al. study (60) also indicates that smaller farmers with less security over the land are more willing to contribute during the design and implementation stages. Small farmers can help in developing ideas that are adequate to local conditions. They can act as experimenters testing new technological packages.

The small farmer's willingness to commit labor, or money, increases as they participate in decision-making.

Mass participation of the rural poor is a crucial element in the success of rural development projects.

Condé et al. (13, p. 27) thinks that "...the integrated approach calls for will power by the state and the active participation of the local populations." Cohen (11) discusses that political participation increased with economic development and that participation theory has been lagging behind.

I think that political participation is one of the most powerful elements for rural development.

So far, the small farmers, the landless and the city dwellers in LDCs are maintained with or without minimum levels of formal education. Half of the citizens in developing countries are without the minimum level of education (96). In most LDCs, citizens who are illiterate are

not allowed to participate in local, regional, or national politics. Only the political and developmental participation of poor people will indicate the beginning of true rural development. One way to accelerate and prepare people for this mass participation is education.

Appropriate Technologies

Concept and kinds of technology

Jackson (45, p. 3) reviews literature about appropriate technologies for LDCs. He defines technology as, "...the whole range of technical inputs other than raw materials and labor which go into each economic activity, in particular, the processor, building plant, machinery equipment and tools for each segment of production."

She discusses three kinds of technology: a) traditional, b) western, and c) intermediate, progressive or appropriate technologies.

Traditional technologies have existed in poor countries, prior to industrialization. This technology is characterized by low capital input and high labor requirements. For instance, the tools used in traditional farming are simple such as wooden plows and hand looms.

Western technologies are characterized by the use of capital -- intensive, labor-raising and by a conscious attempt to maximize output per unit of human input. The "modern" ways have very low yields per caloric unit because of the intensive use of fossil fuels, but they have a high yield per human unit of input (72). This technology is used particularly in the U.S., Europe and more "developed" countries.

Marsden (54) prefers to use the term progressive technologies; it emphasizes the dynamic element required for technology.

Intermediate technologies -- Schumacher (81) writes that in many places of the world the poor are getting poorer and the rich are getting richer. Foreign aid and development planning appears unable to overcome this trend. Weisskoff (92) indicates that as the economy of a country grows, its income distribution gets less equal in relative terms.

Schumacher (81, p. 175) recommends regional development based on intermediate technologies; this would use more labor and would be less expensive than the imported technologies. He proposes that:

1) Workplaces be created in the areas where the people are living now, and not primarily in the metropolitan areas into which they tend to migrate.

2) These workplaces must be, on average, cheap enough so that they can be created in large numbers without this calling for an unattainable level of capital-formation and imports.

3) The production methods employed must be relatively simple so that the demands for high skills are minimized not only in the production process itself but also in matters of organization, raw material supply, financing, marketing and so forth.

4) Production should be mainly from local materials and mainly for local use.

Their intermediate technology would be between the western technology and traditional technology. A problem arises when intermediate technology or middle level technology connotes second-best; hence, it may be less attractive to LDCs.

Arguments in favor and against appropriate technologies

The arguments in favor of appropriate technologies, as cited by Jackson (45, p. 11), are:

1) Capital is scarce relative to labor in the developing countries, in direct contrast to conditions found in the countries where Western technologies have been developed. Therefore, the capital requirements for providing full employment through these technologies are simply beyond the reach of poor countries. Nor can the poor countries afford the level of parallel investment in infrastructure, feeder industries, market delivery systems, which these technologies require to be profitable.

2) Labor, on the other hand, is generally the abundant resource. It is relatively cheap and available to readily be harnessed in production. Appropriate technologies would use more of the poor country's assets for each unit of output.

3) The large-scale nature of production by the capital-intensive Western technologies cannot be realized because of the small size markets in poor countries. Appropriate technologies would lend themselves to smaller-scale operations for which there would be economic demand.

4) Precisely because of the divisible nature of the investment, more appropriate techniques can be introduced more easily into the small units of traditional economic activities. Thus, they can make fullest use of the existing organizations, management and entrepreneurial talents.

5) The smaller scale of the industrial units permits them to be spread throughout several towns where they can increase the links with the rest of the economy, to a greater extent than a few large modern factories isolated in one urban area.

6) More appropriate technologies will provide a greater number of productive jobs from the limited amount of capital available. Thus more of a poor country's actual resources can be utilized in production. Because more people are employed, the benefits of growth will be spread more widely, and this wider distribution of income will contribute greatly to sparking demand for marketable goods in other industries.

7) These technologies are likely to stimulate rather than displace the traditional sectors in which so many people in the poor countries will have to continue to work. These technologies are more likely to develop backward linkages with agriculture and with other feeder industries throughout the rest of the economy. Increased employment in labor-intensive industries is more likely to stimulate demand for traditional consumer goods,

8) Western technologies ignore the use of available raw materials of the countries into which they are introduced, because they have been developed for temperate environment. Importation of the necessary raw materials or components may add substantially to the total cost for poor countries. Further, the designs and processes may be totally inappropriate for climate or terrain.

9) Technologies which made better use of poor countries' resources would in fact produce higher rather than lower rates of economic growth and better distribution of income, and would allow developing countries to compete more equally in the world market.

The arguments against appropriate technologies in LDCs, who argue poor countries must develop their own advanced industrial sector, as cited by Jackson (45, p. 13), are as follows:

1) Highly capital-intensive investments are the only way for the developing countries to maximize the total output in the shortest possible time. Returns on capital investment are greatest using the most efficient Western technologies. They make available the greatest savings for future investment, and thus for future economic growth.

2) Labor-intensive industries are not cheaper because they tie up working capital much longer. Labor-intensive production processes take longer to produce a given output.

3) In reality, labor is neither as abundant or cheap as one might expect. Wage rates are pushed up artificially by government policies and trade unions. Cheap labor is not always the same quality as labor with higher wages. Labor-intensive industries require more complex management skills which are in short supply in the developing countries. The

available entrepreneurial talent should be put to use where it will yield the greatest possible return.

4) Downstream effects or multiplier effects which a capital-intensive industry has in generating jobs more than offset the initial fewness of places.

5) Many industries are not economically divisible, and must be produced for a wider market. Because of the need to compete in international markets, the most efficient method must be used. Capitally-intensive industries provide the degree of quality control and product precision required in international markets.

6) The nature of technical innovation requires the concentration of industries to create a critical mass for competitive innovations. There must be a market demand. Small-scale, decentralized investments fail to create this necessary environment to stimulate future innovation.

7) In many cases, Western technology already exists and can be transferred to the poor countries much more easily than developing a new, more appropriate technique.

8) Finally, the prestige value and future orientation of developing a model capital-intensive industrial sector cannot be underestimated. It provides labor and management with experience and technical skills that are required in the development of modern economy, and it exposes them to the modern work values of precision and efficiency.

One important argument against adopting Western technologies in LDCs is that this technology has been developed in an environment contrary to the LDCs.

Western technology has been developed where labor is expensive or scarce, capital relatively abundant and the objective was to maximize output per unit of input. The factor endowment in LDCs is different, where labor is abundant and capital is scarce. Therefore, the adoption of labor raising technologies or Western technology will worsen the problem of unemployment.

Opponents of appropriate technologies argue that if LDCs are going to compete in the international markets, they can be successful only by introducing the latest capital-intensive methods. A crucial problem is the lack of knowledge about the exact relationship between economic development and technology (45).

Nevertheless, a criterion is needed to select a level of technology. Mahatma Gandhi proposes this criterion that a technology should meet (21, p. 20):

- a) It should be of benefit to most people.
- b) Technology should be within the managerial competence and available resources of most people.

Mahatma Gandhi, quoted in E. G. Vallianato's Fear in Countryside: The Control of Agricultural Resources in the Poor Countries by Non-peasant Elites (1976), wrote:

What I object to is the craze for machinery, not machinery as such. The craze is for what they call labour-saving machinery. Men go on "saving labour" till thousands are without work and thrown on the streets to die of starvation. I want to save time and labour, not for a fraction of mankind, but for all. I want the concentration of wealth, not in the hands of a few, but in the hands of all. Today, machinery helps a few to ride on the backs of millions. The impetus behind it is not the philanthropy to save labour, but greed.

Lund (53) concludes that appropriate technologies need to be identified, developed and adopted. He also suggests that appropriate technologies should be developed by the rural poor and engineers. However, Jackson (45) thinks that appropriate technologies are unlikely to develop without foreign aid and investment policies.

Other Elements in Rural Development

Research

The major breakthroughs to "help" rural development will come from the area of research, such as the "Green Revolution" appropriate technologies; but, all these measures are short solutions only.

The economic and social effects of the "Green Revolution" have been discussed and debated widely; therefore, a large body of literature about it exists. Some of the best known papers about this topic are by Lele and Mellor (49), Falcon (22), Myint (64), and Pearse (70) and here I will not attempt to summarize them, other than to point them out.

It is important to remember that the first-generation effects of "Green Revolution" were negative for the near landless farmers or peasants. Thiesenhusen (87) mentions that the "Green Revolution" is a way to reach the poor without institutional changes.

Some institutions such as the Ford Foundation and Rockefeller Foundation have moved away from the conventional agricultural extension in LDCs toward production technology, policy planning and educational institutions (30, p. 8) giving more emphasis to research. In their own words:

A principal manifestation of these emphases has been the Foundations' role in developing international agricultural research and training centers, which have played an increasingly critical role in the evolving global system of work on food production problems.

Hunter (41, p. 6) in Agricultural Development and the Rural Poor, with respect to research and development recommends:

Such an addition to the range of available technology implies changes in attitude and in some programmes, not only in field stations but at all levels of research. One stimulus to alter programmes has already been applied by the mounting cost and eventual scarcity of oil-energy, and the search for alternatives. But a second new stimulus is needed, towards an output of research much more closely directed to fill gaps and meet needs of actual farming systems in which smallholders predominate. This will certainly mean that some research staff, in devising programmes, should spend more time in the villages, studying farming systems and in direct discussion with farmers.

Education

Galbraith (31) on education writes that professional educators were sent to LDCs by US/AID and ECA and they "readily attributed poverty to the absence of an educational system." Therefore, they presented education as the solution. A large number of people from poorer countries were sent to the U.S. and Europe, but many of them decided not to return home.

Galbraith (31) explains that poor people accommodate their thoughts and expectations to their poor situation. So there are two alternatives:

- a) Enlarge the number of people who refuse accommodation since they are motivated to escape the equilibrium of poverty,
- b) Facilitate that escape.

Education destroys accommodation and often younger men and women (as a result of education) do not accept that they must be poor. These people are referred to as the "educated unemployed."

Ensminger and Bomani (21) recognizes the role of both formal and informal education. He thinks self-reliant people can be formed by either

formal or informal education. Younger people with formal education of a village or rural community are more inclined to leave their villages. This thinking is partially true, however. Formal education enables them to have more access to information and makes them reject accommodation. Another point is that there is nothing wrong with migration, which will be discussed in the subsection of migration.

Galbraith sees education as a means to break accommodation and as a prerequisite to rural development.

Should extension be extended only to those farmers who resist accommodation, assuming this group is a minority, or to all the small farmers?

Contrary to the insinuation that small farmers accept accommodation and are not ready or willing to accept change, Morsset al. (60) found the small farmers more willing to participate and contribute in rural development programs as discussed in the section of mass participation.

Half of the citizens of LDCs are without the minimum level of education, despite the efforts made by the developing countries (21). In many of these countries the illiterate citizens do not participate in the political process, nor do they have the right to vote in presidential elections.

The following convictions of the World Bank (96, p. 266) about education are important to point out:

- 1) That every individual should receive a basic minimum education as soon as financial resources and the priorities of development permit;

2) That skills should be developed selectively in response to specific and urgent needs, by training the right people, both urban and rural, for the right jobs -- both in the modern and traditional sectors;

3) That educational policies should be formulated to respond flexibly to the need to develop educational systems (nonformal, informal, and formal), so that the specific requirements of each society might be met;

4) That opportunities should be extended throughout an educational system for those underprivileged groups who have been thwarted in their desire to enter the mainstream of their country's economic and social life. This must include more equitable access to education for the poor, the ill-fed, women, and rural dwellers, and must provide, as well, a better chance to advance from the classroom to the place of work; and

5) If economic progress is to be rapid and equitable, education will need to be supported by action in other fields such as agriculture, health, nutrition, and employment. Only in such a context can education be effective in strengthening the potential of those developing nations which wish to ensure productive participation by all in the development process.

Migration

During the last century, a mass migration has been in effect particularly from Europe to the United States.

Galbraith (31, p. 136) mentions that the last century migration from Europe has been done by people who rejected accommodation; consequently breaking the equilibrium of poverty.

Migration, we have seen, is the oldest action against poverty. It selects those who most want help. It is good for the country to which they go; it helps to break the equilibrium of poverty in the country from which they come. What is the perversity in the human soul that causes people so to resist so obvious a good?

The resistance to migration as a solution has been mentioned by Galbraith (31) as follows:

- a) Social disturbance and conflict have usually followed mass movements from poor countries to the rich,
- b) The belief that the available employment is a fixed quantity, that immigrants simply replace those who have already arrived,
- c) There is resistance of a sort from the countries from which the people go. There is pride in the ambition to take care of one's own.

Finally, Galbraith points out: "Migration is not, needless to say, the only solution. I do not even urge it as the principal one."

Social Variables to Rural Development

Health and population

One of the main elements in integrated rural development is health. Since health is the most valuable thing that a person has and good health contributes positively to production and higher productivity, economic development plans of LDCs must give special attention to the health sector. Condé et al. (13) recommends that national health plans must be embodied in the overall development plan and there should exist a national health policy.

The World Health Organization (WHO) defines health as: "A complete state of physical, mental and sociological well-being." For a given population, poor health implies higher mortality and morbidity rates.

A measure of health is life expectancy at birth and selected ages. In 1965-70 the life expectancy in developing countries was 49, and 70 in

developed regions. The life expectancy in LDCs is much lower than in developed countries. Even though life expectancy at birth in LDCs has been improving since the beginning of this century, there is still a definite gap with the developed countries.

In developing countries, the mortality rate is high. A World Bank report (96, p. 352) presents three major groups of disease that cause the majority of deaths in LDCs, particularly among children less than five years old. These groups are:

a) Fecally-related diseases. Human feces transmit a wide variety of diseases in LDCs. The most common are intestinal, parasitic, and infectious diarrheal diseases; including poliomyelitis, typhoid and cholera.

b) Air-borne diseases. This group includes tuberculosis, pneumonia, diphtheria, bronchitis, whooping cough, meningitis, influenza, measles, smallpox and chickenpox.

c) Water-borne and vector-borne diseases. This last group of diseases are less widespread and include malaria, trypanosomiasis (sleeping sickness), chagas disease, schistosomiasis (bilharzia), and onchocerciasis (river blindness).

The poor health conditions are persistent in LDCs. An important question arises then; what are the causes of poor health? Health conditions are affected by climate, cultural practices and life styles. The conditions for poor health are compounded with poverty, rapid growth of population, inadequate nutrition and crowded and unsanitary living conditions.

When large numbers of people live in poor households, in crowded conditions and without sanitary facilities, diseases spread fast and easily causing high mortality rates, particularly among children. This in turn induces families to have a large number of children to have a surviving son or daughter.

The fecally transmitted diseases have their origin in the contamination of water, soil or food with human waste. Under these conditions, diarrheal diseases, typhoid, dysentery and cholera spread easily.

It has been observed that the rural populations rarely have access to sewage facilities, and many of them use polluted water without any processing.

The rapid growth of population worsens the poor health conditions of the rural population and city dwellers.

With respect to health and population, the World Plan of Action in Bucharest has given the following world-wide recommendations (30, p. 62):

- 1) Health and education policies must be devised in accordance with a strategy based on population and social measures;

- 2) Health and nutrition programmes designed to reduce morbidity and mortality must be integrated in general development strategy so as to reduce the infant mortality rate to a maximum of 120 per mille in countries with the highest rates. To achieve an average world life expectancy of 62 years by 1985 and 74 by the year 2000, there must be an increase, between now and the end of the century, of 11 years in Latin America, 17 in Asia and 28 in Africa.

- 3) Countries aiming at moderate or small population growth should endeavour to attain this objective through

low birth and death rates. These countries are invited to adopt population policies that fit into the context of socio-economic development and are compatible with fundamental human rights. It seems desirable not to exceed a birth rate of 30 per mille. Countries wishing to increase their population growth rate on the other hand, should, if the death rate is high, strive to reduce this and to promote, as desirable, an increase in fertility and emigration.

4) Migration, manpower and urbanization policies must be clearly formulated in the plans in terms of resource allocation policies.

5) An adjustment in the aims and methods of health policy must be made by strengthening of the demographic scope of health policies, and changes in the organization and management of health services.

6) Integrated approach methods to health planning procedures must be applied.

Nutrition

Willy Brandt made a remarkably correct observation by telling the United Nations General Assembly (1973) that: "Morally it makes no difference whether a man is killed in war or is condemned to starve to death by the indifference of others." This year (1980), hunger is again present in the world. According to the U.N. World Food Council, 26 countries are facing famine, 17 of these are in Africa. The most affected are the southern countries in the Sahara Desert, which is increasing in size at 6 kilometers per year. The other African countries are those in the east. This whole area affected by famine is known as the hunger belt (74, p. 48).

The causes of hunger are wars, droughts, inadequate agricultural policies, inefficiencies in the government, corruption, greed, etc.

Widespread malnutrition is present in LDCs, particularly among small farmers and city dwellers.

Malnutrition is a major threat to children. It contributes to premature birth and to abnormally low weight at birth (96, p. 359). Malnutrition reduces the acquired immunity, increasing susceptibility to tuberculosis, diarrheal diseases and measles (96, p. 360).

Under these conditions of hunger and acute malnutrition the Food First approach seems an adequate policy to apply. This approach is toward food refurbishing. However, under conditions other than famine, this approach may not be appropriate. Reutlinger and Selowsky (76) conclude that: "Malnutrition will not disappear with normal economic development." They recommend deliberate policies to transfer food and income to eliminate undernutrition.

Role of women in rural development

The contribution of women in agricultural production, nutrition, and health is so obvious that "exhortations to 'integrate' women into rural development run the risk of sounding ridiculous" (84, p. 15).

The World Conference on Agrarian Reform and Rural Development (1979) (WCARRD) regarding the role of women in rural development makes several recommendations and the following is the main one (84, p. 16):

Governments should consider action to repeal laws and regulations that discriminate against women in regard to ownership, control and inheritance of property and inhibit effective participation of women in economic transactions and in the planning, implementation, and evaluation of rural development programmes.

The United Nations' Rome Food Conference (1974), recognizing the role of women in all LDCs by their contribution in food production and maternal role, passed the following resolution (21, p. 93):

Considering that the major part of the required increase in food production must occur in the developing countries if the present tragedy of starvation and malnutrition for uncounted millions is not to continue;

Recognizing that rural women in the developing world account for at least fifty percent of food production;

Knowing that women everywhere generally play the major role in procurement and preparation of food consumed by their families;

Recognizing the important role of the mother in the healthy development of future generations through proper lactation and, furthermore, that mothers in most cultures are the best source of food for their very young children;

Reaffirming the importance of the World Health Assembly resolution on lactation in May this year;

1) Calls on all governments to involve women fully in the decision-making machinery for food production and nutrition policies as part of a total development strategy.

2) Calls on all governments to provide to women in law and in fact the right to full access to all medical and social services, particularly special nutritious food for mothers and the means to space their children to allow maximum lactation, as well as education and information essential to the nature and growth of mentally and physically healthy children.

3) Calls on all governments to include in their plan provision for education and training for women on an equal basis with men in food production and agricultural technology, marketing and distribution techniques, as well as to put at their disposal consumer, credit, and nutrition information.

4) Calls on all governments to promote equal rights and responsibilities for men and women in order that the energy, talent and ability of women can be fully utilized in partnership with men in the battle against world hunger.

Instruments and macro policies of rural development

Instruments of rural development and macro policies for rural development are discussed in Chapter VII. The general policy implication for rural development is also included in Chapter VII.

Summary

In this chapter we reviewed the basic literature on rural development. Different lines of thinking about how to reach the poorest people were discussed and an integrated rural development approach was presented as a possible alternative to rural development. At this point we will delay a discussion of the instruments to affect rural change until later. Rather, we shall continue to closer investigate the causes of poverty of one particular region in Puno, Peru.

CHAPTER III.

REVIEW OF LITERATURE ON AREA OF STUDY AND PREVIOUS
STUDIES ON PEASANTS IN PUNO AREA

Peru is divided into three natural regions: a coastal area next to the Pacific Ocean, the Andes highland area, and the Amazon Jungle area.

One of the problems that befalls this country is the dual economy problem. For the most, the "modern sector," consists of mining, industry, construction, services and energy activities. These activities are more productive than the agricultural activity which is considered the "traditional" sector. Discrepancies exist within the agricultural activity itself. For instance, the huge, modern cooperatives, located mostly in the coastal area, are in direct contrast to the peasant, traditional economy which is located mostly in the highland area.

Fitzgerald (27) considers that the contradictions of the dual economy in the case of the Peruvian economy go much deeper with the following characteristics:

a) The highly concentrated ownership of the modern sector, and in particular the external dependence of its structure, results in the outflow of surplus, the alienation of decision-making power and the absence of either domestic technology or capital goods industry.

b) The lack of integrated and sustained industrialization, due principally to the outward orientation of the modern sector and the

narrow domestic market, itself the result of the skewed personal income distribution.

c) The neglect of the traditional sector, leading to a shortage of food supplies on the one hand, and a worsening of internal migration on the other.

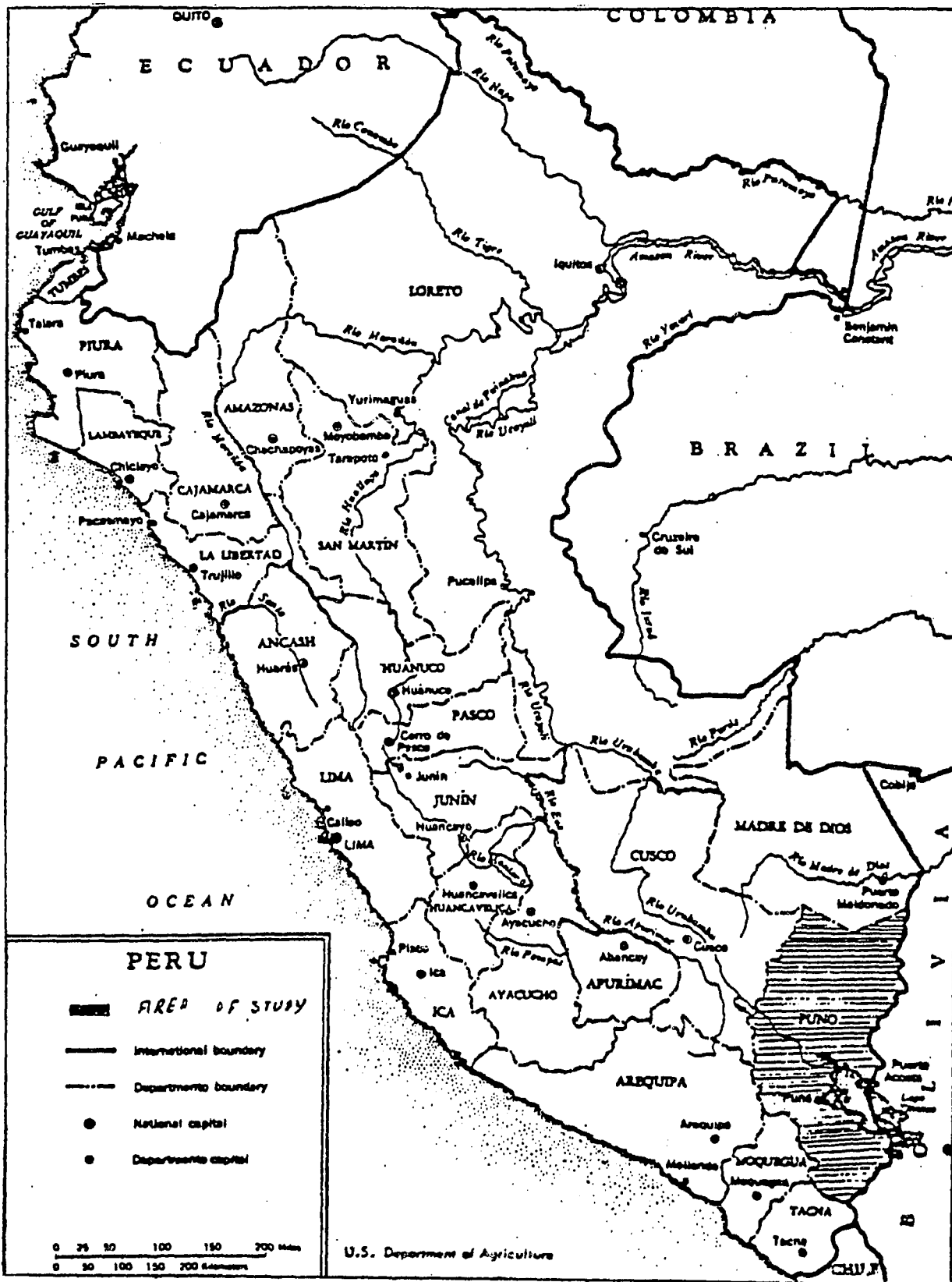
d) The decline in capital formation - reducing the possibility of economic development to continued export - led growth based natural resource exploitation rather than autonomous reproduction.

During the last decade the Peruvian government has put effort into land reform, hoping to increase production and productivity. It seems that production will increase in the long-run. The agricultural development has found in huge co-ops formed as a consequence of land reform. However, the medium and particularly the small farmers and peasants have been neglected. Even though Peru had an extensive land reform, the number of small farmers and peasants that benefited from it is very small; besides, agricultural production has declined due to changes in ownership, improper management and destruction of capital by ex-landowners just before land reform (20, p. 23).

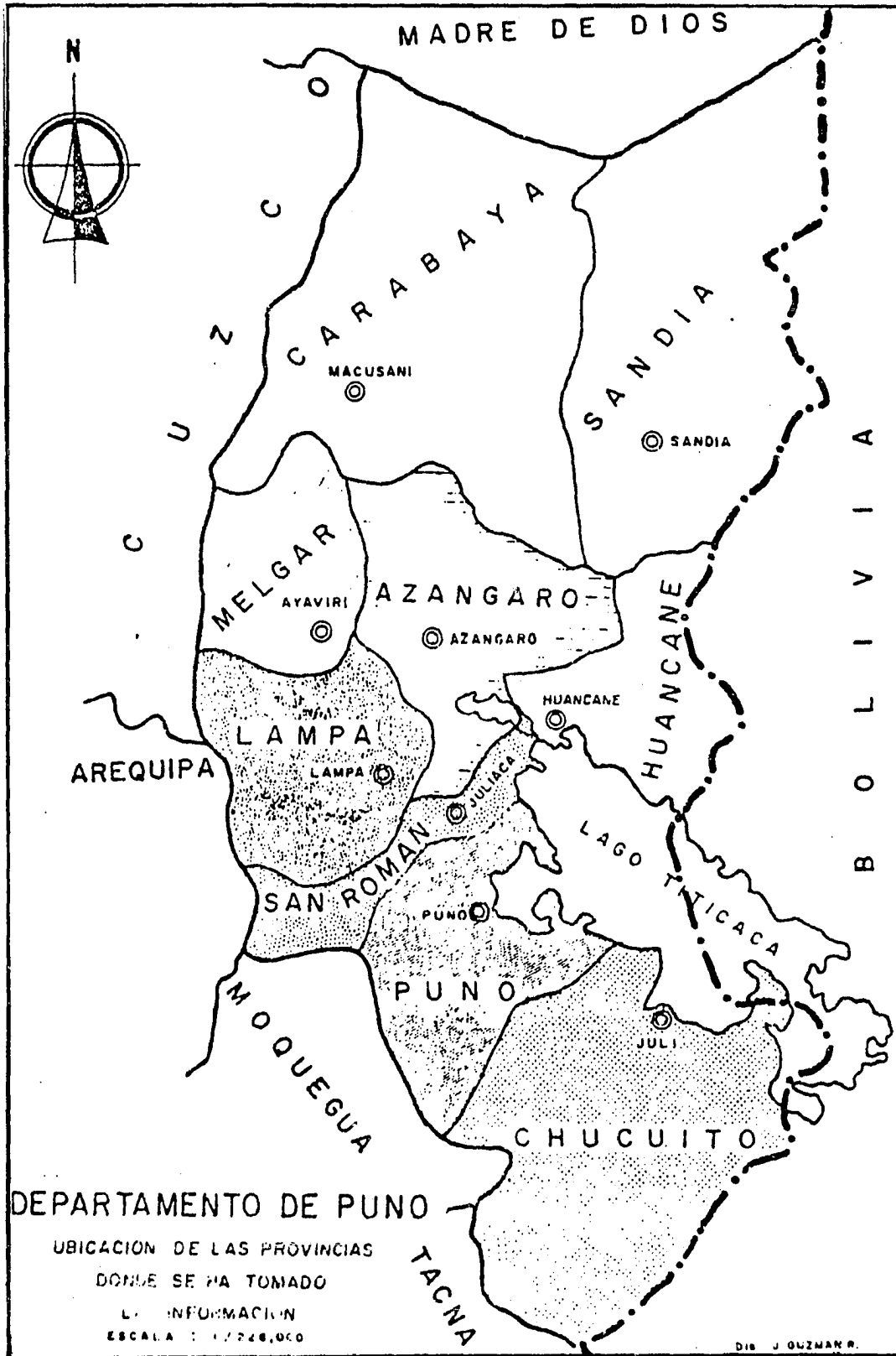
Regional Description of Puno Area

Puno is one of the 23 areas, Departamentos, into which Peru is divided (see Maps 1, 2). It is located in the plateau of the high Andes at an altitude of over 10,000 feet. Because of the cold temperatures, frost, hail, and drought, neither fruit crops nor vegetables are grown. The climate is adverse to agricultural activities; the annual mean

Map 1. Map of Peru by departamentos



Map 2. Departamento of Puno by provinces and area of present study



temperature is 8.3° centigrade (47° Fahrenheit), fluctuating between 0.8° and 15.7° centigrade (33°-60° Fahrenheit). However, the area around Lake Titicaca is warmer; as one gets further from the lake, the climate becomes harsher.

Demography and transportation facilities

According to the census of 1972 the Departamento of Puno has 804,756 people from which 76 percent live in rural areas (67).

There are two cities: Puno and Juliaca, each with a population between 39,000 and 41,000; several towns with a population between 5,000 and 10,000, most of which are the capital of a sub-area of the departamento known as provincias. See Map 5 in Appendix 2 which presents the distribution of population.

Most people who live in this region are descendents of the ancient Incas and/or Lupakas, therefore, three languages are spoken. Spanish has been the official language since the conquest; Quechua and Aymara were the languages of the Incas and Lupakas, respectively. Older people and most women in rural areas do not speak Spanish; they speak Quechua or Aymara. However, younger people, particularly those with schooling, are bilingual in most cases. Bertholet (7) found that there is no significant difference between the Quechua and Aymara-speaking peasants, with respect to the crops they farm, the technology used in farming, and other aspects of life.

The two main cities are linked by a single paved road and by a railroad system that goes as far as Ilo (the most important port in

the southern area of Peru.) The rest of the town is linked only by a dirt road.

Puno has a port which joins Puno with Guaqui in the Republic of Bolivia. Thirty miles from Puno (Juliaca) there is an airport which makes daily trips to Arequipa and Lima and links Puno with the rest of Peru.

Main economic activities in Puno area

At present the main economic activities in this region are:

- a) trade and tourism
- b) small scale industries
- c) mining
- d) agriculture
- e) livestock raising

Trade is an important activity for this region due to the geographical situation and international trade flows to the neighboring country of Bolivia. An illegal activity that is rarely discussed is the smuggling of merchandise and cocaine. Petty trade is rampant and people engage in it as a source of employment. Tourism is an activity that peaks in the month of February, when tourists visit the local festivities and appreciate the beauty of Lake Titicaca.

Small scale industry or cottage industries are present in the larger towns; this sector of the economy produces furniture, beaded clothing, etc. The only heavy industry in this area is a cement factory that provides cement to the whole southern region of Peru.

Mining has been a very important activity in this area particularly during the colonial times. At that time, silver was the main mineral exported to Europe, and recently, the government has shown some interest in reopening these mines.

Agriculture and livestock raising are the two most important activities, in terms of volumes, generating gross value and employment. However, agriculture is a cyclical activity. In the next section agriculture and livestock raising activities are described briefly.

Agriculture and raising of livestock

Departamento of Puno has a total extension of 6,738,616 hectares; a small portion of this area is jungle, most of it is on the altiplano plateau.

The distribution of land by use is as follows (77):

| | |
|-----------------------------------|-------------------------|
| ● area with natural pasture | 4,000,000 hectares |
| ● area with forest | 1,719,616 hectares |
| ● cultivated area | 123,000 hectares |
| ● agricultural area in rest | 96,000 hectares |
| ● land inadequate for agriculture | <u>800,000 hectares</u> |
| Total area | 6,738,616 hectares |

Most of the farming in the Departamento of Puno is dry farming, only 11 percent of the cultivated area is irrigated.

From these 123,000 hectares of farmed area in the Departamento of Puno, the distribution by crops for 1976 has been as follows (77):

| | |
|--------------------|------------------------|
| ● potatoes | 44,444 hectares |
| ● quinoa | 15,872 hectares |
| ● forage | 19,821 hectares |
| ● industrial crops | 10,833 hectares |
| ● vegetables | 252 hectares |
| ● fruit trees | 2,505 hectares |
| ● other grains | <u>28,481 hectares</u> |
| Total | 122,211 hectares |

The main crops in this region are: potatoes (Solanum tuberosum), barley (Hordeum vulgare), and quinoa (Chenopodium quinoa). Other crops of less importance in terms of cultivated areas are: cañihua (Chenopodium pallidicaule), isaño (Tropaeolum tuberosum), ulluku (Ullucus tuberosus), oka (Oxalis tuberosa), tarhui (Lupinus mutabilis), and lima beans (Vicia faba). In the jungle area of the Departamento of Puno grows industrial crops, vegetables and fruit trees; however, in the area of study these crops do not grow properly.

The production, yield and prices of several crops in Puno during recent years is presented in Table 1 in terms of gross value generated the most important crops are potatoes, barley (grain), quinoa, forage oats, forage barley, ulluku, oka, cañihua and isaño.

Historical data on the production of quinoa and potatoes and barley in Puno are presented in Table 2. The cultivated area of potatoes has

Table 1. Production of crops in Puno, recent years^a

| | 1976 | 1976 | 1976 | 1974 | 1974 | 1974 | 1975 | 1975 | |
|----------------------------|-----------|--------|-----------------|---------|--------|--------|----------------|------------------|-----------------|
| | Potatoes | Quinoa | Grain Barley | Cañihua | Oka | Ulluku | Forage Oats | Forage Barley | Mashua Isaño |
| Cultivated Area (Hect.) | 41,628 | 10,656 | 18,430 | 5,180 | 1,180 | 610 | 6,645 | 11,415 | 456 |
| Yield (kgm./hect.) | 4,740 | 500 | 650 | 450 | 3,500 | 4,200 | 10,450 | 6,592 | 3,600 |
| Production (m.t.) | 197,317 | 5,328 | 11,980 | 2,331 | 4,130 | 2,562 | 69,440 | 75,248 | 1,642 |
| Price (soles/kgm.) | 7.00 | 16.00 | 8.50 | 4.80 | 3.00 | 5.60 | .70 | .50 | 4.10 |
| Gross Value (thous. soles) | 13181,217 | 85,248 | 101,830 | 11,189 | 12,390 | 14,347 | 48,608 | 37,624 | 6,731 |

^aSource: (58).

Table 2. Historical data on production of main crops in Puno, 1963-76^a

| | Potatoes | | | Quinoa | | | Barley | | |
|------|------------------------------------|---------------------------|---------------------------|------------------------------------|---------------------------|---------------------------|------------------------------------|---------------------------|---------------------------|
| | Culti- vated Area (hect.) | Yields (kgm/ hect.) | Produc- tion (m.t.) | Culti- vated Area (hect.) | Yields (kgm/ hect.) | Produc- tion (m.t.) | Culti- vated Area (hect.) | Yields (kgm/ hect.) | Produc- tion (m.t.) |
| 1963 | 46,520 | 1,926 | 89,580 | 13,875 | 839 | 11,631 | 33,000 | 613 | 20,220 |
| 1964 | 48,000 | 3,500 | 168,000 | 15,000 | 900 | 13,500 | 20,000 | 900 | 18,000 |
| 1965 | 40,000 | 4,500 | 180,000 | 16,000 | 1,000 | 16,000 | 13,000 | 1,100 | 14,300 |
| 1966 | 35,000 | 3,200 | 112,000 | 15,000 | 720 | 10,800 | 12,000 | 890 | 10,680 |
| 1967 | 38,000 | 4,200 | 159,600 | 15,000 | 800 | 12,400 | 13,500 | 830 | 11,205 |
| 1968 | 36,100 | 4,100 | 148,100 | 7,000 | 450 | 3,150 | 9,000 | 500 | 4,500 |
| 1969 | 41,030 | 4,005 | 164,325 | 12,564 | 319 | 4,008 | 13,350 | 450 | 6,005 |
| 1970 | 50,980 | 4,540 | 231,449 | 12,621 | 330 | 4,164 | 15,740 | 370 | 5,861 |
| 1971 | 50,300 | 5,175 | 260,303 | 11,615 | 370 | 4,298 | 16,450 | 375 | 6,168 |
| 1972 | 48,770 | 4,750 | 231,658 | 10,550 | 440 | 4,642 | 18,885 | 540 | 10,198 |
| 1973 | 47,350 | 5,150 | 243,853 | 10,600 | 500 | 5,300 | 16,849 | 439 | 7,903 |
| 1974 | 46,600 | 4,500 | 209,700 | 10,200 | 440 | 4,488 | 14,813 | 379 | 5,608 |
| 1975 | 47,003 | 5,162 | 242,629 | 10,780 | 545 | 5,875 | - | - | - |
| 1976 | 41,628 | 4,740 | 197,317 | 10,656 | 500 | 5,328 | 18,430 | 650 | 11,980 |

^aSource: (58, pp. 1-2).

remained stable; the area of cultivated quinoa has decreased slightly and the cultivated area of barley has declined also.

The most important livestock raised in this region in terms of head are: sheep, alpaca (Lama pacos) and llama (Lama glama glama), bovine, guinea-pig (Cavia cobaya), poultry and hogs. Table 3 presents the quantity of livestock for Puno.

Bovine, sheep and alpaca are the main source of regional income. Hogs, poultry and guinea-pigs are mostly raised for familiar consumption.

Units of Agricultural Production

The most important units of agricultural and livestock production in Puno are:

- a) units of the reformed sector (co-ops)
- b) peasant communities and individual peasants
- c) shepherds of llamas and alpacas
- d) individual farmers

Each of these units will be described briefly.

Units of the reformed sector (co-ops)

The units of the reformed sector were formed as a consequence of the land reform law (17716) enacted in 1968. There are 30 large co-ops, and they own 21 percent of the total land area of Puno (1,413,655 hectares.) They are organized into: 1) Agrarian Cooperatives of Production (C.A.P.), 2) Agrarian Societies for the Social Interest (S.A.I.S.) and 3) Enterprises of Social Property (E.P.S.).

Table 3. Inventory of livestock for Puno, 1968-73^a

| | Bovine (head) | Sheep (head) | Hogs (head) | Alpacas (head) | Poultry (head) | Guinea-pig (head) |
|------|------------------|-----------------|----------------|-------------------|-------------------|----------------------|
| 1968 | 481,200 | 7,200,000 | 148,000 | 2,100,000 | 190,000 | 410,000 |
| 1969 | 471,200 | 7,100,000 | 152,500 | 2,100,000 | 320,000 | 410,000 |
| 1970 | 471,500 | 7,000,000 | 146,000 | 2,000,000 | 480,000 | 410,000 |
| 1971 | 463,500 | 6,200,000 | 136,000 | 1,600,000 | 585,000 | 410,000 |
| 1972 | 405,246 | 3,384,848 | 62,725 | 2,000,000 | 206,077 | 158,070 |
| 1973 | 402,400 | 3,358,900 | 65,250 | 1,500,000 | 216,000 | 77,898 |

^aSource: (58, p. 12).

On the average, each co-op owns 41,035 hectares and it is similar to the old Latifundio. However, each co-op benefits only 252 families, an average of 163 hectares per family. In contrast, peasant communities are very small and each peasant farms small tracts of land.

Peasant communities

Bertholet's (7) study, done in 1969, in approximately the same area as this study, has found the following characteristics:

The average landholding was 1.85 hectare by a peasant family from which .49 hectare was used for farming potatoes, .46 for barley and .44 hectare for quinoa. Bertholet's study also shows that peasants in this area have 2.1 bovines, 1.1 equine, 8.6 sheep and .4 llamas.

Figueroa (25) took only two peasant communities in the area around the Titicaca. His study takes a total of 7 communities for the whole southern sierra region of Peru. On the average, the tenure of bovine is 1.9 units; 8.3 units of sheep and no equine, llamas or alpacas (this is the average for the two peasant communities around the Puno region.)

The author's study shows that peasants have small plots of land. Some groups of peasants are organized into peasant communities; there are around 377 recognized ones. On the average, these peasant communities have about 897 hectares each. The peasant communities around Lake Titicaca have the highest population density in the Puno area (see Map 6 in Appendix 2). The average family has five members and about 2.2 hectares of land. But it is important to point out that the peasants who live around Lake Titicaca have better crops due to a special micro-clime

than those farming the land farther away from the lake and at higher altitudes. More detail about the general characteristics of peasant communities are presented in Chapter V.

Shepherds

Shepherds of this area live in Puna region that is over 3,800 m. above sea level. The shepherds of llama and alpaca are dedicated fully to taking care of these animals.

In the Puno region there are several peasant communities exclusively dedicated to raising llamas and alpaca without any kind of agricultural activity, such as the community of Paratia as described by Flores (28, p. 31).

During the Lupaca empire and early period of the Peruvian conquest, llamas and alpacas were raised all around this area; but with the introduction of sheep and bovine by the Spaniards (after the conquest), llamas and alpacas were displaced from better farming areas to the marginal areas where agriculture is almost impossible.

At present, llamas and alpacas are very important resources for these shepherds and for this region. Llama and alpaca wool is highly appreciated in Europe. The export of alpaca wool started at the beginning of the last century (28).

Individual farmers (medium-size farmers known also as middle-size producers)

The individual farmers usually have larger amounts of land than the

peasants, and they have access to resources such as fertilizer, credit, new seeds, and other aids offered through the Department of Agriculture in its extension programs. These services rarely go to the peasants or peasant communities. The cooperatives also have access to the extension services and to the credit offered by national and international financing institutions.

Review of Literature on Peasants in Puno Area

This section presents a review of the basic literature on history, peasant movements and anthropological studies relating to peasants in the Puno area. Murra (63) studied the economic and political organization of the Incas and "Lupaqa" or "Aymaras". These two cultures flourished in the Andes region of Peru and Bolivia until the conquest of Peru by Spain. According to Murra (63) these societies were integrated vertically across a great number of ecological levels. This means that they farmed in the jungle areas as well as on the coastal area even though the majority of the population resided on the Andes area. This is known as the vertical control of ecological levels.

Murra (63) mentions that the earliest study of the altiplano region and its inhabitants, the Aymaras, goes back as far as 1567.

Garci Diez de San Miguel and official functionaries of the king of Spain made a socio-economic study of the Aymaras in order to understand their human and social situation. The use of this study was to help the bureaucrats to raise or decrease taxes, limit the human genocide and understand their litigations (63).

According to Murra (63), the "lupaqa" or Aymaras had 20,000 families with a population of 100,000 persons. They lived at different micro-climates ranging from the jungle to the coastal area within the present countries of Peru, Bolivia and Chile.

Murra describes that in the plateau of Peru and Bolivia the Aymaras had livestock, particularly llamas (Lama pacos) and alpacas (Lama glama). "Generally, every Aymara Indian had livestock (llama and alpacas), even the poorer ones." (My translation, 63, p. 123).

During colonial times in Peru the Lupaças paid taxes directly to the king of Spain; Felipe II of Spain. They were allowed to own their land in contrast to other regions of Peru, where land was taken from the Indians and given to the Spaniards. The richness of the Lupaças comes from owning llamas and alpaca. Money was introduced very early in this region, attracting illegal merchants (63).

Llamas and alpacas were useful, since they provided a means of transportation (particularly llama), wool and meat to the ancient inhabitants of the altiplano region.

They farmed potatoes and corn in large volumes. Other crops that the Incas as well as the Lupacas farmed are: quinoa, cañihua, kidney beans, peanuts, tarhui, yucca, sweet potatoes, and many vegetables and fruit trees (39, p. 27).

They were able to store food in the form of chuño (dehydrated potatoes) and charqui (salted and dry meats). Handelman (36, p. 27) writes that during the early colonization after the conquest of Peru

(sixteenth and seventeenth centuries):

At that time, the Spanish crown instituted a system of control over the land and over the indigenous population known as the encomienda. Important Spanish settlers were given title to large tracts of land in the sierra and control over the Incan peasants living on the newly formed estates. These villagers were forced to serve the hacendado as a free labor force.

The name encomienda has been an euphemistic term for slavery that followed the conquest of Peru by Spain. Under this system the Indians were not allowed to leave a given encomienda. In the twentieth century up to 1968, the hacienda used agricultural laborers known as colonos; however these peons were not forced any longer to remain on a given hacienda.

Handelman (36) mentions that some of the colonos' obligations to the hacendado have been:

- a) the provision of free labor (up to 150-200 days per year),
- b) the colono's wife often had to contribute on the hacendado house as domestic servant,
- c) colonos children had to serve as domestics or shepherds.

In exchange of the colonos labor force, the hacendado granted to their peons (colonos) a small plot of land, or the colono could rent land from the hacendado. These obligations of the colonos made them a kind of serf. "In short, until recently, the hacienda peon's life was totally controlled by the patron."

During the 1960s in the Puno region, most peasants were not hacienda peons. According to Handelman (36), out of 650,000 peasants living in this

area only 140,000 were full time colonos (this is 21.5%).

The Puno region has 23% of the peasant communities (including both those recognized by law and non recognized). In Peru, there exist about 6,000 peasant communities with a population over 3 million people making up 70 to 75 percent of the sierra's rural population (36, p. 29, p. 32).

The Departamento of Puno has had 1396 villages or peasant communities from which only 30 were recognized legally as peasant communities has increased to 377. The peasant communities are governed by a specific body of legislation dating back to the Peruvians' constitution of 1920 (52). "Peasant communities are found at village or hamlet level and they control and exploit communal land resources and labor." However, Hurtado (42) argues that the formation of peasant communities goes back as far as the fifteenth century. He names three stages of peasant communities:

| | |
|--------------|-------------|
| First Stage | 1532 - 1630 |
| Second State | 1631 - 1730 |
| Third Stage | 1731 - 1831 |

With the formation of haciendas, the marginal and poorer lands were left to the peasants. So a long and painful struggle started. As Handelman (36, p. 37) put it:

The history of Peruvian Sierra (was) the struggle for land between the land owner and the Indian community, a struggle that the land owner (was) constantly winning.

At times this struggle between the hacendado and comunidades campesinas became an armed battle giving a history of peasant movements.

Dew (17) gives a brief summary of peasant movements in the Puno area.

In 1886 a widespread Indian revolt took place in the altiplano against the aggressive hacendados and local authorities. After several months of fighting and great bloodshed, the Indians were finally subdued. Other uprisings took place in the 1870's [sic] and at the end of the century. Between 1903 and 1928, still other revolts took place in the districts of Asillo, Huancho, Chucuito, Huancané, Samás, Platería, Ilave and Lampa.

Those of Huancané and Huancho writes Escobar were the most severe. In the latter site ... the Indians tried to revive the Incan Empire and to separate themselves from the country. (Even today, the Indians call Huancho "Lima Huancho," referring to the capital of their would-be empire).

As Indian unrest became widespread all over Peru, Augusto Leguía tried to solve by forming a commission, but it did not work.

Not able to hope for redress of grievances from the government, the Indians between Puno and Azángaro resorted increasingly to violence. The army was therefore ordered into the sierra and, after a number of Indian massacres, succeeded by the end of 1923 in making the area safe once again for the white and cholo landowners.

Dew (17) claims that the political problem in the altiplano derives from the castelike separation of mestizo and Indian cultural groups.

In 1867, the class conflict between the Indian living mostly in the peasant communities and the "white" hacendados became acute.

It seems that the patience of the Indian race has gone and they decided to struggle. Vasquez (90) describes the "rebelión de Huancané" which has been the name given to the peasant movements that took place in the Puno region between 1867-1868.

On January 2 of 1868, there was one of the last battles between the Indians and the regular Peruvian army. The Indians, fighting against their oppressor, were directed by Colonel Juan Bustamante. The peasant Indians, who came from all over this region, were outnumbered and poorly armed, mostly with farming tools, lost this battle. Bustamante was assassinated and many Indians were taken prisoner, 72 of whom were suffocated in a small room while another 400 were flogged in the public plaza. As a consequence of the flogging 50 of them died (90).

So in the Puno area the small farmer or peasant who is usually Indian was transformed (during the Republic) to Colono, Comunero or Pastor of Puna. The latter is a shepherd of llamas and alpacas.

Dew (17, p. 185) writes clearly of this interdependence in the following way:

The altiplano system bears a close resemblance to the plural society type developed by M. G. Smith. The barely self-sufficient colonos and comuneros among the Indians clearly possessed distinct cultural institutions from those of the mestizo elite. The principal cross-cultural relationships that had existed until recent times were the economic dependencies of colonos on their landlords and the exploitation of comuneros by lawyers, landlords, and local authorities. The mestizo elite, living almost exclusively upon the various kinds of tribute exacted from the peasants, had evolved a rudimentary, but organic, division of labor.

The situation of llama and alpaca shepherds has been described in detail by Flores (28). This group of peasants is mostly dedicated to raising llama and alpaca. This activity goes back to the pre-Columbian times, when the Indians domesticated the llama (Lama glama glama) and

alpaca (Lama pacus). However, two of them were not domesticated. These are vicuña (Lama vicugna) and guanaco (Lama guanicoe).

To conclude the class conflict which has gone on for centuries between the peasant-Indians and their oppressors, the following remark of Dew (17, p. 185) is relevant.

Once their pre-Columbian institutions providing for adjustment to ecological uncertainties had been broken down, the Indians became exceedingly vulnerable to exploitation. Dispersed and isolated in barely self-sufficient units throughout a wide area, the peasantry had little access to its own various segments or to outside groups for action in defense of its interests. An attrition of its already meager resources thus occurred in the conflicts of its individual units with the more mobilized groups of the mestizo society, whose interdependency permitted a greater strategic sharing of resources. The result was that, except for brief anomic outbursts, the peasantry remained atomized and politically subordinate throughout the four hundred years in which this plural society has existed.

Handelman (36) also concludes with similar observations.

Despite the many political and socioeconomic changes that transpired in Peru from the sixteenth through the twentieth centuries, the feudalistic hacienda system retained most of its early characteristics. As we have seen, the early 1960's [sic] latifundios still encompassed over 75 percent of the sierra's cultivable land and an even greater percentage of the southern highlands. A French scholar recently noted that the socioeconomic condition of many hacienda peons has not changed significantly for four centuries. Thomas Ford adds: "In the sierra the Indian still prepares his small plot of land with ... a digging stick antedating the plow, improved in the past 400 years only through the addition of an iron point. He can afford no other implements and even if he could, the terrain is often too rugged to allow their use."

Summary

A regional description of the Puno region was presented and the units of agricultural production were mentioned. Finally, a survey of literature on peasants, peasant movements and class conflicts was discussed. We now turn to a survey of that research undertaken of these peasant communities as they presently survive in Puno.

CHAPTER IV.

METHODOLOGY

This chapter is divided into three sections: the origin of data used and communities participating in the survey, general aspects of methodology used and techniques of multivariate analysis used in this study.

Data Used and Peasant Communities Participating
in the Survey

The data for the present study were collected through a pilot survey of 263 peasant families in 20 peasant communities or villages. In Table 4, we present the data from the communities participating in the survey and the number of heads of families surveyed. The approximate sample size is 9 percent of the number of families living in each community. The unit of observation used in the survey is the family.

The survey was designed by the author with the assistance of an anthropologist and an economist who are familiar with and live within the area of study.

A copy of the questionnaire developed for the sample survey is presented in Appendix 1. The questionnaire was developed in Spanish; however, the interviews took place in Quechua or Aymara, which are the native tongues of the peasants. To explain the general socio-economic characteristics, production, technologies and consumption in peasant villages (objectives a - e); questions concerning the following topics

Table 4. Number of surveys conducted in 20 peasant communities

| Name of peasant community | Heads of families (estimated) | Number of surveys ^a |
|---------------------------|-------------------------------|--------------------------------|
| 1. Chaupi Sahuacasi | 160 | 8 |
| 2. Layocota | 53 | 7 |
| 3. Tercer Jilahuata | 32 | 4 |
| 4. Llicllica Pucacancha | 23 | 3 |
| 5. Centro Poblado Chipana | 30 | 7 |
| 6. Chaullocamani | 120 | 11 |
| 7. Pacocusullaca | 104 | 14 |
| 8. Yajja Circatuyo | 550 | 55 |
| 9. Huancho | 782 | 59 |
| 10. Ramis | 182 | 16 |
| 11. Sulcacatura I | 136 | 10 |
| 12. Sulcacatura II | 126 | 12 |
| 13. Sorasa | 315 | 15 |
| 14. San Juan de Ilata | 43 | 4 |
| 15. Carata | 76 | 5 |
| 16. Sucasco | 40 | 6 |
| 17. Huatta Collana | 40 | 5 |
| 18. San José de Collana | 125 | 10 |
| 19. Yanico Rumini | 60 | 5 |
| 20. Camata | 84 | 7 |
| Total | 3,081 | 263 |

^aSurveys: Quantitative and structured questions.

were posed to the small farmers:

1. Geographic situation of the community surveyed.
2. Number of people that constitute a family.
3. Listing of food-stuff consumed, by quantity.
4. Total expenditures in items other than food.
5. Varieties of barley farmed (in hectares).
6. Quantity (of barley) harvested, bought, sold, stored and used.
7. Human and non-human consumption of barley.
8. Second occupation of peasant (besides agriculture).
9. Level of formal education of head of family.
10. Extent of land use in farming: potatoes, barley, quinoa, beans, oka, isaño and others.
11. Land use by: cultivated land, land in fallow, and uncultivable land.
12. Ownership of livestock per family by: bovine, equine, sheep, llamas and alpacas.
13. Listing of most important tools owned by a peasant family, indicating its ownership.
14. Cost incurred in farming one hectare of barley as well as benefits originated from it.

Some of the above items focus on barley because originally this questionnaire was prepared for a report on "Barley in the economy of peasant communities in Puno, Peru," presented by the author to the Canadian International Development Agency (CIDA) which financed the data

collection and design of the survey used on the present study.

In the summer of 1978, the author made a trip to Peru with a fellowship from the World Food Institute of I.S.U., to collect data on quinoa; that trip also allowed him to collect the data for this study.

The survey was done over a period of 2 months (September - October, 1978) with the extra help of four other graduating seniors of the Universidad Nacional Técnica del Altiplano at Puno, Peru. Three of these young professionals had a B.S. in Economics. Included in the group working with the author were an anthropologist and an economist. The extra help was hired as surveyors and the criteria for selecting them was two-fold.

- a) In addition to Spanish, they spoke fluent Quechua or Aymara.
- b) They were originally from a peasant community and they still had contact with them.

Map 3 shows the areas where Quechua or Aymara are spoken. The survey took place in Quechua or Aymara according to the location of the peasant communities. The list of communities that speak Quechua or Aymara is presented in Table 5. The previously mentioned table also presents the peasant communities according to climate.

In eight of the peasant communities Aymara is the major language and in the remainder it is Quechua.

Most of the peasant communities included in the survey are located around Lake Titicaca. The type of climate around Lake Titicaca is milder than farther away from it. This climate is known as the cold climate represented as Dwb in Map 4. This type of climate has a mean temperature



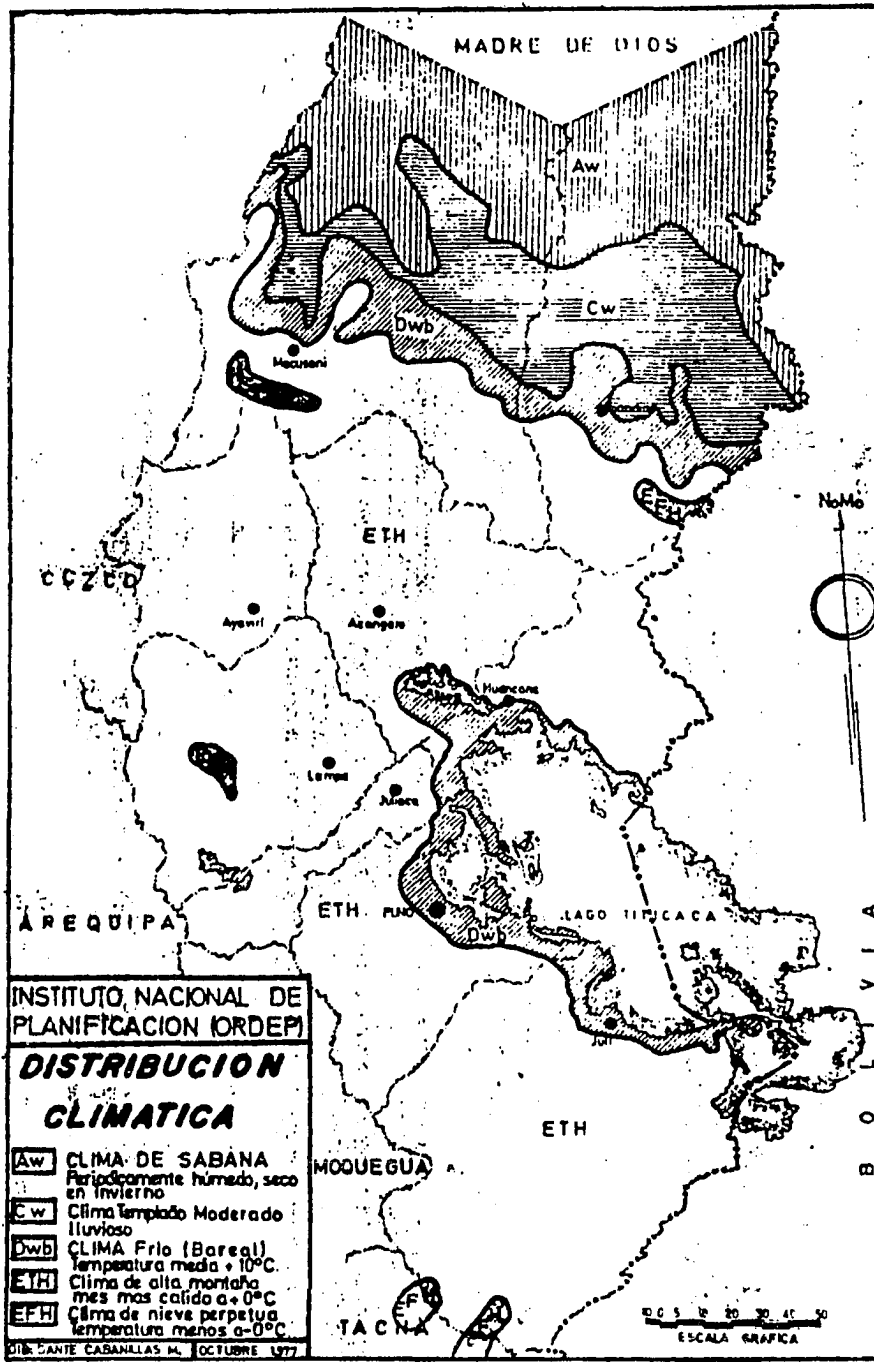
Map 3. Linguistic map of Puno

Table 5. Peasant communities by type of climate and language they speak

| Name of peasant community | Type of climate ^a | Language spoken ^b |
|---------------------------|------------------------------|------------------------------|
| 1. Chaupi Sahuacasi | 1 | Q |
| 2. Layocota | 1 | Q |
| 3. Tercer Jilahuata | 1 | Q |
| 4. Llicllica Pucacancha | 1 | Q |
| 5. Centro Poblado Chipana | 0 | A |
| 6. Chaúllacamani | 0 | A |
| 7. Pacocusullaca | 0 | A |
| 8. Yajja Circatuyo | 0 | A |
| 9. Huancho | 0 | A |
| 10. Ramis | 0 | Q |
| 11. Sullcacatura I | 0 | A |
| 12. Sullcacatura II | 0 | A |
| 13. Sorasa | 0 | Q |
| 14. San Juan de Ilata | 0 | Q |
| 15. Carata | 0 | Q |
| 16. Sucasco | 0 | Q |
| 17. Huatta Collana | 0 | Q |
| 18. San José de Collana | 0 | Q |
| 19. Yanico Rumini | 0 | Q |
| 20. Camata | 0 | A |

^aClimate: 1 = cold climate, mean temperature is 10° C., (Dwb in Map 4). 0 = high mountain climate, mean temperature is + 0° C., (ETH in Map 4).

^bLanguage: Q=Quechua; A=Aymara.



Map 4. Climatic distribution of Puno

0° centigrade in the warmest month; this is known as the high mountain climate.

An important point to remember is that in rural areas of LDCs countries it is almost impossible to get survey data by mail, since service is completely absent. To get data it was necessary to visit the peasant communities and ask questions of the inhabitants.

Table 6 presents the peasant communities by geographic location including the province, district and sector of peasant community. Since the headquarters for collecting data were in the city of Puno, it was necessary to do a lot of traveling. Weekly trips were usually made from Puno to the peasant community, leaving on Tuesdays and returning on the weekend. Monday was allocated for a group meeting to overcome difficulties or to reschedule the new trips.

The means of transportation were train, bus, truck, bicycle and on foot. Generally taking a bus or a car to a peasant communities is a luxury.

It is difficult to open contact and keep in touch with peasant communities. Foreigners to the community are not usually welcome unless there was some previous contact or communication. In the communities where data were obtained, the Canadian International Development Agency was, through an extension program, attempting to improve production of crops such as barley and rape-seed (colza) by introducing high-yield seeds. CIDA provided seed and fertilizer as well as technical assistance to the peasants. In case of a good year the farmers had to repay the seed

Table 6. Geographic location of peasant communities included in the survey by province, district and sector of peasant community

| Province | District | Peasant community | Number of surveys per community | Sector of peasant community | Number of surveys per sector | |
|----------|--------------------|---------------------|---------------------------------|-----------------------------|------------------------------|----|
| Azángaro | Azángaro | Chaupi Sahuacasi | 8 | --- | | |
| | | Layocota | 7 | --- | | |
| | | Tercer Jilahuata | 4 | --- | | |
| Chucuito | J. D. Choquehuanca | Lliclica Pucacancha | 3 | --- | | |
| | | Pilcuyo | | Centro Poblado | 1 | |
| | | | Chipana | 7 | | |
| | | | | | K'elkata | 1 |
| | | | | | Q'etekelkata | 1 |
| | | | | | Sucane | 1 |
| | | | Chaullacamani | 11 | Churacutipa | 3 |
| | | | | | Mamani | 1 |
| | | | | | Pacco | 4 |
| | | | | | Pacohuanaco | 3 |
| Huancané | Huancané | Paccocusullaca | 14 | --- | | |
| | | Yaja Circatuyo | 55 | --- | | |
| | | Huancho | 59 | | Aquicucho | 5 |
| | | | | | Chururaya y Alfaque | 8 |
| | | | | | Huayllaraya | 6 |
| | | | | | Llchojani | 14 |
| | | | | | Laccaya | 7 |
| | | | | | Marcatacani | 7 |
| | | | | | Mucuraya | 4 |
| | | | | | Quiapati | 3 |
| | | | Quichuata | 5 | | |
| Puno | Taraco | Ramis | 16 | --- | | |
| | Acora | Sullcacatura I | 10 | Ccamatamani | 2 | |

| | | | | |
|-------------|---------------------|----|--------------------|---|
| | | | Ccama | 1 |
| | | | Cutipa | 2 |
| | | | Llanquesa | 1 |
| | | | Morroccauraya | 1 |
| | | | Putiuyo | 1 |
| | | | Tarquiri | 1 |
| | | | --- | |
| Atuncolla | Sulcacatura II | 12 | Patiaty | 5 |
| | Sorasa | 15 | Santiago de Sorasa | 2 |
| | | | Yurac Cancha | 8 |
| | | | --- | |
| Capachica | San Juan de Ilata | 4 | Putucuni | 3 |
| Coata | Carata | 5 | Quispicucho | 4 |
| | Sucasco | 6 | Collana segunda | 5 |
| Huatta | Huatta Collana | 5 | --- | |
| Paucarcolla | Janico Rumini | 5 | --- | |
| | San José de Collana | 10 | --- | |
| Plateria | Camata | 7 | --- | |

and fertilizer; but in a poor year, it was considered a loss to the CIDA. This working relationship between the peasant community and CIDA allowed an entry to the peasant communities in the survey.

At times the president of the peasant communities would not allow anyone to take a survey or do interviews. This happened in at least two peasant communities.

Sometimes the survey team was welcomed by the president of the community, particularly if previous arrangements were made through CIDA. In that case, the president would call for a general meeting and then it was possible to draw a random sample of about 9 percent of the families.

In most of the cases, however, the president would allow a survey to be taken, but without any great welcome. In this case, the survey was given to people who were visited by the survey team. Peasant families were very cooperative in answering the questions and they were very generous with their time.

The more advanced economic study done on peasant economy in this area is by Figueroa (25); he uses only two peasant communities. The author in this study covers 20 peasant communities of the Puno region. Therefore, this study has the largest sample size.

Complementary data for the present study come from the Ministry of Food and Agriculture (57, 58) and Peruvian census data (44).

Hypothesis of Study

In the following study the following ideas are hypothesized:

- a) The computation of socio-economic variables will reflect the poverty level and some of the problems that small farmers or near landless farmers are facing.
- b) The technologies used by peasants in farming their crops are the "traditional" or "primary." The trend is towards a higher dependency on farming tools coming from the industrial sector.
- c) Peasants are not a uniform group of poor families; but some of the peasant-villages may be richer than others. Also, within the communities there exists a peasant differentiation.
- d) Two or more groups may be formed among peasant communities having very similar characteristics.
- e) Peasant families produce their food-stuff by farming potatoes, quinoa, barley, etc.; these products are also their staple food in terms of volume and expenditure (value).

General Aspects of the Methodology Used

To test and measure the hypothesis mentioned; the frequency distribution, the mean and standard deviation statistics will be computed to:

- a) Determine and measure some of the general socio-economic variables;
- b) Quantify the production of crops and livestock per family;

- c) Determine an inventory of tools used in farming;
- d) Estimate a food basket per capita in the rural areas.

The objectives mentioned above will be developed by using descriptive statistics and it will be compared with similar studies whenever possible.

The description of the present technology used in farming will also include an analytical efficiency of technologies by comparing the technology used with the one recommended by the extension services of the Ministry of Agriculture and other institutions concerned with improving production and productivity of agricultural crops.

The methodology used to determine a food basket and budget share for the average peasant household will be computed in two ways: 1) using all the numbers of observation. This will give the average quantity consumed by all the families in the survey; 2) using their frequencies only which will give the average amount consumed by people who consumed more than zero for each item.

To test the hypothesis about peasant differentiation, three statistical techniques will be used. They are:

- a) Multivariate Analysis of Variance (MANOVA)
- b) Analysis of Variance (ANOVA)
- c) Cluster Analysis

A more detailed description of each of them is included in Chapter VI.

MANOVA will be used to test if any differences exist among peasant

communities taken simultaneously several variables.

ANOVA tests the difference among peasant communities but taking only one variable at a time. ANOVA will use the following hypothesis:

$$H_0: \mu_1 = \mu_2 \cdots \mu_{20}$$

$$H_a: \mu_i \neq \mu_j \text{ for at least one } i \neq j$$

$$i = 1, 2, \dots, 20$$

$$j = 1, 2, \dots, 20.$$

The alternative hypothesis indicates that at least a pair of means are different.

ANOVA will also be used for a post stratification of peasant communities to test if any significant differences exist within each group of villages.

Cluster analysis will be used to obtain a sub-set of peasant communities in order to obtain two or more groupings; the criteria for cluster analysis will use 22 variables simultaneously.

The most important variables used in the MANOVA, ANOVA and cluster analysis are presented in Table 7.

Table 7. List of 26 relevant variables used in MANOVA, ANOVA and cluster analysis

| Code | Variable and their dimensions |
|---------------|--|
| 1. PLACE | = name of peasant community, village or hamlet |
| 2. AGE | = age of head of family |
| 3. EFICISPA | = proficiency in Spanish of head of family coding: 1. good 2. satisfactory 3. poor |
| 4. MEMBERS | = number of persons that form a family |
| 5. TOTALEXP | = total expenditure (imputed), per year, per capita, in soles |
| 6. FPOTATOE | = land area used in cultivating potatoes, hectare per year |
| 7. FBARLEY | = land area used in cultivating barley, hectare per year |
| 8. FCANAHUA | = land used in cultivating <u>cañihua</u> , hectare per year |
| 9. FQUINUA | = land area used in cultivating quinoa, hectare per year |
| 10. FBEAN | = land area used in cultivating lima beans, hectare per year |
| 11. FOCA | = land area used in cultivating <u>oka</u> , hectare per year |
| 12. FIZANO | = land area used in cultivating <u>isaño</u> , hectare per year |
| 13. TOFAREA | = total land used in farming, hectare per family |
| 14. TENECULA | = tenure of cultivated land, hectare per year |
| 15. TENUREST | = tenure of land in fallowing, hectare per year |
| 16. TENURERI | = tenure of uncultivable land, hectare per year |
| 17. TENURELA | = total land tenure (sum of 14, 15 & 16) hectare |
| 18. TENU LIVE | = number of livestock, units |
| 19. TENU EQUI | = number of equine, units |
| 20. TENU SHEP | = number of sheep, units |
| 21. TENU AUQE | = number of llamas and alpacas, units |
| 22. CHAQUITQ | = number of foot plows, per family, units |
| 23. PLAWQ | = number of plows, per family, units |
| 24. EDUCAT | = level of formal education of head of family coding: 28. none 32. fourth grade 36. eighth grade 29. first grade 33. fifth grade 37. ninth grade 30. second grade 34. sixth grade 38. tenth grade 31. third grade 35. seventh grade 39. university level |
| 25. CLIMATE | = climate coding: 1. cold, average temperature 10° C. (Dwb, see Map 4) 0. average temperature +0° C. (ETH, see Map 4) |
| 26. LANGUAGE | = language spoken besides Spanish coding: 1. Quechua language speakers 2. Aymara language speakers |

Summary

In this chapter we described the procedure used on the data collection and several hypothesis were formulated. Analysis of variance (ANOVA), multivariate analysis of variance (MANOVA) and cluster analysis are the statistical tools used in this study. In the next chapter, we will present the empirical results on: a) the general socioeconomic characteristics of peasants, b) the most important crops farmed and livestock raised by peasants, c) the present technology used in farming by peasants and d) the food basket and consumption of food items by peasants.

CHAPTER V.

GENERAL ECONOMIC CHARACTERISTICS

Empirical Results of the General
Characteristics of Peasants

According to the empirical results, some of the general characteristics of the peasant families are presented in Table 8. On the average, the head of the family is 43 years old, speaks Quechua or Aymara, and is also able to communicate in Spanish (72 percent). A typical family has five members.

Dew (17) mentions that the illiteracy rate for the Departamento of Puno was 86 percent; this illiteracy rate is probably greater for peasants.

Peasants are of Indian origin speaking their own languages as mentioned in the previous paragraph. Indians were banned from formal schooling during colonial times and even after Independence. If an Indian was caught learning how to read and write he was castrated and the teacher's tongue was cut out. (This is according to verbal tradition passed from one generation to another.) The facilities for formal education in rural areas have improved and have been available only in the last three decades.

At present, ten percent of the heads of families lack formal schooling. The average length of formal schooling is three years. 63 percent of the heads of peasant families have 3 years or less of

Table 8. General characteristics of peasant families

| Variable | | |
|---------------------------|---------------|---------|
| Sample size | (n) | 263.0 |
| Age | | |
| mean | (\bar{x}) | 43.4 |
| standard deviation | (sd) | 12.5 |
| Member of family | | |
| mean | (\bar{x}) | 5.3 |
| standard deviation | (sd) | 2.2 |
| Efficiency in Spanish | | Percent |
| good | | 21 |
| average | | 51 |
| poor | | 28 |
| Level of formal education | | Percent |
| none | | 10 |
| primary | | |
| first grade | | 14 |
| second grade | | 13 |
| third grade | | 20 |
| fourth grade | | 15 |
| fifth grade | | 17 |
| high school | | |
| sixth grade | | 0.9 |
| seventh grade | | 4 |
| eighth grade | | 3 |
| ninth grade | | 1 |
| tenth grade | | 2 |

formal schooling. However, 2 percent have a high school diploma.

Besides their own agricultural activities, peasants make seasonal migrations in order to get complementary income; these seasonal migrations are toward cities and agricultural areas of the Peruvian coast.

Fifty percent of the peasants do not have a secondary job and these live from agriculture alone. The other half work on a part-time basis as the skilled labor of the peasant communities in jobs such as livestock merchants, textile artisans, masons, tailors, merchants, musicians, medicine men, carpenters, hatmakers, teachers, blacksmiths, ceramic artisans, and shoemakers. Table 9 presents the second occupation of the heads of families. Every community has skilled manpower for their agricultural activities, as well as their nonagricultural activities (such as building houses, manufacturing clothing, etc.)

Total land tenure is about 2.2 hectares, of which only 58 percent is cultivated. The rest is in fallow or is uncultivated rough land. In Table 10, land tenure by use is presented.

According to Roa and Vega (77) the most important crops in the Departamento of Puno, in 1966-67, are potatoes, other grains, forage, quinoa, industrial crops, fruit trees and vegetables (see Chapter III, p. 47.) He does not specify which grains.

The Most Important Crops Farmed and Livestock Raised by Peasants

The agricultural production of small farmers is diversified; they farm on many small plots of land. The plots of land are located in

Table 9. Second occupation of head of family besides agriculture

| Second occupation | Percent |
|-----------------------|---------|
| None | 49 |
| Merchant of livestock | 12 |
| Textile artisan | 9 |
| Mason | 7 |
| Tailor | 5 |
| Merchant | 5 |
| Musician | 4 |
| Medicine man | 2 |
| Carpenter | 2 |
| Hatmaker | 1 |
| Teacher | 1 |
| Blacksmith | 0.8 |
| Ceramic artisan | 0.4 |
| Shoemaker | 0.4 |
| Other | 1.4 |

Table 10. Land tenure by use

| Land tenure (use) | Mean (hectare) | % (Vertical) |
|----------------------|-------------------|-----------------|
| Cultivated land | 1.29 | 58 |
| Land in fallow | 0.63 | 28 |
| Uncultivable land | 0.30 | 14 |
| Total | 2.22 | 100 |

diverse climates and places, but each plot is small. The main crops are barley, potatoes, quinoa, lima beans, oka, cañihua, isaño and recently, oats.

The cultivated areas (by crops) are presented in Talbe 11. Farming barley and potatoes take the largest extension of land. Together, they occupy 73 percent of the cultivated area. This result is similar to that of a study done by Bertholet (7) eleven years ago. The main source of income for a peasant family is selling its livestock (if it has any), not their crops. Barley, quinoa and other grains, as well as potatoes, are grown for self-consumption. For instance, barley is farmed for forage and grain; the grain in turn is used for human consumption as well as feed for hogs, dogs and livestock. Only a minimum amount is sold or bartered. None of the peasants sell their grain to beer breweries. However, in other regions of Peru, peasants may have contracts with breweries to sell their barley produce.

In this area, cañihua, oka and isaño are cultivated less because these crops are better adapted to other regions.

Most peasant families have livestock in addition to their dogs. The tenure of livestock is presented in Table 12. On the average, a peasant family has four bovines, one equine (usually a donkey) and twelve sheep; only one-fourth of them has a llama or alpaca.

The number of llamas and alpacas increases as one moves to higher regions from Lake Titicaca; it is possible to find llama and alpaca

Table 11. Cultivated area by crops

| Crop | Mean (hectare) | % (vertical) | Standard deviation |
|----------------|-------------------|-----------------|-----------------------|
| Barley | 0.57 | 44 | 0.49 |
| Potatoes | 0.38 | 29 | 0.40 |
| Quinoa | 0.10 | 8 | 0.14 |
| Broad beans | 0.08 | 6 | 0.13 |
| <u>Oka</u> | 0.03 | 2 | 0.07 |
| <u>Cañihua</u> | 0.02 | 2 | 0.06 |
| <u>Isaño</u> | 0.01 | 1 | 0.04 |
| Others | 0.10 | 8 | |
| Total | 1.29 | 100 | |

Table 12. Kind of livestock per unit of family

| Livestock | Mean | Standard deviation |
|-----------------------|-------|-----------------------|
| Bovine | 3.91 | 2.80 |
| Equine | 1.31 | 1.08 |
| Sheep | 12.32 | 10.00 |
| Llamas and alpacas | 0.27 | 1.38 |

herders where agriculture is almost impossible. Similarly, as one moves away from Lake Titicaca, the production of cañihua, isaño and oka increases in terms of land area cultivated.

Description of Present Technology

Levels of technology

In the Peruvian altiplano there are two types of technology used in cultivating crops. One of them is called "traditional", "native", or "primary", and the other is the "introduced" or "modern". The first is practiced by peasants who make up approximately 70 percent of the rural population; the second, or "introduced" technology, is used by individual farmers who work with the Department of Agriculture and Food, and by the cooperatives.

"Traditional technology" has its origin in pre-Inca and Inca cultures. These people developed potatoes and the other cereals mentioned previously using this "traditional" technology. It was appropriate and at the level of high culture of that time. At present, this technology seems inadequate, since it has remained virtually unchanged for centuries. Emphasis has been placed on "modern technology" which is characterized by large machinery, improved seed, synthetic fertilizer, and pesticides. However, the use of modern technology does not mean that it is appropriate for this region. In this area, the Hacienda and large cooperatives - SAIS, CAP, and EPS - have made an effort to use and adopt the "modern technology". However, this technology is not appropriate

for the mini-farms in areas where there are many small farmers and where capital is scarce and labor is relatively abundant.

Main characteristics of technology used by peasants

Some of the characteristics of present technology used by peasants are:

- a) The main source of energy is human and animal power; (see pictures 1 and 2)
- b) The principal tools used are: chaquitajilla, raukana and plow;
- c) A small portion of these tools are manufactured (assembled) locally;
- d) The agricultural practices and the use of fertilizer is minimum.

The agricultural practices used in farming with emphasis in quinoa and barley are described next.

Crop rotation

Two of the most-used patterns of rotation are:

- | | | | | | |
|----|-------------|-----------------|----|-------------|-----------------|
| a) | first year | potatoes | b) | first year | potatoes |
| | second year | quinoa | | second year | barley |
| | third year | barley | | third year | lima beans |
| | fourth year | land rest | | fourth year | land rest |
| | | (or start again | | | (or start again |
| | | with potatoes) | | | with potatoes) |

About half of the peasants fallow their land after farming it for three or four consecutive years. Some experts do not agree with letting



Picture 1. Foot-plow (front view)



Picture 2. Planting barley with oxen

land lie idle for one or two years.¹ The Ministry of Agriculture recommends the following rotation of crops:

| | |
|-------------|------------------------------|
| first year | potatoes |
| second year | quinoa |
| third year | barley or oats |
| fourth year | <u>tarhui</u> or broad beans |
| fifth year | potatoes |

Soil preparation

In general, peasants do not prepare soil, particularly if they grew potatoes in the previous year. This practice also holds with quinoa, cañihua, and lima beans. Only 30 percent of the farmers prepared their land before planting barley. However, land is prepared before planting potatoes.

Planting

Peasants plow their land with oxen, using the simple wooden plow with steel shaft, or by using a foot-plow. Then grain seeds are spread at random by hand (see pictures 1 and 2). Clumps of earth are smashed by pendulum-like motions of a hand-swung sledge. Larger farmers and co-ops use machinery for planting grains or potatoes. Planting is done mostly from September to November. A small number of peasants (16 percent) use fertilizer, such as manure. Usually they do not use synthetic fertilizer because they do not think it is necessary. However, the extension program of CIDA and the Department of Agriculture recommend its use

¹A well-known agronomist from the Canadian International Development Agency, Richard Johnson, does not agree with letting land be idle for one or more years in an area where agriculture land is scarce.

in order to maximize production. No other crop-related activities are undertaken until harvest except for keeping livestock out of the planted areas. They perform crop-related activities only for potatoes.

In the case of quinoa, technicians recommend planting Kancolla and Blanca de Juli varieties the first week of September and the Sajama variety the first week of October. In general, planting is recommended from the end of August to the end of October. They also recommend planting in row strips 40 centimeters apart, using 10 kilograms of quinoa seed, 240 kilograms of ammonium nitrate, and 200 kilograms of calcium superphosphate per hectare (80-40-00). The Department of Agriculture and Food indicates that weeding, thinning, and transplanting of seedlings be done two or three times before harvest, according to the quantity of weeds and quinoa plants (57).

Harvest

Crops are harvested during the months of May and June. The harvest of barley is done by cutting it out at the bottom with a sickle. Threshing of grains is done manually using wooden threshers which are curved at one end called huactanas. Sometimes, threshing of barley is done with the aid of donkeys, however. Barley shocks are beaten during threshing; the grain is separated from the chaff by tipping (or pouring from) a container, allowing the wind to blow away all but the grain, which is heavier. A similar technique is used in the threshing of quinoa and cañihua.

The harvesting of quinoa is done by taking out the plant, including

its roots, but technicians advise cutting it. Threshing is done manually using wooden threshers about 1.5 meters long and 5-10 centimeters in diameter. They are curved at one end. Quinoa shocks are beaten during the threshing; the grain is separated from the chaff by carefully tipping (or pouring from) a large round container, allowing the wind to blow away all but the grain, which is heavier. Larger farmers and co-ops own threshing machines or rent them for the harvest.

The harvest of potatoes is done manually using a short hoe; potatoes are harvested from the soil or subsoil. The harvesting of potatoes is a labor-intensive activity. The large cooperatives and rich individual farmers use machinery to harvest potatoes if the terrain allows it.

Consumption of Food Items by Peasants

In this section we analyze a consumer's food basket and budget shares, on the basis of surveys collected in the villages. We address the basic question of what are the composition of food-stuff that peasants consume.

A consumer's food basket was estimated for 20 peasant communities. The results are presented in Table 13 and Table 14. For both tables, the per capita expenditure is an imputed value based on market prices and quantities of consumption. In Table 13, the average per capita food basket was computed using the whole same size of 227 observations. In Table 14, the average per capita food basket was computed for only those who consume the different food-items; in this case the food basket was

Table 13. Consumer's food basket and budget share in 20 peasant communities (per person for whole sample, n = 227)

| Product | Expenditure per capita (soles/year) | Consumption per capita (kilograms/ year) | Budget share (percent) | Price (soles/ kilogram) | Percent of families with zero consumption |
|--|---|---|------------------------------|-------------------------------|--|
| 1. Potatoes | 3,010 | 119 | 7.79 | 25.29 | 0 |
| 2. Quinoa | 1,376 | 34 | 4.48 | 40.47 | 17 |
| 3. <u>Cañihua</u> | 88 | 4 | 0.29 | 22.03 | 88 |
| 4. Lima beans | 1,434 | 36 | 4.66 | 39.82 | 20 |
| 5. Barley | 2,294 | 82 | 7.46 | 27.97 | 2 |
| 6. Wheat | 158 | 5 | 0.51 | 31.67 | 86 |
| 7. Oxalis (<u>oka</u>) | 260 | 11 | 0.85 | 23.68 | 53 |
| 8. <u>Chuño</u> | 4,948 | 78 | 16.10 | 63.43 | 2 |
| 9. <u>Tunta</u> | 723 | 5 | 2.35 | 144.55 | 61 |
| 10. <u>Tropeaeolum</u> (<u>isaño</u>) | 53 | 2 | 0.17 | 26.32 | 89 |
| 11. <u>Papa Liza</u> | 24 | 1 | 0.08 | 23.84 | 90 |
| 12. Salt | 203 | 14 | 0.66 | 14.47 | 3 |
| 13. Cheese (units) | 1,005 | 20 | 3.27 | 50.23 | 34 |
| 14. Corn | 195 | 3 | 0.63 | 65.05 | 70 |
| 15. Rice | 591 | 14 | 1.92 | 42.22 | 20 |
| 16. Beef | 138 | 1 | 0.45 | 138.26 | 93 |
| 17. Llama | 105 | 1 | 0.34 | 105.03 | 95 |
| 18. Lamb | 1,554 | 12 | 5.06 | 129.47 | 10 |
| 19. Milk (cow) | 456 | 17 | 1.48 | 26.84 | 34 |
| 20. Milk (processed) | 45 | 1 | 0.15 | 44.93 | 97 |
| 21. Flour (wheat) | 300 | 6 | 0.98 | 49.97 | 52 |
| 22. Fish (units) | 18 | 9 | 0.06 | 2.00 | 91 |
| 23. Lard | 311 | 5 | 1.01 | 62.28 | 64 |
| 24. Oil | 1,073 | 6 | 3.49 | 178.80 | 24 |
| 25. Sugar | 663 | 20 | 2.16 | 33.16 | 4 |
| 26. Noodles | 469 | 6 | 1.53 | 78.22 | 54 |
| 27. Eggs (units) | 462 | 55 | 1.50 | 8.40 | 32 |
| 28. Vegetables | 367 | | 1.19 | | 5 |
| Food considered | 22,323 | | 72.62 | | |
| Other food | 35 | | 0.11 | | 93 |
| Total food | 22,358 | | 72.73 | | |
| Total nonfood | 8,382 | | 27.27 | | 0 |
| Total expenditure | 30,740 | | 100.00 | | |

Table 14. Consumer's food basket and budget shares at Puno, Peru
(per person who consumed, using frequencies)

| Product | Expenditure per capita (soles/year) | Consumption per capita (kilogram/ year) | Budget share (percent) | Price (soles/ kilogram) | Using frequencies <u>n</u> |
|------------------------------------|---|--|------------------------------|-------------------------------|----------------------------------|
| 1. Potatoes | 3,017 | 119 | 6.73 | 25.29 | 227 |
| 2. Quinoa | 1,679 | 41 | 3.74 | 40.47 | 118 |
| 3. <u>Cañihua</u> | 787 | 36 | 1.76 | 22.03 | 28 |
| 4. Lima beans | 1,798 | 45 | 4.01 | 39.82 | 181 |
| 5. Barley | 2,321 | 83 | 5.18 | 27.97 | 223 |
| 6. Wheat | 1,167 | 37 | 2.60 | 31.67 | 31 |
| 7. Oxalis (<u>okra</u>) | 554 | 23 | 1.24 | 23.68 | 106 |
| 8. <u>Chuño</u> | 5,083 | 80 | 11.33 | 63.43 | 222 |
| 9. Tunta | 1,868 | 13 | 4.16 | 144.55 | 89 |
| 10. Tropaeolum (<u>isaño</u>) | 554 | 21 | 1.24 | 26.32 | 25 |
| 11. <u>Papa liza</u> | 172 | 7 | 0.38 | 23.84 | 23 |
| 12. Salt | 208 | 14 | 0.46 | 14.47 | 221 |
| 13. Cheese | 1,537 | 31 | 3.43 | 50.23 | 149 |
| 14. Corn | 673 | 10 | 1.50 | 65.05 | 68 |
| 15. Rice | 753 | 18 | 1.68 | 42.22 | 182 |
| 16. Beef | 2,435 | 18 | 5.43 | 138.26 | 15 |
| 17. Llama | 1,359 | 13 | 3.03 | 105.03 | 12 |
| 18. Lamb | 1,653 | 13 | 3.69 | 129.47 | 205 |
| 19. Milk (cow) | 700 | 26 | 1.56 | 26.84 | 150 |
| 20. Milk (processed) | 1,784 | 40 | 3.98 | 44.93 | 6 |
| 21. Flour (wheat) | 641 | 13 | 1.43 | 49.47 | 108 |
| 22. Fish (units) | 185 | 93 | 0.41 | 2.00 | 21 |
| 23. Lard | 839 | 13 | 1.87 | 62.28 | 81 |
| 24. Oil | 1,338 | 7 | 2.98 | 178.80 | 172 |
| 25. Sugar | 697 | 21 | 1.55 | 33.17 | 218 |
| 26. Noodles | 1,043 | 13 | 2.33 | 78.22 | 104 |
| 27. Eggs | 675 | 80 | 1.50 | 8.40 | 155 |
| 28. Vegetables | 387 | | 0.86 | | 215 |
| Food considered | 35,907 | | 80.05 | | |
| Other food | 528 | | 1.18 | | 15 |
| Total food | 36,435 | | 81.23 | | |
| Total nonfood | 8,419 | | 18.77 | | 227 |
| Total expenditure | 44,854 | | 100.00 | | |

estimated using their respective frequencies. In terms of volume, potatoes, barley, chuño (dehydrated potatoes), lima beans, and quinoa were consumed most frequently. All families consumed potatoes and almost everyone consumed barley, chuño, salt, sugar, and vegetables, particularly onions. In terms of value, chuño has been the most important food, followed by potatoes, barley, lamb, lima beans, and quinoa.

Potatoes, quinoa, chuño and barley are the staple products in the rural areas of Puno. Cañihua and lima beans are also staple products but their consumption varies among communities.

A brief description of the human consumption of potatoes, quinoa and barley in the Puno region is as follows:

Potatoes are usually consumed in every kind of soup and every day a peasant family eats some kind of soup. It is also common to eat steamed potatoes with cheese or chako, particularly during the harvest season. During the harvesting of potatoes and in the field, potatoes are baked under the earth. Chako is a white soil; some western scientists have seen this phenomenon and they have said, "This is geophagy!" Chako is eaten regardless of a good or poor harvest. It is diluted with water and a kind of gravy is formed to accompany the potatoes.

In rural areas, quinoa is prepared and eaten in several ways. The dishes most commonly prepared from quinoa are: quinoa soup, mazamorra, quispiño (a kind of soft cracker), tojito (similar to a Mexican tortilla), pesque (quinoa puree) and chicha (a low alcohol content drink).

Barley is also consumed in several ways in rural areas. For example, barley is toasted (similar to popcorn) or made into barley soup. Other forms are jakopito (toasted, ground into flour, and eaten hot, similar to mashed potatoes), pataska, and phata uchu. All of these dishes are delicious according to the peasants, but the toasted barley is preferred particularly by children, followed by jakopito and pataska. The main reason barley is eaten is that they are used to it and they do not have money for other fancier dishes.

A typical rural menu was observed, as follows:

Breakfast: quinoa soup or chuño soup, "pesque", or mazamorra of quinoa with mate or barley coffee.

Lunch: normally eaten cold; composed of boiled chuño, lima beans or toasted barley, eaten along with cheese, meat, or some kind of chili pepper.

Dinner: quinoa, rice, or barley soup; sometimes with some other dish, barley coffee or mate.

Inventory of tools

Table 15 shows the inventory of tools used by peasants in farming potatoes, barley, quinoa, cañihua and other food. The main tools are the plow, foot-plow, sickle, raukana, and huactana. On the average, each family has one plow, one foot-plow, and two or more raukanas, Kupanas and huactanas. Table 16 shows the origin of these tools.

Table 15. Inventory of tools (units)

| Tool | Mean | Standard deviation |
|----------------------------------|------|--------------------|
| Raukana ^a (hoe) | 3.42 | 3.19 |
| Kupana ^a (smasher) | 2.63 | 1.37 |
| Huactana ^a (thresher) | 1.98 | 1.02 |
| Sickle | 2.78 | 1.38 |
| Foot-plow | 0.99 | 1.14 |
| Plow | 1.10 | 0.57 |
| Pick ax | 0.88 | 0.64 |
| Shovel | 1.17 | 0.70 |
| Pushcart | 0.44 | 0.55 |
| Bags | 4.83 | 3.99 |
| Rope | 4.11 | 3.59 |

^aRustic homemade tools made of stone, wood and iron.

Table 16. Origin of tools used in farming

| Tool | Bought from | Made | Mixed | Inherited |
|----------------------------------|-------------------|---------|-------|-----------|
| | industrial sector | locally | | |
| (in percentages, horizontal) | | | | |
| Raukana ^a (hoe) | 70 | 8 | 21 | 1 |
| Kupana ^a (smasher) | 32 | 50 | 17 | 1 |
| Huactana ^a (thresher) | 42.5 | 42.5 | 12 | 3 |
| Sickle | 91 | 4.5 | 4.5 | 0 |
| Foot-plow | 73.5 | 20.5 | 4 | 2 |
| Plow | 72 | 13 | 8 | 7 |
| Pick ax | 99 | 0 | 0 | 1 |
| Shovel | 95 | 0 | 0 | 5 |
| Pushcart | 100 | 0 | 0 | 0 |
| Bags | 63 | 31 | 3 | 3 |
| Rope | 91 | 5 | 1 | 3 |

^aRustic homemade tools made of stone, wood and iron.

"Bought from the industrial sector" means all the parts or components of a tool are manufactured in the industrial sector. In general, most agricultural tools used by peasants are bought from the industrial sector with the exception of the kupana (smasher) which is made locally.

"Made locally" means that all the parts of a tool are manufactured locally by the small farmers of peasants. Fifty percent of the kupana (smasher), 43 percent of the huactana (thresher) and 21 percent of the foot-plows in use were made locally.

"Mixed" means that some component of a tool is made locally and the rest is bought from the industrial sector; which means the tool is assembled locally.

During the last few years, even bags and ropes have been manufactured synthetically from products derived from petroleum. Pick axes, shovels, and pushcarts are manufactured solely by the industrial sector.

Summary

In this chapter, we described the peasants' organization according to the empirical results. Peasants of this area are a group of poor people with few rudimentary farming tools, farming a variety of crops on small plots of land and have very low levels of formal education. In the next chapter, we examine the problem of peasant differentiation. We address the question of whether or not peasants are a uniform mass of poor people. A cluster analysis will indicate if a grouping can be done

among peasant's communities. Finally, a post-stratification will be used to describe the peasant differentiation within groups formed by cluster analysis.

CHAPTER VI.

PEASANT DIFFERENTIATION

Deere and de Janvry (15) in "A Conceptual Framework for the Empirical Analysis of Peasants" recommend that one study the peasant household using Marx's categories of production, circulation and differentiation. This chapter is about peasant differentiation. It uses MANOVA and ANOVA to test the hypothesis that a set of population means are equal.

To form two groups of peasant communities from the 20 studied, a cluster analysis is used. Finally a post-stratification is done by the variable-total land use to determine any differences within communities.

Peasant Differentiation Between Communities

MONOVA

MONOVA is used to test the equality of mean vectors of several populations. However, MANOVA uses several methods of test construction which do not generate the same statistics (59).

To determine if significant differences among peasant communities exist, a MANOVA test is performed by taking a vector of the mean values of a set of variables.

The null hypothesis states that the vector of means for several variables is the same for the 20 peasant communities. The alternative

hypothesis states that at least one pair of vectors exists which are similar. Notational form can be expressed as follows:

$$\begin{bmatrix} \mu_1 \\ \mu_2 \\ \cdot \\ \cdot \\ \cdot \\ \mu_k \end{bmatrix} \text{place} = 1 = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \cdot \\ \cdot \\ \cdot \\ \mu_k \end{bmatrix} \text{place} = 2 = \dots = \begin{bmatrix} \mu_1 \\ \mu_2 \\ \cdot \\ \cdot \\ \cdot \\ \mu_k \end{bmatrix} \text{place} = i.$$

The alternative hypothesis states that:

$$\begin{bmatrix} \mu_1 \\ \mu_2 \\ \cdot \\ \cdot \\ \cdot \\ \mu_k \end{bmatrix} \text{place} = i \neq \begin{bmatrix} \mu_1 \\ \mu_2 \\ \cdot \\ \cdot \\ \cdot \\ \mu_k \end{bmatrix} \text{place} = j \quad \text{for at least one pair } i \neq j.$$

A MANOVA was run to test if any significant differences existed between peasant communities. The following variables were examined simultaneously:

- μ_1 = TOTALEXP (total expenditure)
- μ_2 = TENURELA (total land tenure)
- μ_3 = PLAWQ (number of plows)
- μ_4 = EDUCAT (formal education)
- μ_5 = TENULIVE (number of livestock)

The variables used in this chapter were previously defined in Table 7.

MANOVA test criterion asserts that the vector of mean values of $\mu_1 - \mu_5$ are different. The Hotelling, Pillai's Trace and Wilk's statistics indicate that the vector of mean values are significantly different at the 0.0001 level of significance.

| Test | Statistic |
|------------------|-----------|
| Hotelling | 5.28* |
| Pillai's Trace | 4.73* |
| Wilk's Criterion | 5.02* |

* = 0.0001.

Analysis of variance (ANOVA)

To test if there exists any significant differences between peasant communities at their mean value an ANOVA test is performed. The null and alternative hypothesis are presented as follows:

$$H_0: \mu_1 = \mu_2 \dots \mu_{20}$$

$$H_a: \mu_i \neq \mu_j \text{ for at least one } i \neq j$$

$$i = 1, 2, \dots, 20$$

$$j = 1, 2, \dots, 20.$$

Some of the results of the analysis of variance for a one-way design are presented in Tables 17-24.

These results indicate that the mean values among peasant communities are different due to PLACE (name of community). F statistics are highly

Table 17. ANOVA one-way: dependent variable = TOTALEXP (imputed total expenditure)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|------|
| PLACE (community) | 19 | 769,646,133 | 5.1* |
| Error | 236 | 151,309,856 | |
| Corrected total | 255 | | |

^aR² = 0.29.

* = 0.0001..

Table 18. ANOVA one-way: dependent variable = FCANAHUA (area farmed in cañihua)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|-------|
| PLACE (community) | 19 | 0.0265 | 13.6* |
| Error | 225 | 0.0020 | |
| Corrected total | 244 | | |

^aR² = 0.53.

* = 0.0001.

Table 19. ANOVA one-way: dependent variable = TENUREST (land in following)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|-------|
| PLACE (community) | 19 | 10.73 | 14.3* |
| Error | 229 | 0.75 | |
| Corrected total | 248 | | |

$${}^aR^2 = 0.54.$$

$$* = 0.0001.$$

Table 20. ANOVA one-way: dependent variable = TENURELA (total land tenure)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|------|
| PLACE (community) | 19 | 32.44 | 9.0* |
| Error | 227 | 3.62 | |
| Corrected total | 246 | | |

$${}^aR^2 = 0.43.$$

$$* = 0.0001.$$

Table 21. ANOVA one-way: dependent variable = TENUEQUI (number of equine)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|------|
| PLACE (community) | 19 | 6.72 | 9.1* |
| Error | 243 | 0.74 | |
| Corrected total | 262 | | |

$$a_R^2 = 0.41.$$

$$* = 0.0001.$$

Table 22. ANOVA one-way: dependent variable = TENAUQE (number of llamas and alpacas)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|-------|
| PLACE (community) | 19 | 22.66 | 79.0* |
| Error | 243 | 0.29 | |
| Corrected total | 263 | | |

$$a_R^2 = 0.86.$$

$$* = 0.0001.$$

Table 23. ANOVA one-way: dependent variable = CHAQUITQ (number of foot plows)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|--------------------|
| PLACE (community) | 19 | 12.64 | 34.79 [*] |
| Error | 228 | 0.36 | |
| Corrected total | 247 | | |

$$a_R^2 = 0.74.$$

$$* = 0.0001.$$

Table 24. ANOVA one-way: dependent variable = PLAWQ (number of plows)^a

| Source | DF | Mean square | F |
|-------------------|-----|-------------|------------------|
| PLACE (community) | 19 | 1.08 | 4.1 [*] |
| Error | 240 | 0.27 | |
| Corrected total | 259 | | |

$$a_R^2 = 0.29.$$

$$* = 0.0001.$$

significant at the 0.0001 level of significance. This means that the null hypothesis of equal mean values among peasant communities is rejected. The high values of the F statistics indicate the difference or variation among the mean values tested are dissimilar due to more than a mere chance.

ANOVA confirms the hypothesis that peasants are different among communities, particularly for the following variables that were highly significant at the 0.0001 level of significance.

| | |
|---|---|
| TOTALEXP (total expenditure) | TENURERI (tenure of uncultivable land) |
| FCANAHUA (area farmed of <u>cañihua</u>) | TENURELA (total land tenure) |
| FQUINUA (area farmed of quinoa) | TENULIVE (number of livestock) |
| FOCA (area farmed of <u>oka</u>) | TENUEQUI (number of equine) |
| FIZANO (area farmed of isaño) | TENUSHEP (number of sheep) |
| TOFAREA (total land use in farming) | TENUAUQE (number of llamas and alpacas) |
| TENECULA (land tenure of cultivated land) | CHAQUITQ (number of foot plows) |
| TENUREST (land in fallowing) | PLAWQ (number of plows) |

When analyzed by location (PLACE), peasant communities are found to be similar in terms of the following variables:

| | |
|-----------------------------------|---------------------------------|
| AGE (age) | FBARLEY (area farmed of barley) |
| EFICISPA (proficiency in Spanish) | EDUCAT (formal education) |
| MEMBERS (number of persons) | |

This analysis indicates that peasant communities are different due to economic variables but they are similar in terms of social variables.

Peasants themselves are similar at their mean value due to the level

of formal education. More specifically, there is no difference in total household expenditure or quantity of livestock owned due to the level of formal education.

Cluster Analysis

Twenty-five variables at their mean value are reported for each one of the 20 peasant communities studied (see Table 25). The codes used for each community is presented in Table 26.

To classify the 20 peasant communities into two groups, each one with a high degree of similarity, a cluster analysis is used. This cluster analysis uses 23 variables excluding AGE, EFICISPA and EDUCAT variables.

Hinz (38) defines cluster analysis as:

"...the process of arranging sets of objects into subsets (clusters) so that the objects within a subset have a high degree of homogeneity compared to objects from different subsets."

Cluster analysis is easy to visualize if two variables are used, according to Hinz (38), and he presents an example using two variables.

If there are four peasant communities and the objective is to group them into two variables using cluster analysis, a graphical presentation is helpful. For Example:

o = community 1
 x = community 2
 * = community 3
 Δ = community 4

The variables measured are: land tenure and number of livestock owned at the mean by each household.

Table 25. Main characteristics of 20 peasant communities, for 25 variables at their mean value in each peasant community

| Variable | Name of community | | | | | | | | | | |
|-------------|-------------------|--------|----------|----------|---------|----------|---------|----------|---------|----------|----------|
| | CAMATA | CARATA | CHAULLAC | CHAUPISA | CHIPANA | COLLANAJ | HUANCHO | HUATACOL | JLATASJ | JILAHUA3 | LAYOCOTA |
| 1 AGE | 49.1 | 36.2 | 51.1 | - | - | 52.1 | 43.4 | 44.6 | 34.5 | - | - |
| 2 EFICISPA | 1.9 | 1.5 | 2.3 | - | - | 2.1 | 1.9 | 2.0 | 2.0 | - | - |
| 3 MEMBERS | 6.6 | 5.2 | 4.8 | 7.6 | 5.3 | 6.6 | 5.2 | 6.0 | 4.8 | 5.0 | 5.6 |
| 4 TOTALEXP | 18,823 | 29,365 | 19,011 | 24,835 | 46,969 | 16,525 | 21,862 | 16,483 | 48,362 | 31,438 | 31,593 |
| 5 FPOTATOE | 0.221 | 0.221 | 0.479 | 0.387 | 0.524 | 0.874 | 0.363 | 0.206 | 0.893 | 0.457 | 0.655 |
| 6 FBARLEY | 0.614 | 0.704 | 0.470 | 0.264 | 0.937 | 0.844 | 0.457 | 0.903 | 0.923 | 0.520 | 0.877 |
| 7 FCANAHUA | 0 | 0.050 | 0.0005 | 0.095 | 0.003 | 0.040 | 0 | 0.054 | 0 | 0.260 | 0.042 |
| 8 FQUINUA | 0.114 | 0.077 | 0.150 | 0.184 | 0.192 | 0.205 | 0.009 | 0.038 | 0.069 | 0.353 | 0.272 |
| 9 FBEAN | 0.208 | 0.040 | 0 | 0 | 0.030 | 0.030 | 0.121 | 0.026 | 0.266 | 0.127 | 0.048 |
| 10 FOCA | 0 | 0 | 0 | 0.088 | 0 | 0.168 | 0.033 | 0.026 | 0.101 | 0.083 | 0.102 |
| 11 FIZANO | 0 | 0 | 0 | 0.073 | 0 | 0.010 | 0.001 | 0.016 | 0.030 | 0.122 | 0.045 |
| 12 TOFAREA | 1.108 | 1.393 | 1.132 | 1.011 | 1.701 | 2.503 | 1.173 | 1.283 | 2.282 | 2.045 | 2.032 |
| 13 TENECULA | 1.372 | 1.500 | 1.745 | 0.786 | 2.384 | 3.270 | 1.282 | 1.454 | 2,125 | 2,063 | 1.966 |

| | | | | | | | | | | | | |
|----|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 14 | TENUREST | 0.152 | 1.000 | 0.091 | 5.157 | 0.970 | 0.717 | 0.475 | 1.324 | 0.250 | 1.375 | 1.909 |
| 15 | TENURERI | 0 | 0 | 0.009 | 1.600 | 0 | 0.285 | 0.251 | 0.530 | 0 | 0.438 | 2.029 |
| 16 | TENURELA | 1.524 | 2.333 | 1.845 | 7.604 | 3.354 | 4.535 | 1.998 | 3.308 | 2.375 | 3.875 | 5.903 |
| 17 | TENULIVE | 2.4 | 4.6 | 2.0 | 3.6 | 3.9 | 6.4 | 2.3 | 4.2 | 4.0 | 3.5 | 3.1 |
| 18 | TENUEQUI | 0.9 | 1.2 | 1.4 | 0.6 | 1.7 | 2.1 | 0.8 | 1.0 | 1.0 | 0 | 0 |
| 19 | TENUSHEP | 7.3 | 6.4 | 3.5 | 17.4 | 8.1 | 32.9 | 11.4 | 11.6 | 18.5 | 19.5 | 25.1 |
| 20 | TENAUQE | 0 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0 | 0 | 1.5 | 2.9 |
| 21 | CHAQUITQ | 0.1 | 1.8 | 0 | 2.4 | 0 | 0.8 | 1.6 | 1.6 | 2.5 | 2.0 | 2.3 |
| 22 | PLAWQ | 0.9 | 1.0 | 1.0 | 0.4 | 1.1 | 2.0 | 1.3 | 1.2 | 1.0 | 0.8 | 0.9 |
| 23 | EDUCAT | 31.4 | 32.0 | 30.9 | - | 31.0 | 31.3 | 31.9 | 31.4 | 35.0 | - | - |
| 24 | CLIMATE ^a | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 25 | LANGUAGE ^b | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 |

^aClimate: 1 = ETH, - 0° C; 0 = Dwb \bar{x} 10° C.

^bLanguage: Aymara = 1; Quechua = 3.

Table 25. continued

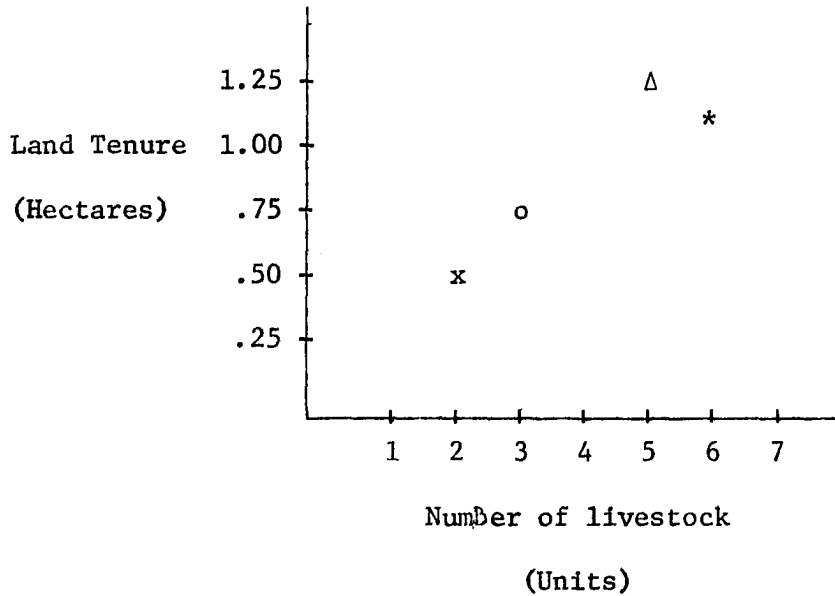
| Variable | Name of community | | | | | | | | | \bar{x} MEAN |
|-------------|-------------------|----------|--------|---------|--------|---------|----------|----------|---------|----------------|
| | LLICLLIP | PACCOCUS | RAMIS | RUMINIJ | SORASA | SUCASCO | SULLCATA | SULLCATB | YAJJAOR | |
| 1 AGE | 52.0 | - | 40.2 | 47.3 | 46.3 | 38.2 | 39.8 | - | 42.2 | 43.4 |
| 2 EFICISPA | 3.0 | - | 2.0 | 1.8 | 2.0 | 2.2 | 2.0 | - | 2.3 | 2.1 |
| 3 MEMBERS | 7.3 | 3.9 | 6.1 | 6.0 | 5.8 | 5.8 | 5.4 | 4.1 | 4.7 | 5.3 |
| 4 TOTALEXP | 33,464 | 43,755 | 24,369 | 21,200 | 34,545 | 26,052 | 21,324 | 21,066 | 24,901 | 26,070 |
| 5 FPOTATOE | 0.349 | 0.298 | 0.443 | 0.800 | 0.354 | 0.294 | 0.575 | 0.161 | 0.213 | 0.376 |
| 6 FBARLEY | 0.405 | 0.589 | 0.713 | 0.485 | 0.589 | 0.296 | 0.666 | 0.340 | 0.366 | 0.523 |
| 7 FCANUHUA | 0.274 | 0.013 | 0.043 | 0 | 0 | 0.029 | 0 | 0 | 0 | 0.018 |
| 8 FQUINUA | 0.250 | 0.132 | 0.048 | 0.111 | 0.129 | 0.036 | 0.280 | 0.157 | 0.070 | 0.104 |
| 9 FBEAN | 0.005 | 0.021 | 0.090 | 0 | 0.025 | 0.058 | 0.059 | 0.075 | 0.089 | 0.076 |
| 10 FOCA | 0.014 | 0 | 0.009 | 0.068 | 0 | 0.015 | 0 | 0 | 0 | 0.024 |
| 11 FIZANO | 0.008 | 0 | 0.007 | 0.025 | 0 | 0.001 | 0 | 0 | 0 | 0.008 |
| 12 TOFAREA | 1.315 | 1.060 | 1.261 | 1.603 | 1.052 | 0.737 | 1.580 | 0.737 | 0.696 | 1.164 |
| 13 TENECULA | 1.473 | 1.180 | 1.202 | 1.250 | 0.802 | 0.832 | 1.555 | 1.322 | 0.734 | 1.294 |

| | | | | | | | | | | | |
|----|----------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| 14 | TENUREST | 2.027 | 0.219 | 0.812 | 0.800 | 1.183 | 0.379 | 0.041 | 0.265 | 0.062 | 0.634 |
| 15 | TENURERI | 4.333 | 0 | 0.033 | 0.100 | 1.067 | 0.197 | 0 | 0 | 0.0005 | 0.305 |
| 16 | TENURELA | 7.833 | 1.398 | 2.048 | 2.150 | 3.052 | 1.408 | 1.596 | 1.587 | 0.796 | 2.239 |
| 17 | TENULIVE | 3.7 | 3.7 | 6.0 | 1.4 | 1.7 | 2.8 | 6.1 | 3.1 | 6.0 | 3.9 |
| 18 | TENUEQUI | 1.7 | 1.6 | 0.4 | 1.0 | 0.7 | 1.5 | 2.6 | 1.5 | 2.2 | 1.3 |
| 19 | TENUSHEP | 30.0 | 6.3 | 10.4 | 4.6 | 11.9 | 7.5 | 15.9 | 5.8 | 13.0 | 12.3 |
| 20 | TENAUQE | 11.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| 21 | CHAQUITQ | 4.0 | 0 | 2.1 | 1.0 | 1.8 | 2.2 | 0 | 0 | 0 | 1.0 |
| 22 | PLAWQ | 0 | 1.0 | 0.9 | 0.8 | 0.9 | 0.8 | 1.0 | 1.3 | 1.1 | 1.1 |
| 23 | EDUCAT | 33.0 | 30.9 | 32.1 | 30.0 | 30.3 | 29.5 | 31.4 | - | 30.9 | 31.3 |
| 24 | CLIMATE | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 25 | LANGUAGE | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | |

Table 26. Name of peasant communities in cluster analysis, ANOVA and MANOVA

| Code | Name |
|--------------|------------------------|
| 1. CAMATA | Camata |
| 2. CARATA | Carata |
| 3. CHAULLAC | Chauillacamani |
| 4. CHAUPISA | Chaupi Sahuacasi |
| 5. CHIPANA | Centro Poblado Chipana |
| 6. COLLANAJ | San José de Collana |
| 7. HUANCHO | Huancho |
| 8. HUATACOL | Huatta Collana |
| 9. ILATASJ | San Juan de Ilata |
| 10. JILAHUA3 | Tercer Jilahuata |
| 11. LAYOCOTA | Layocota |
| 12. LLICLLIP | Llicllica Pucanchacha |
| 13. PACCOCUS | Pacocusullaca |
| 14. RAMIS | Ramis |
| 15. RUMINIS | Yanico Rumini |
| 16. SORASA | Sorasa |
| 17. SUCASCO | Sucasco |
| 18. SULLCATA | Sullcacatura I |
| 19. SULLCATB | Sullcacatura II |
| 20. YAJJACIR | Yajja Circatuyo |

Graphically, this hypothetical situation can be represented as:



The above graph indicates that community x and o are close which may indicate that these communities are similar with a high correlation, following this reasoning:

community x and o may be placed in one cluster $\boxed{x + o}$ and community Δ and * may be placed in another cluster $\boxed{\Delta + *}$.

If four or more variables are used, it becomes difficult to visualize the grouping graphically because, several dimensions are required. However, the procedure is the same.

Data presented in Table 25 were standardized across objects (peasant communities), then an association matrix was formed by computing a correlation matrix for these 20 objects. A single linkage cluster analysis was

performed where the smallest distance between objects was grouped first (between x and o in the previous example).

A dendogram was obtained from this cluster analysis; this dendogram is presented in Graph 1. Hinz (38) defines a "dendogram as a graphical representation of grouping."

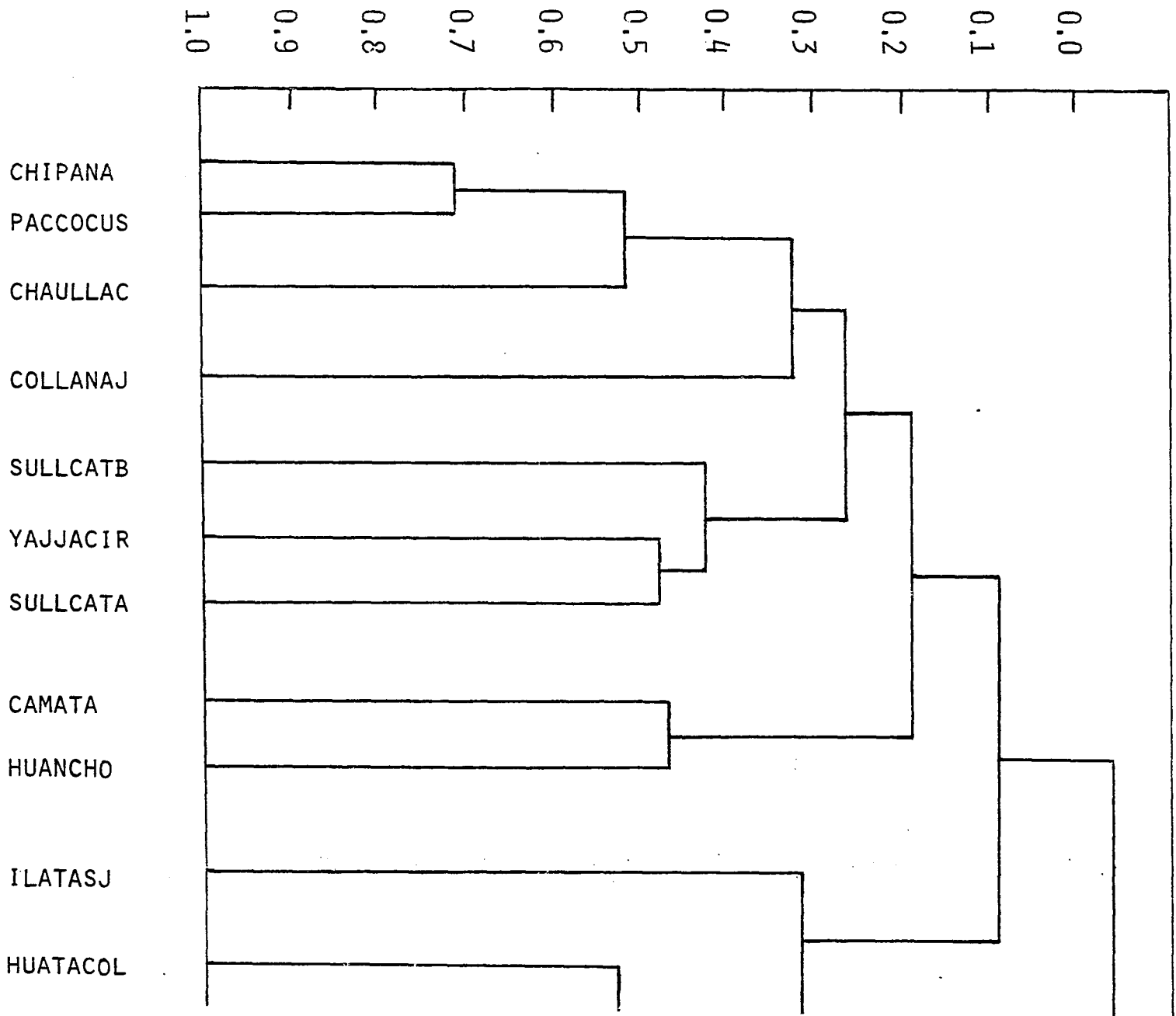
On the vertical axis of the dendogram the dissimilarity distance is measured, computed by the correlation matrix. On the horizontal axis the objects of the clustering (peasant communities) are presented. Objects which are most similar are connected with low heights (see Graph 1). For instance, communities CHIPANA and PACCOCUS are very similar; in fact, they are neighboring communities. They have the highest correlation (0.7). A lower value dissimilarity distance indicates that they are different.

Cluster analysis grouped the 20 peasant communities into two sub-groups. These are Group A and Group B; it is expected that each group is fairly homogeneous. The new sub-groups are composed of:

| <u>GROUPA = Group A</u> | | <u>GROUPB = Group B</u> |
|-------------------------|----------|-------------------------|
| CHIPANA | CAMATA | JILAHUA3 |
| PACCOCUS | HUANCHO | LAYOCOTA |
| COLLANAJ | ILATASJ | RUMINIJ |
| SULLCATB | HUATACOL | SUCASCO |
| YAJJACIR | RAMIS | SORASA |
| SULLCATA | CARATA | LLICLLIP |
| CAMATA | | CHAUPISA |

The above coded names for peasant communities were defined previously in Table 26. The main differences between these two new sub-groups are the distance to the lake or ecological differences.

Graph 1. Dendogram: cluster analysis of 20 peasant communities



CAMATA

HUANCHO

ILATASJ

HUATACOL

RAMIS

CARATA

JILAHUA3

LAYOCOTA

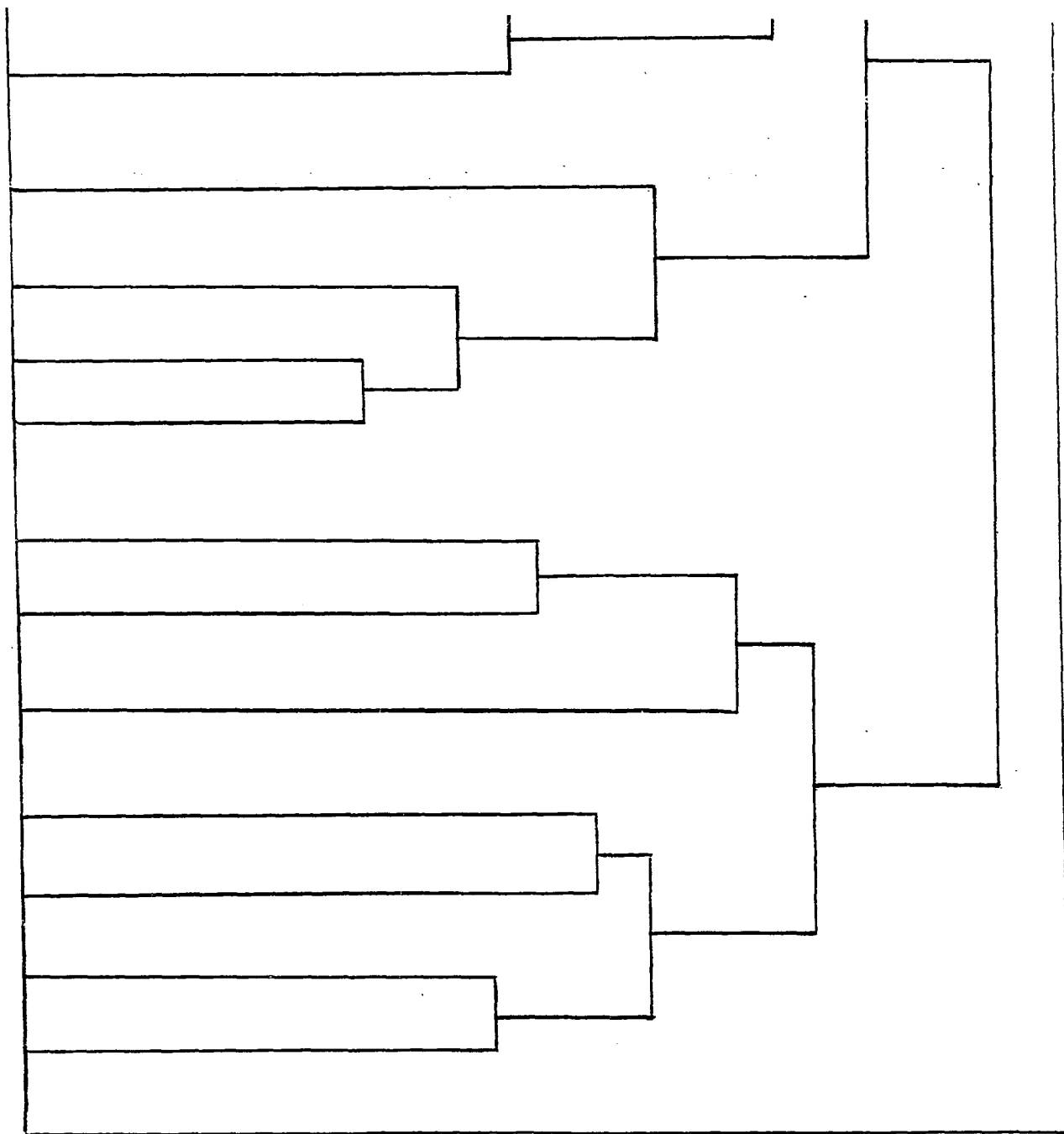
RUMINIJ

SUCASCO

SORASA

LLICLLIP

CHAUPI SA



The mean values of 25 variables for each group obtained from the cluster analysis are presented in Table 27. According to ANOVA, the mean values are different among the GROUPA and GROUPB peasant communities. The null hypothesis is rejected due to the fact that the F statistic is highly significant at the 0.0001 level of significance; this is the case for the following variables:

| | |
|---|---|
| FCANAHUA (area farmed of <u>cañihua</u>) | TNEUAUQE (number of llamas and alpacas) |
| FIZANO (area farmed of <u>isaño</u>) | CHAQUITQ (number of foot plows) |
| TENUREST (land in fallowing) | PLAWQ (number of plows) |
| TENURERI (tenure of uncultivable land) | CLIMATE (climate) |
| TENURELA (total land tenure) | LANGUAGE (language) |
| TENUEQUI (number of equine) | |

GROUPA and GROUPB are similar in terms of the following variables:

| | |
|---|-----------------------------------|
| TOFAREA (total land use in farming) | AGE (age) |
| TENECULA (land tenure of cultivable land) | EFICISPA (proficiency in Spanish) |

For the above four variables, the F statistics were not significant due to the influence of GROUP in the one-way analysis of variance.

Table 28 indicates that climate differs for the two groups of peasant communities. It also indicates that climate is an important factor in grouping and 41 percent of the variation between groups can be explained due to climatic differences. Table 29 indicates that the language spoken in each group is different.

A generalization from the cluster analysis is that all the peasant communities in GROUPA are situated around Lake Titicaca. Peasant communities in GROUPB are located further away from the lake, but are

Table 27. Mean values of 25 variables, by groups determined in cluster analysis

| Variable | GROUPA Around the lake | GROUPB Away from lake | Overall Average | Overall Standard deviation |
|---------------------------|---------------------------|--------------------------|--------------------|----------------------------------|
| 1. AGE | 43.1 | 45.3 | 43.4 | 12.5 |
| 2. EFICISPA | 2.1 | 2.0 | 2.1 | 0.7 |
| 3. MEMBERS | 5.1 | 6.1 | 5.3 | 2.2 |
| 4. TOTALEXP | 25,268 | 29,638 | 26,070 | 14,049 |
| 5. FPOTATOE | 0.360 | 0.449 | 0.376 | 0.40 |
| 6. FBARLEY | 0.526 | 0.507 | 0.523 | 0.49 |
| 7. FCANAHUA | 0.008 | 0.064 | 0.018 | 0.06 |
| 8. FQUINUA | 0.089 | 0.171 | 0.104 | 0.14 |
| 9. FBEAN | 0.086 | 0.031 | 0.076 | 0.13 |
| 10. FOCA | 0.019 | 0.049 | 0.024 | 0.07 |
| 11. FIZANO | 0.002 | 0.032 | 0.008 | 0.04 |
| 12. TOFAREA | 1.136 | 1.299 | 1.164 | 1.02 |
| 13. TENECULA | 1.324 | 1.166 | 1.294 | 1.20 |
| 14. TENUREST | 0.361 | 1.810 | 0.634 | 1.23 |
| 15. TENURERI | 0.092 | 1.231 | 0.305 | 1.00 |
| 16. TENURELA | 1.772 | 4.224 | 2.239 | 2.42 |
| 17. TENULIVE | 4.2 | 2.6 | 3.9 | 2.8 |
| 18. TENUEQUI | 1.4 | 0.7 | 1.3 | 1.0 |
| 19. TENUSHEP | 11.7 | 15.2 | 12.3 | 10.0 |
| 20. TENAUQE | 0 | 1.5 | 0.3 | 1.4 |
| 21. CHAQUITQ | 0.7 | 2.1 | 1.0 | 1.1 |
| 22. PLAWQ | 1.2 | 0.7 | 1.0 | 0.6 |
| 23. EDUCAT | 31.5 | 30.2 | 31.3 | 2.3 |
| 24. CLIMATE | 0 | 0.5 | 0.1 | 0.3 |
| 25. LANGUAGE | 1.6 | 3.0 | 1.8 | 1.0 |
| Number of Observations | 215 | 48 | 263 | |

Table 28. ANOVA one-way: dependent variable = CLIMATE^a

| Source | DF | Mean square | F |
|-----------------------|-----|-------------|--------------------|
| GROUP (group A and B) | 1 | 8.24 | 180.5 [*] |
| Error | 261 | 0.05 | |
| Corrected total | 262 | | |

$$a_R^2 = 0.41.$$

$$* = 0.0001.$$

Table 29. ANOVA one-way: dependent variable = LANGUAGE^a

| Source | DF | Mean square | F. |
|-----------------------|-----|-------------|--------------------|
| GROUP (group A and B) | 1 | 79.49 | 117.6 [*] |
| Error | 261 | 0.68 | |
| Corrected total | 262 | | |

$$a_R^2 = 0.31.$$

$$* = 0.0001.$$

usually found next to GROUPA communities. If one moves further away from the lake, agricultural activities diminish primarily because climate gets harsher. Peasants very far away from the lake and at higher altitudes are completely dedicated to raising llamas and alpacas since climate is not suitable for agriculture. The shepherds of llama and alpacas are found in the Puna region which is between 4,000-4,800 meters above sea level as mentioned in Chapter III.

Peasants next to the lake (GROUPA) are similar to those further way from the lake in the following ways:

a) Both groups are similar in terms of total cultivated land area, tenure of cultivated land, age of head of household and fluency in the Spanish language.

b) Potatoes and barley are farmed by both groups in almost the same proportion.

However, these two groups of peasants differ in the following characteristics:

a) Cañihua, quinoa, oka, and isaño are farmed in large quantities by GROUPB. Most of the lima beans are farmed around the lake by GROUPEA peasants.

b) GROUPEA raises larger quantities of bovine and equine since plants in the lake can be used as a resource to feed some of their livestock.

c) Alpacas and llamas are raised in greater proportion by GROUPB who are located further away from the lake.

d) Land tenure (TENURELA) is larger in GROUPB, but climate is also colder.

e) The plow is used more often in flat and softer soil, closer to the lake by GROUPA. The foot-plow is the main tool used by GROUPB, although the plow is also used.

Language is not a sufficient criterion to group peasants in these areas although it has been suggested and used by some people. Some of the suggestions made were, that the Aymara speaking group are harder working than the Quechua speaking. The Aymara speaking are mostly located around the lake. This study shows that language is not the only variable that should be taken into account for grouping. The ecological and climatological conditions are more influential on the organization of peasant economic activities.

Since peasants are not a homogenous mass of poor people, and since there are at least two groups of peasants with some similarities in the area of study, it is more realistic to present two different sets of rural development, program of research, extension and other activities aimed at small farmers.

If this approach is generalized to peasants of the sierra region of the departamento of Puno, at least three different sets of peasants should be considered:

- a) Peasants around the lake (GROUPA)
- b) Peasants next to GROUPA, but further away from the lake (GROUPB)

c) Peasants located in the Puna region, mostly dedicated to raising llama and alpacas.

Peasant Differentiation Within

Deere and de Janvry (15) recommend that the analysis of social differentiation be based on the level of stocks of means of production.

To determine peasant differentiation within communities a post-stratification based on the variable, total land use by each family was performed. The mean value of 25 variables, according to social strata by total land use is presented in Table 30.

Deere and de Janvry (15) mention that the minimum requirement for a peasant household in the sierra region of Peru (Cajamarca) is 3.5 hectares to maintain the minimum level of subsistence. If this criterion is used in the Puno area, 98 percent of the peasants live below the minimum level to be able to reproduce their full subsistence requirements.

Sixty-one percent of the peasants cultivate less than a hectare, 33 percent cultivate 1-3 hectares and only 6 percent cultivate 3.1-7 hectares. The post-stratification by total land use is highly consistent with all the relevant with the economic variables, as shown in Table 30.

It is clear that a peasant differentiation exists between as well as within peasant communities. Peasant differentiation within means that some groups of peasants are very poor in comparison to others which are relatively rich.

Table 30. Mean value of 25 variables, according to social strata
(post-stratification by total land used by each household)

| Variable | Landless peasants LANDL (0-.50 hectares) | Near landless peasants NEARL (0.51-1.00 hectares) | Poor peasants POORP (1.01-1.50 hectares) | Middle peasants MIDLE (1.51-3.00 hectares) | Rich peasants RICH (3.01-7) hectares) |
|---------------|--|---|--|--|---|
| Frequency (%) | 21 | 40 | 16 | 17 | 6 |
| n = | 51 | 98 | 39 | 41 | 14 |
| 1. AGE | 45.6 | 44.9 | 39.7 | 42.5 | 39.6 |
| 2. EFICISPA | 2.0 | 2.1 | 2.2 | 1.8 | 1.7 |
| 3. MEMBERS | 4.2 | 5.2 | 6.1 | 6.1 | 5.3 |
| 4. TOTALEXP | 26,420 | 24,978 | 25,013 | 25,325 | 39,202 |
| 5. FPOTATOE | 0.104 | 0.229 | 0.404 | 0.680 | 1.417 |
| 6. FBARLEY | 0.201 | 0.347 | 0.558 | 0.861 | 1.843 |
| 7. FCANAHUA | 0.003 | 0.013 | 0.017 | 0.041 | 0.049 |
| 8. FQUINUA | 0.006 | 0.076 | 0.102 | 0.194 | 0.294 |
| 9. FBEAN | 0.039 | 0.063 | 0.087 | 0.106 | 0.195 |
| 10. FOCA | 0.004 | 0.015 | 0.017 | 0.055 | 0.102 |
| 11. FIZANO | 0.001 | 0.003 | 0.004 | 0.018 | 0.042 |
| 12. TOFAREA | 0.324 | 0.744 | 1.204 | 2.135 | 4.220 |
| 13. TENECULA | 0.496 | 0.857 | 1.428 | 2.192 | 4.252 |
| 14. TENUREST | 0.153 | 0.672 | 0.755 | 0.924 | 1.179 |
| 15. TENURERI | 0.020 | 0.415 | 0.306 | 0.364 | 0.343 |
| 16. TENURELA | 0.669 | 1.955 | 2.489 | 3.480 | 5.824 |
| 17. TENULIVE | 2.8 | 4.0 | 4.8 | 3.9 | 6.8 |
| 18. TENUEQUI | 1.1 | 1.4 | 1.6 | 1.2 | 1.9 |
| 19. TENUSHEP | 7.4 | 10.6 | 14.8 | 16.2 | 20.6 |
| 20. TENAUQE | 0 | 0.3 | 0.2 | 0.7 | 0.4 |
| 21. CHAQUITQ | 0.4 | 0.9 | 1.1 | 1.2 | 1.6 |
| 22. PLAWQ | 1.0 | 1.1 | 1.1 | 1.3 | 1.1 |
| 23. EDUCAT | 30.7 | 31.1 | 31.3 | 31.9 | 34.0 |
| 24. CLIMATE | 0 | 0.1 | 0.1 | 0.1 | 0.1 |
| 25. LANGUAGE | 1.4 | 1.7 | 2.1 | 2.1 | 2.1 |

Some of the peasants are very poor in general: 3 percent do not own any bovine, 25 percent do not own equine, 6 percent do not own sheep, 94 percent do not own llamas and alpacas. These percentages become more acute for the landless strata.

The claim of differences among different strata of peasants can be confirmed by the one-way analysis of variance by stratification. The F statistics were highly significant at 0.0001 level of significance for the following variables:

| | |
|------------------------------------|--------------------------------------|
| MEMBER (number of persons) | TOFAREA (total land use in farming) |
| FPOTATOE (area farmed of potatoes) | TENECULA (tenure of cultivated land) |
| FBARLEY (area farmed of barley) | TENURELA (total land tenure) |
| FQUINUA (area farmed of quinoa) | TENULIVE (number of livestock) |
| FOCA (area farmed of <u>oka</u>) | TENUSHEP (number of sheep) |

Peasants among different social strata are also different due to the FBEANS, FIZANO, CHAQUITQ, EDUCAT and LANGUAGE variables, but at the 0.001 level of significance. Tables 31 and 32 show a one-way ANOVA, where the factor is STRALAN, for FBARLEY and TENECULA variables. The social stratification should reflect the differences within peasant communities. It was not feasible to post-stratify properly each peasant community because the sample size was too small for some of the peasant communities.

A two-way analysis of variance was performed with respect to group and stratification to determine the differences due to group and stratification simultaneously and sequentially. The F statistics show that when GROUP and STRALAN are taken simultaneously on the model, all the tests (for each

Table 31. ANOVA one-way: dependent variable = FBARLEY (area farmed of barley)^a

| Source | DF | Mean square | F |
|--------------------------|-----|-------------|--------|
| STRALAN (stratification) | 4 | 9.37 | 107.0* |
| Error | 238 | 0.09 | |
| Corrected total | 242 | | |

$$a_R^2 = 0.64.$$

$$* = 0.0001.$$

Table 32. ANOVA one-way: dependent variable = TENECULA (land tenure)^a

| Source | DF | Mean square | F |
|--------------------------|-----|-------------|-------|
| STRALAN (stratification) | 4 | 51.82 | 90.7* |
| Error | 237 | 0.57 | |
| Corrected total | 241 | | |

$$a_R^2 = 0.60.$$

$$* = 0.0001.$$

variable) are highly significant at 0.001 level of significance except for TOTALEXP, AGE and EFICISPA. It means that peasants are different in terms of their economic variables due to the ecological conditions (GROUP) and social class (STRALAN). However, they are similar due to the social variables such as age and proficiency in Spanish. If both factors, ecological and social classes are taken simultaneously to see the difference among peasants, it indicates that the basic expenditure in food-stuff are similar among peasants. Tables 33 and 34 show two-way analysis of variance taking GROUP and STRALAN as the factors.

In the two-way analysis of variance, the factors are STRALAN and GROUP sequentially. It indicates that STRALAN, a measure of post-stratification, has more influence since it is highly significant ($\alpha = 0.003$) for the following variables:

| | |
|---------------------------------------|---|
| MEMBERS (number of persons) | TENECULA (land tenure of cultivated land) |
| FBARLEY (area farmed of barley) | TENURELA (total land tenure) |
| FQUINUA (area farmed of quinoa) | TENULIVE (number of livestock) |
| FPOTATOE (area farmed of potatoes) | TENUEQUI (number of equine) |
| FBEANS (area farmed of lima beans) | TENUSHEP (number of sheep) |
| FOCA (area farmed of <u>oka</u>) | CHAQUITQ (number of foot plows) |
| FIZANO (area farmed of <u>isaño</u>) | EDUCAT (formal education) |
| TOFAREA (total land use in farming) | |

Table 35 shows the effect of GROUP, STRALAN and STRALAN * GROUP in the area farmed of FCANAHUA. It indicates FCANAHUA varies due to STRALAN

Table 33. ANOVA two-way: dependent variable = FBARLEY (area farmed of barley)^a

| Source | DF | Mean square | F | PR>F |
|-----------------------------|-----|-------------|---------|--------|
| Model | 5 | 7.53 | 86.40* | 0.0001 |
| GROUP (group A and B) | 1 | | 0.15 | 0.7007 |
| STRALAN (stratification) | 4 | | 107.96* | 0.0001 |
| Error | 237 | 0.09 | | |
| Corrected total | 242 | | | |

$$a_R^2 = 0.65.$$

$$* = 0.0001.$$

Table 34. ANOVA two-way: dependent variable = TENECULA (tenure of cultivated land)^a

| Source | DF | Mean square | F | PR>F |
|-----------------------------|-----|-------------|-------|--------|
| Model | 5 | 41.88 | 74.2* | 0.0001 |
| GROUP (group A and B) | 1 | | 0.7 | 0.4060 |
| STRALAN (stratification) | 4 | | 92.5* | 0.0001 |
| Error | 236 | 0.56 | | |
| Corrected total | 241 | | | |

$$a_R^2 = 0.61.$$

$$* = 0.0001.$$

Table 35. ANOVA two-way: dependent variable = FCANAHUA (area farmed of cañihua)^a

| Source | DF | Mean square | F | PR > F |
|-----------------------------|-----|-------------|--------|--------|
| Model | 9 | 0.026 | 8.64* | 0.0001 |
| GROUP (group A and B) | 1 | | 39.01* | 0.0001 |
| STRALAN (stratification) | 4 | | 3.32 | 0.0114 |
| GROUP * STRALAN | 4 | | 6.36* | 0.0001 |
| Error | 233 | 0.003 | | |
| Corrected total | 242 | | | |

^aR² = 0.25.

* = 0.0001.

for a given level of GROUP. The production of cañihua varies according to farm size or richness of peasant household for a given ecological set-up.

The area farmed of cañihua and isaño in a given ecological group varies according to the social class of peasant. Similarly, the total land tenure and cultivable land area owned by peasant household depends on the social class where this family belongs; this is for a given ecological set-up. For a given social class, the amount of llamas and alpacas that a peasant household owns depends where this peasant family is located or ecological conditions where he lives.

Summary

An analysis of variance (ANOVA) was applied to test if peasant communities are different at their mean values. ANOVA indicates that peasant communities are different due to the economic variables such as: area of crops farmed, land tenure, number of livestock, number of llamas and alpacas and agricultural tools. However, peasant communities are similar in terms of their social variables such as: age, proficiency in Spanish and level of formal education.

Peasant communities were grouped in two sets using cluster analysis. The new groups were named GROUPA and GROUPB. The main difference between these two sets of peasants is the distance from the lake reflecting the ecological differences. Climate around or close to Lake Titicaca is warmer, but further away from the lake climate becomes colder and agriculture becomes difficult.

A generalization from cluster analysis is that in the Puno region there are at least 3 homogenous sets of peasants. These sets are:

- a) GROUPA situated around Lake Titicaca,
- b) GROUPB situated away from Lake Titicaca, and
- c) shepherds of llamas and alpacas. This group was not included in this study. They live in the Puna region.

It seems that peasants' production and economic organization are logical and consistent with the ecological conditions where they live. The policy implications in terms of rural development are that: at least, three different sets of extension programs should exist rather than none or just one. Each kind of extension program may be geared toward each sub-set of peasants.

If only one kind of extension source or rural development program exists, this may increase the differences among peasants. For instance, an extension of agricultural activities (if there is any) toward improving the production of quinoa, oka and isaño will benefit the peasants away from the lake more than those closer to the lake. For instance, extension services to improve livestock and bovine will benefit more the peasants around the lake (if there is any positive effect) than the peasants away from the lake. Shepherds of the Puno region with this hypothetical extension service will not get any benefit.

If extension services and other programs of rural development were geared to improve llamas and alpacas, it will benefit shepherds of the Puno region if these services reach them.

Peasants are not a homogenous mass of poor people, since differences exist between communities and within the different social stratification. However, 98 percent of the peasants live below the minimum level to be able to reproduce their full subsistence requirements. Some of the peasants are extremely poor and few relatively rich.

The peasant differentiation is due more to differences within social classes than between groups or sets of peasants. This statement holds particularly true for the economic variables such as: land tenure, area farmed in different crops, and number of livestock owned by peasant households.

In the next chapter we will present: the general policy implications of rural development around the world, policy implications for the Peruvian government, and policy implications to help the poor peasants in the Puno area.

CHAPTER VII.

RURAL DEVELOPMENT AND POLICY IMPLICATIONS

This chapter contains a section of summary and conclusions of the present study. Instruments of rural development, such as planning, agrarian reform, price policies, irrigation, etc. are discussed in the context of Latin America. General policy implications on rural development are included. Policy implications to develop the agricultural sector of the Peruvian economy are listed. Finally, a section on policy implications for the Puno area are mentioned.

Summary and Conclusions

a) Peasants farm small plots of land (1.3 hectares on the average) with a diversified agriculture, farming barley, potatoes, quinoa, lima beans, oka, cañihúa and isaño. These crops are farmed in several small tracts at different places.

b) Livestock is also diversified. Typical peasant farmers have about four bovine, one equine, and twelve sheep. One-fourth of them have a llama or alpaca.

c) The level of technology used by peasants is the "traditional", "native", or "primary", based on human and animal power. The main source of animal power is oxen; the use of fertilizer is minimal, as are crop-related activities.

d) Barley, potatoes, chuño, lima beans, and quinoa are the staple

foods of these people.

e) Peasant communities are different among themselves. This can be confirmed by MANOVA.

f) ANOVA indicates that peasant differentiation exists among peasants for all the variables, except AGE, EFICISPA, MEMBERS, FBARLEY and EDUCAT.

g) There are not significant differences among peasants in terms of tenure of livestock (TENULIVE) of total expenditure (TOTALEXP) due to their level of formal education.

h) Cluster analysis indicates that two distinct groups of peasant communities exist in the area studied. GROUPA peasants are located around Lake Titicaca. Peasants in GROUPB are located further away from the lake where the climate is colder.

i) In the sierra region of the Departamento of Puno, three different sets of peasant organization and production exists: 1) Peasants of GROUPA, 2) peasants of GROUPB and 3) peasants living far away from the lake in Puno who are completely dedicated to raising llama and alpacas.

j) Peasant differentiation within peasant communities or groups exists. Some of them are very poor and others relatively rich. This situation was shown by a post-stratification and ANOVA.

d) The Swedish International Development Study, the Peruvian Department of Agriculture, and the Inter-American committee of Agricultural Development studies show that one of the problems in the Puno area is malnutrition (86, p. 12).

Instruments of Rural Development

This section will deal with institutional changes and governmental policies related to rural development.

Planning

Rural development projects must be included into the national planning system. The different objectives about rural development have to be included in the developmental policies of LDCs and in the policies of international institutions.

The World Bank paper (96, p. 33) mentions that the planning and implementation of rural development programs require the following elements:

- 1) A national plan or program of action for rural development, together with supporting national and regional policies and adequate center-local financing arrangements.
- 2) A strong organization at the national level to coordinate vertically organized, central government sectoral departments.
- 3) Greater decentralization with effective machinery at the regional and local level to coordinate the sectoral activities of national departments operating in the region and regional and local departments.
- 4) Participation by the rural poor in the planning and implementation processes through local government, project advisory committees, cooperatives and other forms of group organization.

Agrarian reform

Agrarian reform or land reform has given a lot of hope to small farmers and to the landless, but thus far agrarian reform benefits have been limited.

Eckstein et al. (19, p. i) define land reform as: "A redistribution of the rights to land away from large-scale owners to those who work on it. Former owners may or may not retain a portion of their lands, and may or may not be compensated for lands transferred."

For Oliart (68, p. 165) "Agrarian reform in Latin-American countries must have the following objectives: a new, open and mobile social structure; the creation of a new type of agricultural entrepreneur; the integration of new marketing systems at national and international levels, and the constitution of new, authentically democratic political system.

Araujo (3) considers agrarian reform as the liberation of the Latin American peasantry.

Both Oliart's (68) and Araujo's (3) claims about agrarian reform are idealistic if not utopian.

At present the land tenure systems are based on huge holdings of land by a few owners in the form of plantations or haciendas. Along with the latifundia system, there exists a large number of landless farmers and a great number of peasants who own and farm small extensions of marginal land.

In Latin America, land reform was introduced by the meeting of Heads of state of Latin American countries at Punta del Este. Since then almost every Latin American country has written agrarian reform laws but few have implemented them (96).

Eckstein et al. (19, p. i) review the agrarian reform in Bolivia, Chile, Mexico and Peru, making preliminary conclusions about each of them.

The World Bank (96) considers four factors of agrarian reform:

a) A meaningful land reform affects many land owners, by reducing the source of their political power, therefore "Ambitious programs of land reform will seldom be implemented unless there are shifts in political sentiment and power."

b) To implement and make effective agrarian reform, the creation of appropriate institutions is needed.

c) Agrarian reform is rarely without considerable loss in production since marketing systems for inputs and outputs are often destroyed.

d) The effects of land reform may be limited in the short run. Socio-economic benefits may be derived on the long run.

Figuroa (24) in his analysis of agrarian reform as an instrument of rural development considers four effects.

a) The effects of agrarian reform in terms of income distribution are very limited. Agrarian reforms do not affect the medium size farm operated by its owner, the very small farmers and the landless.

b) In terms of level of output, since the present land tenure systems based on latifundia and minifundia are inefficient, agrarian reform will increase levels of output.

c) Capital formation will be difficult; ex-land owners destroyed their existing capital just prior to land reform. In some cases, there may be debts to pay such as agrarian debt.

d) Latifundia does not favor the adoption of new technologies

because land is a source of economic power and political influence. The intention of landowners is to monopolize land and they will adopt only technologies that are not substitutes for land (16).

Figueroa (24, p. 163) concludes: "Land reform as an instrument for overcoming rural underdevelopment has very limited possibilities. These results, however, must not be considered as arguments against land reform. On the contrary they show us that a radical change in the present rural situation requires more than land reform.

I think agrarian reform is a prerequisite to integrated rural development, otherwise the benefits of rural development projects will go to the landowners and not to the peasants or the landless. Therefore, agrarian reform is a must in Latin American countries; however, complementary macro policies for rural development are needed. Some of these policies are: appropriate agricultural price policies, rural industrialization, irrigation, land colonization of the jungle and upland areas, etc. All of these policies should be taken in the context of integrated rural development.

Farm output price policies

Many LDCs with high inflation rates use price controls to make food products less expensive in order to keep down the cost of living in urban areas. Price controls on farm products have negative effects on the agricultural sector and on farmers, because they decrease farm income and discourage greater production of agricultural necessities.

It is desirable to have just prices for farmers and consumer, but "governments are urban-biased largely because of the pressures on them by powerful urban interests" (96, p. 33).

The simultaneous objectives to fight inflation and increase food production at low prices (using price control or any artificial governmental policy) are conflicting.

Farmers are often forced to sell their produce to inefficient market boards, contributing to higher costs of foodstuffs.

Evidence of urban-biased price policies of farm product are presented by Lipton (50, p. 293).

Farm input price policies

Some LDCs have decided to give subsidy to their farming sectors in some inputs such as fertilizer, irrigation, machinery or credit.

These subsidies have created problems to the economy of poor countries because:

- a) subsidies create distortions in the economy.
- b) subsidies are costly to implement.
- c) subsidies have problems in their administration.

Only the richer and influential farmers have been able to get the benefit of these subsidies. On the contrary "the small farmer, typically is excluded" (96, p 29).

Lipton (50, p. 289) argues that "the actual administration of input subsidies usually makes inputs dearer to the mass of farmers and confines

subsidies to big farmers who are responsible for most sales to town."

Lipton continues:

"They are best able to overcome the complex bureaucratic obstacle course of licenses, approvals, credit applications and form-filling that separates subsidized inputs from the soil. They have contacts, knowledge, power and money to exploit any corruption or nepotism. And, sometimes, only they want to buy even subsidized inputs. Small farmers are often tenants paying 30 to 60 percent of output as crop-share rent, and having to borrow at 25 to 50 percent annual interest. Such farmers often lack either the resources or the incentives to use new inputs, especially if outputs are risky. Furthermore, such inputs as tractor-hire and weedicides replace labour and are therefore less attractive to small farmers, who have idle household labour but little cash. Also, because many operations with subsidized inputs (especially fertilizers and weedicides) must be precisely timed, the purchases-- and for the poor man the acquisition of credit--must be swiftly and accurately synchronized. All in all--unless administrators are determined and independent--the bigger, literate, relatively knowledgeable farmer, with his own cash or bank account, gets most of the subsidized inputs and uses them to produce the outputs needed for urban consumption."

Lipton's (50, p. 290) main argument is that prices are twisted against agriculture. The prices of inputs with subsidies become more expensive and scarce than a free competitive market price.

Lipton asks himself, "How does this twist in prices against agriculture happen?" His answers are:

- 1) Scarce subsidized inputs are acquired more easily by big farmers, input scarcities for small ones are greater, and prices higher, than they would be if subsidies were absent.
- 2) Farm input subsidies, even nominal ones, help industrializers and industrialists to argue for lower prices for the product of the (apparently) subsidized inputs.
- 3) If inputs are available to a nation's own farmers

more cheaply than to its neighbour's (or to its foreign-owned plantation sector), national who acquiring such inputs may well sell them abroad for a quick profit rather than use them for farm, especially if the latter is made less attractive by high risk, crop-share rents,....

4) A national penchant for subsidies on current inputs normally benefits the non-farm sector.

The empirical evidence of this price twist against agriculture with farm input subsidies is presented in Lipton's book, Why Poor People Stay Poor (50).

To solve this problem, the World Bank (96, p. 30) recommends the use of policies that guarantee minimum prices for farm products rather than to use subsidies on farm inputs.

Irrigation

Two problems that rural development has to face are 1) the scarcity of agricultural land and 2) the lack of fresh water for drinking and agricultural activities. In most LDCs, these problems will continue to exist even after agrarian reform.

To expand the extension of agricultural areas, irrigation and colonization of jungle areas have been used.

Irrigation has been practiced since the earliest civilizations. People made the rivers work for them. Later, technological development allowed people the use of underground water and water-lifting devices powered by different sources of energy (8).

At present, technologically it is possible to have large scale

irrigation projects and some international financial institutions have been interested in financing them.

The "green revolution" has increased the demand for water. With an adequate supply of water and the "green revolution" package, adequate farm prices are favorable to increases in food production. Besides, the large-scale and small-scale irrigation may be needed if appropriate technologies are taken into account; tube wells and electrically powered pumps have been suggested (8).

In Latin America and the Caribbean, the largest extension of irrigated lands are in Mexico, Argentina, Chile and Peru. Irrigation has technological and economic side effects.

In some countries, the unwanted side effect of irrigation has been the rising of ground water to levels close to the soil's surface causing saltiness and inhibiting the growth of plant roots (8).

Large-scale irrigation projects worsen the income disparities within the agricultural sector, because they may benefit only a limited number of farmers. At the same time, they contribute to uneven regional development (24, p. 164).

More irrigation projects, particularly small-scale projects, are required to benefit a larger number of small farmers. Simultaneously policies are required that will reduce the negative side effects of income distribution.

Land colonization of the jungle area

Latin America has large extensions of humid tropic land (60 percent) which are sparsely populated. Most of this area is virgin forest land. These lands are rich in forest, mineral, fertile land and water. Consequently a lot of people think of this region of Latin America as an unlimited source for economic development (66). As Nelson (66, p. 1) writes: "In some quarters it is an article of faith that the great forested heartland of South America can and must be utilized if Latin America is to realize its development goals."

In some countries such as Bolivia, colonization was an integral part of land reform. In other countries colonization and irrigation projects were taken as substitutes to land reform. Nelson (66) evaluates colonization projects that have taken place in Bolivia, Brazil, Colombia, Ecuador, Mexico, Paraguay and Peru. His evaluation is that "the experience in the development of new land in the humid tropic has been very mixed."

Colonization projects have been very expensive. They require large amounts of capital and good management. Government settlements have had poor results and many of them failed (66, p. 287). In Latin America, colonization projects of the last decade, with governmental finance, increased the level of rural development only by two percent (94, p. 6).

Colonization projects of humid tropic land should be taken as a complementary action to land reform and as an integral part of integrated rural development projects.

Nonagricultural activities or industries

Food-crop farming of small tracts of land and raising of livestock does not generate enough employment or income for the near-landless farmer. This situation is even worse for the landless farmers (95).

Ensminger and Bomani (21, p. 85) recommend a national program for creating economic enterprises in the rural areas. They also recommend the introduction of banks in rural villages to finance small industries such as dairying, sheep raising, fisheries, beekeeping, handloom, blacksmithing, food processing and chicken hatcheries. Finally Ensminger thinks rural enterprises can manufacture parts as a subsidiary of a large urban-based industry.

The basic difference between agriculture has been observed by Georgescu-Roegen (33). He points out that farming is a seasonal activity, causing large unemployment during some seasons of the year. To avoid this idleness in the rural labor force, Figueroa (24, p. 166) recommends complementary activities. These activities lack seasonality or have an opposite seasonality to that of agriculture. These complementary activities are:

- 1) exploitation of new resources such as mining or forestry;
- 2) improvement of resources, such as dairy products, wool, or wood;
- 3) more processing of products, such as dairy products, wool or wood;
- 4) some services, such as repair of machinery; and
- 5) industries which may operate efficiently on small scale.

Figueroa (24) observes that these activities are forms of rural industrialization which need financing and governmental support.

Daines et al. (14) recommend the introduction of rural enterprises where they enjoy competitive advantages. However, rural enterprise, complementary activities or small and medium rural enterprises face problems such as:

- a) Government disincentives by distorting factor prices i.e. overvalued foreign exchange, favoring capital-intensive projects, excessive governmental regulations and taxes and tariffs in favor of large firms.
- b) Management problems due to the lack of specialized management.
- c) Lack of access to technical information, consequently decisions may be based on inefficient practices.
- d) Small firms may lack marketing contacts, therefore advertising of their products will be harder.
- e) Small entrepreneurs may rely on personal savings, friends or money-lenders because of the lack of financial intermediaries.
- f) Raw materials and equipment may be more expensive for small firms. Large firms may enjoy special discount, political and social influence.
- g) Due to socio-cultural habits the rural entrepreneur may be expected to share his or her wealth with relatives, decreasing the amount of funds available for reinvestment.
- h) The lack of basic infrastructure such as roads, electricity and water may cause additional handicaps to rural enterprises.

i) Landlords typically are opposed to rural enterprises due to conflicting interests (24).

To overcome some of the problems enumerated above, Ensminger and Bomani (21) suggest the introduction of financial intermediaries in rural areas. Figueroa (24) recommends that "National priorities must be modified, but the government is often not interested in rural industrialization." Daines (14) thinks that the mechanisms to support rural industrialization will be training, research services, advisory services in managerial and technical matters, credit programs targeted to rural entrepreneurs, marketing aids by the state and providing sub-contracting possibilities with government and other institutions.

Land reform benefits are limited to the ones who work the land. The near landless and the landless are unemployed and under-employed with very low levels of income. Rural industrialization is an important element of rural development, particularly to help the landless and near landless. Simultaneously complementary macro policies for rural development such as colonization, irrigation, agrarian reform, etc. are required.

Policy Implications on Rural Development

The poorest of the poor in developing countries live in rural areas composed of small, near landless and landless farmers. This group of people are often called "the peasants" and they are usually discriminated against politically.

The peasants' main problem is poverty; consequently low income, poor health, malnutrition, etc. However, there is disagreement as to what causes the poverty. Peasants typically have been omitted from the benefits of economic development and in many instances, have been neglected on purpose.

Many governmental policies of LDCs discriminate against the agricultural sector and protect the manufacturing sector by price policies, tax policies, import-export controls and foreign exchange. Other governments are reluctant to make institutional changes such as agrarian reform, induce research and to invest large funds in education, health or appropriate technologies. Some of these policies may conflict among themselves.

Some governments have been following erroneous policies toward economic development particularly toward rural development. The question is, why are they following these erroneous policies? Some of the reasons are probably as follows:

a) Some governments are dominated by special interest groups (i.e. the "oligarchy"), that are against or unsympathetic to the objectives of rural development. For instance, land reform is essentially against their own interest, so how could they propose and implement it (96, p. 29)? The World Bank points out: "In some developing countries, present policies and institutional structures are so far from favorable to rural development that a policy shift could only follow a major political change."

b) "Others may hold the view that rural development is technically difficult or economically unsound or it may lead to slower growth in output and export." A high placed official of the International Monetary Fund comments to Harberger (in 32), "I go to lots of countries and I see lots of young technical economists, and they all seem to be very bright and very smart. But, it's funny. In the other places they seem to use a lot of their brains and talent figuring out arcane reasons why they shouldn't do what good common sense and simple economic analysis indicate probably should be done."

c) The erroneous belief that only industrialization will produce development, consequently neglecting the agricultural sector. They take industry as the panacea, promoting industrialization by different macro policies such as import substitution, etc.

I think that the first step in reaching the rural poor is to recognize that rural development is important to reduce poverty and that it has been neglected. Once it is acknowledged that rural development is a necessary condition for economic development, integrated rural development projects must be part of the national planning; and they must be included in the overall objectives of a country, and in the objectives of international institutions dedicated to economic development.

Some of the international institutions that have been financing rural development projects in Latin America are: The World Bank,

Organization of American States, the Inter-American Development Bank, U. S. Agency for International Development and other institutions.

Some Latin American countries have shown some interest in rural development, among these are Mexico and Colombia. In 1967, Mexico started with the Puebla Project which is already well known in the rural development literature (18, p. 61). Later, in 1973, Mexico created a national system for Public Investment in Rural Development (PIDER, 7). Colombia also has shown some interest and has some experience in rural development projects (10, p. 78).

Mexico and Colombia are among the first Latin American countries to apply the integrated rural development approach on a large scale. The evaluation and lessons from these experiences of rural development are awaited anxiously.

Integrated rural development is not the only way to reach the rural poor. The other instruments to be used in rural development were discussed previously and they are:

- 1) land reform,
- 2) creation and introduction of appropriate technologies,
- 3) irrigation,
- 4) land colonization of jungle areas,
- 5) adequate food price policies,
- 6) farm input price policies
- 7) nonagricultural activities or industries

8) health and

9) education.

In terms of policy priorities, agrarian reform is one of the most important, and a true agrarian reform should change the old land tenure system. Almost every Latin American country has land reform programs, though few have implemented them.

In Latin America, colonization and irrigation are ways to gain additional agricultural land; however, they require large amounts of capital investment.

To increase productivity of agricultural goods, biological research along the lines of the "green revolution" is required; but the creation and introduction of appropriate technologies is also important.

To increase rural employment, migration and rural industrialization are among the alternatives for rural development.

Investment in social services such as in education, health and shelter will increase the productivity in the future.

Finally, a true rural development will start only with the organization and political participation of the rural poor in control of their own lives and countries.

Policy Implications to Develop the Peruvian Agricultural Sector

Kindleberger and Herrick (46, p. 209) write: "Development economists as well as those more directly charged with furthering the development process have seen a renewed interest in agriculture as a vehicle

for growth of productive employment and income."

In general, some of the reasons to give attention to the development of the agricultural sector are:

- a) In the poorest countries a large proportion of the labor force (3/4) is in the agricultural sector.
- b) The results of industrial growth have not been very bright causing disillusionment.
- c) Groups of low-productivity rural workers can be directed toward a greater agricultural production, capital formation or rural industries without transferring people from the agricultural sector to the modern or industrial sector.
- d) More productive rural employment may improve the present uneven distribution of income.
- e) Higher rural income may increase savings and investment creating an environment for higher taxes and capital formation.
- f) The need of greater export of food can be offset by greater agricultural production and by increasing productivity.
- g) The rural sector produces food for the whole economy.
- g) Peasants in the rural sector are the least educated and the poorest, forming part of the lowest income group.
- i) Import substitution has emphasized the production of goods consumed by richer income groups rather than given priority to basic

goods such as food.

j) Export led industries are harmful when a country depends on the export of a single product and the international market for this particular good decreases and prices fall.

k) Investment projects have been biased toward the capital intensive rather than the labor intensive.

Van Slooten (89) reviews the Peruvian economic performance from 1945 to 1963, covering five administrations. He recommends skillful management of the Peruvian export economy to develop the Peruvian economy as a whole. He forgets completely the development of the agricultural sector as an important condition to improve the well being of the Peruvian population.

Echevarria (19) shows that the Peruvian policy has been to import food-stuffs particularly meat and wheat. The import of food-stuffs has caused difficulties to the Peruvian balance of payments. It was acute during the last decade of the 70s.

Due to the neglectful and inappropriate policies for agricultural development in 1979, the Peruvian government had to import the following items (88):

| <u>Products</u> | <u>Quantities (tons)</u> |
|-------------------|--------------------------|
| Wheat | 740,000 |
| Corn/sorghum | 175,000 |
| Milled rice | 80,000 |
| Soybeans | 43,500 |
| Crude soybean oil | 64,000 |
| Nonfat dry mild | 17,000 |
| Butter oil | 8,000 |

The importance of most of the items listed above has decreased from the previous year due to a decline in the demand and in turn the decrease in demand has been worsened by the economic crisis (88).

During the last decade, the Peruvian government has put effort in land reform, hoping to increase production and productivity. It seems that production will increase in the long run. The agricultural development has been based on organizing huge co-ops as a consequence of land reform. However, the medium and particularly the small farmers and peasant have been neglected. Even though Peru had an extensive land reform, the number of small farmers and peasants that benefited from it is very small; besides, agricultural production has declined due to change in ownership, improper management and destruction of capital by exlandowners just before land reform (20, p. 24).

If the objective of the Peruvian economy is self-sufficiency against dependence, particularly in the area of basic needs such as food, the agricultural sector should have the first priority for development. Some of the reasons are:

a) The agricultural sector employs 50 percent of the labor force and yet only contributes to 17 percent of the gross value product (this is for the years 1963-68). The industrial sector employs 13.6 percent of the labor force.

b) Agriculture sectors are not growing at the same rate as other sectors of the economy. In fact, the gross output value as

percentage of the total economy has decreased from 17.28 percent in 1903 to 16.28 in 1968.

c) The agriculture sector is not growing at the same rate as other sectors of the economy and it is the second largest importer after industry.

d) The import of large quantities of food causes a drainage in the foreign exchange of the Peruvian economy.

Some of the policy recommendations to accelerate growth in the agricultural sector are:

a) Minimize or, if possible, stop food imports from abroad and start stimulating national production and productivity if self-reliance is the main objective.

b) Increase production by expanding cultivatable land area, colonization and irrigation. In the last decade, the population over land area was 0.1 but the density of population is 4.8 when it is measured in terms of population over permanent arable land; which is high compared to other countries (29). Peru has made large investments in irrigation projects on the coastal area where there are Chira-Piura, Jequetepeque, Olmos and Majes; but these irrigation projects are still in construction. It is necessary also to make irrigation investments in the sierra region where peasants need it badly.

c) Colonization of the jungle area is not new, but it has not been successful due to inappropriate infrastructure. There are

insufficient roads and other basic services to live comfortably in these areas. About two-thirds of the Peruvian territory is in the Amazon Jungle region.

d) Research needs special attention, particularly in the development of new or hybrid seeds, higher yielding varieties and in the area of control and prevention of disease.

e) It seems to me that one of the main obstacles will be to create and adopt appropriate technologies to the Andean and to the jungle regions.

f) Extension services in developed countries help to transfer knowledge to the farmer. Somehow the knowledge generated and or adopted by appropriate technologies has to be transferred; one way to do this might be through agricultural extension services.

g) Enlarge institutions that will support the agricultural sector. The amount of expenditures or the percentage of GNP in agriculture is minimum compared to expenditures for military purposes. Giving more funds to the INTETEC institute in charge of developing appropriate technologies will help in the development of the agricultural sector.

h) The best way to reap fruits in the future is to invest in human capital, particularly in the rural population who are the least educated and poorest of all income groups.

i) Invest in infra structure in rural areas, particularly by constructing roads, schools and health services.

j) Develop appropriate marketing channels. Eliminate the racketeers that are present in the marketing of agricultural products and food.

k) From the input side, guarantee the flow of fertilizers, since shortage of fertilizers is frequent. Mellor (56) mentions that one way would be by allocating an appropriate amount of foreign exchange for fertilizer and having long-term contracts between producers and users.

l) Creation of rural industries that generate employment and income.

m) Stimulate the export of excess production. This means to increase production and create food surpluses to export the part that is not insured in order to obtain part of the resources needed for capital formation.

n) Stimulate the growth of local crops rather than fooling with foreign exotic crops (such as rape-seed). I am particularly referring to increasing the production of quinoa and cañihua which are small grains rich in protein content, these crops have been adapted through centuries and local people are used to eating them in their diet.

o) Land reform must continue in the next stage; it has been partially successful. The production of food has declined but in the long run will probably increase. Land reform has benefited only a limited number of farmers. It will be necessary to expand its benefits

to peasants that are living around the co-op created by the land reform.

p) Rural electrification to provide electricity for rural irrigation. Irrigation can also be done using wind generated wells.

q) Prices have been kept artificially low in order to satisfy consumers. But prices below production cost discourage production. Prices have to be reasonable to producers and consumers.

r) So far the small farmer or peasant has been neglected in every sense of the word. They are the least educated in terms of formal schooling, and the poorest among all the general population. International Aid should be channelled to them as well as national services.

In summary, to develop the agricultural sector of the Peruvian economy, the policies to follow are: land reform, irrigation, land colonization of the jungle area, adequate food price policies, farm input policies, development of nonagricultural activities or rural industries and improvement of health and education. These policies were discussed on the previous section as part of rural development.

Policy Implications of Rural Development for the Rural-Puno Area

Quinoa and cañihua's potential contribution to solve malnutrition

It was mentioned in Chapter I that one of the main problems that peasants in this region face is malnutrition; in case of drought, hunger may be present.

When did malnutrition start, and why? Horkheimer (39, pp. 127-139)

writes that during pre-Hispanic times this population did not suffer from malnutrition. He believes that nutrition in ancient Peru was balanced. The conquest of Peru by the Spaniards changed this balance. Spaniards thirsty for gold and silver put a lot of emphasis on mining these minerals and neglected the agriculture and well-being of the conquered people. Land tenure changed drastically when Spaniards became the owners of all these lands, farming the latifundios. Many agricultural products were looked down on as "Indian food" including potatoes, quinoa, cañihua, tarhui, etc. The conquest meant not only slavery, but also, decline in the production of agricultural goods, causing inadequate nutrition, which in turn, contributed to the physical and mental degeneration of a country at one time strong and creative.

From the time of the conquest to the present, the problems of malnutrition, the pattern of looking down on native food, and the unequal distribution of land tenure have changed very little, although Peru went through a land reform and became independent. The Peruvian government officials know very well that peasants suffer from malnutrition, but they have not been interested in increasing the peasants' welfare.

Agricultural policies at the national level have been in favor of international and foreign farmers. For instance, Peru has been importing wheat and giving a subsidy to the consumers. This makes wheat less expensive than quinoa to consumers, but the difference from the actual price is paid by the government (19).

There is a wide range of ideas concerning the solution to the problem of malnutrition. Phipard and Shepherd think that in a limited way, food import may solve the nutrition problems if local production of these foods is more expensive than importing them (in 37, pp. 70-71).

Shepherd (83) suggests that it is possible to provide a nutritious food product at a low cost of production for families with low incomes and with nutritional deficiencies. Such a product is incaparina, developed in Central America. It is a vegetable mix with a 25 percent protein content. This product has the appearance of fine flour which can be mixed with other flours, or used in drinks. However, it did not accomplish its objective in reaching the people for whom it was designed because of its high retail price and low acceptance.

In Peru a similar product was developed. Peruvita, made from a mix of cottonseed, quinoa and soybean flour, and dry milk. The supply of this product has been low because manufacturers had to import soybean and cottonseed flour, making the cost of production higher than had been expected. Shepherd also suggests the possibility of producing fish meal for human consumption. But, he argues, "It is more expensive than peruvita." At present, peruvita is not known any more and the idea of producing a high protein content product to solve the problem of malnutrition has been a failure.

The idea of producing fish meal flour for human consumption is still there, but Peruvians have not been enthusiastic in promoting it.

Even though a large portion of the Peruvian rural population suffers malnutrition, fish meal with a high protein content has been traditionally exported to Europe for feeding hogs and to the United States for feeding poultry. It is known that Norway has developed a technology to produce fish meal or fish flour for human consumption. It is important to remember that Peru is one of the largest producers of fish meal in the world. However, this country has not been able to use its renewable resources - which are rich in protein - to feed and solve the malnutrition problem of its own inhabitants (9).

Another idea to produce high protein concentrate has been to produce artificial protein known as "single cell protein" or byproduct of the sugar and paper industries (9). In 1973, "single cell protein" was produced for animal feed as a source of protein. This artificial protein from petroleum hydrocarbons is economically unfeasible according to Scrimshaw (82), due to the high price of petroleum.

Some scientists think that quinoa may contribute to solving the malnutrition problem in the area because it is rich in protein content. The nutritional values of quinoa were pointed out about three decades ago; these findings have been confirmed in later investigations. In 1955, White et al. (93) found that quinoa had 11.0 grams protein per 100 grams, and cañihua had 14.1 grams (see Table 36).

Quinoa and cañihua are rich in several essential amino acids such as arginine, lysine, leucine, and isoleucine (Table 37). Quinoa and cañihua are also richer in protein content than other cereals such as rice, corn,

Table 36. Nutrient composition of quinoa and cañihua (per 100 grams, all values corrected to moisture content of 12%)^a

| Nutrient | <u>Cañihua</u> | Quinoa |
|--------------------------|----------------|--------|
| Protein (N X 6.25), g. | 14.1 | 11.0 |
| Fat (ether-solubles), g. | 4.1 | 5.3 |
| Fiber, g. | 10.7 | 4.9 |
| Ash, g. | 4.6 | 3.0 |
| Calcium, mg. | 126.0 | 131.0 |
| Phosphorus, mg. | 461.0 | 424.0 |
| Iron, mg. | 18.8 | 6.8 |
| Thiamine, mg. | 0.78 | 0.52 |
| Riboflavin, mg. | 0.55 | 0.31 |
| Niacin, mg. | 1.34 | 1.60 |

^aSource: (93, p. 532).

Table 37. Essential amino acid composition of quinoa, cañihua, and whole wheat (calculated to 16.0 grams of nitrogen)^a

| Amino acid | Quinoa, % | <u>Cañihua</u> , % | Whole wheat, % |
|---------------|-----------|--------------------|----------------|
| Arginine | 7.4 | 7.9 | 4.3 |
| Histidine | 2.7 | 2.5 | 2.1 |
| Lysine | 6.6 | 6.0 | 2.7 |
| Tryptophan | 1.1 | 0.8 | 1.2 |
| Phenylalanine | 3.5 | 3.6 | 5.1 |
| Methionine | 2.4 | 1.8 | 2.5 |
| Threonine | 4.8 | 4.8 | 3.3 |
| Leucine | 7.1 | 5.8 | 7.0 |
| Isoleucine | 6.4 | 6.8 | 4.0 |
| Valine | 4.0 | 4.6 | 4.3 |

^aSource: (93, p. 533).

wheat and barley (Table 38).

Horkheimer (39) writes that quinoa played a very important role in the diet of the natives who lived in the high altitudes of the Andes before and after the Peruvian conquest.

Weber (91) writes in "The Inca's Ancient Answer to Food Shortage":

Researchers in a number of Latin American countries are looking at a crop first cultivated by the ancient Incas and then neglected for centuries, as a possible answer to the Andean region's acute shortage of locally-produced food protein. The crop is quinoa....

Quinoa is little known in the world as a food crop as the National Academy of Science, in its compendium of underexploited tropical plants states (65, pp. 20 and 22):

A staple of the ancient Incas, and still a staple for millions, quinoa is virtually unknown outside the highlands of Bolivia, Chile, Ecuador, and Peru. Its grain, rich in protein and containing a good amino acid balance, may prove to be a better protein source than most of the true cereals....

No intensive research on quinoa cultivation has been done: growing methods have changed imperceptible during the past four centuries....

Quinoa varieties show highly variable protein content. The Patacamaya Experiment Station has varieties with 16, 17, 18 and 19 percent proteins.

Ninety-five percent of the total production of Peru's quinoa and 97 percent of the national production of cañihua occurs in the departamento of Puno, as shown in Table 39.

However, the total farmed area of cañihua and quinoa has been declining because cañihua and quinoa did not have any promotion, and it was not

Table 38. Quality of some plant proteins^a

| Grain | Percent level in diet | Percent protein | Average gain/rat/wk. grams | Liver fat dry weight |
|---------------|-----------------------|-----------------|----------------------------|----------------------|
| Washed quinoa | 90 | 10.1 | 24.4 | 11.3 |
| White rice | 90 | 5.9 | 8.8 | 31.8 |
| Corn | 90 | 7.4 | 2.2 | 12.8 |
| Wheat | 88 | 9.1 | 9.9 | 11.8 |
| Washed quinoa | 87 | 9.8 | 18.8 | 13.4 |

^aSource: (75, p. 540).

Table 39. Cultivated area and units producing quinoa and cañihua, 1972^a

| | Peru | Puno | % Puno/Peru |
|------------------------------|-----------|---------|-------------|
| A. All crops | | | |
| 1. Total area cultivated | 1,900,805 | 154,973 | 8 |
| 2. Agricultural units | 1,390,877 | 122,269 | 9 |
| B. Quinoa production | | | |
| 1. Area cultivated | 15,127 | 14,349 | 95 |
| 2. Production (metric tons) | 4,600 | 4,212 | 92 |
| 3. Productivity (tons/hect.) | .300 | .294 | 98 |
| 4. Agricultural units | 51,871 | 47,262 | 91 |
| C. <u>Cañihua</u> production | | | |
| 1. Area cultivated | 6,544 | 6,375 | 97 |
| 2. Production (metric tons) | 1,876 | 1,833 | 98 |
| 3. Productivity (tons/hect.) | .287 | .288 | 100 |
| 4. Agricultural units | 21,727 | 20,748 | 95 |

^aSource: (44).

included in the planning project of the agricultural sector 1971-75 nor in the operative plans. Quinoa yields are usually higher in larger farms and agricultural cooperatives which use "modern technology"; however, only 1,253 hectares were farmed by these units. About 97 percent of Puno's quinoa is produced on mini-farms by individual peasants or peasant communities (44). Cañihua is almost entirely produced by small farmers or peasant communities.

In addition to quinoa and cañihua, another important crop for small farmers is barley. It is one of the few nondomestic crops that was successfully adapted to this region, overcoming the harsh climate of this area. In terms of volume, the consumption of barley is second only to that of potatoes. It is consumed by humans as well as being used for feeding livestock, poultry, and dogs. Because of its multiple uses, peasants reserve their largest farming area for barley. But production of food is scarce in this region, even though a large part of the population is engaged in farming. Peasants do not produce enough food and sometimes they have to import from the Cusco area.

A critical resource of this region has been neglected - the raising of llamas and alpacas. The livelihood of thousands of sheperds in this area depends on the raising of llamas and alpacas. These animals provide wool, meat, and, in the case of llamas, means of transportation in areas where there are no roads. With the introduction of sheep and bovine, the raising of llama and alpaca has been reduced to poorer areas of the departamento of Puno.

Alpaca wool is greatly appreciated in Europe, therefore, adequate services of extension, control of disease and proper management are needed.

Need of rural development projects

Due to the poverty level in this area, integrated rural development projects are needed urgently. The World Bank has started the first phase of their project, "Puno Rural Development Project." The implementation of this project alone is not sufficient. It covers only a small part of the Puno region, even though it is the largest project in this area.

This study shows that peasants' organization of their crop and livestock production differs. At least three kinds of peasants exist. Within each group exists peasant differentiation; some of them are poorer in terms of others. Peasants close to the lake, GROUPA, enjoy a better climate and livestock activities are important. They have potential resources for fisheries and farming of aquatic plants. Peasants of GROUPB are between GROUPA and shepherds of llamas and alpacas. The crops of cañihua, quinoa, oka, isaño and papa liza are more important to GROUPB than to GROUPA. The shepherds of llama and alpacas are located in the Puno region at higher levels than both GROUPA and GROUPB peasants.

Potatoes and barley are farmed almost in the same proportion by GROUPA and GROUPB.

At least three sets of different programs, each aimed at each group of peasants are needed. This opinion is based on the grouping of peasants in homogenous sub-set based on cluster analysis. More specifically,

institutions interested in rural development should have at least three different sets of extension programs and/or other services for peasants, other than the services geared toward huge co-ops, medium sized farms, large farms and ranches. The reason is obvious; peasants of GROUPA do not own llamas and alpacas. On the contrary, the livelihood of peasant-shepherds of llamas and alpacas depends almost entirely upon the raising of these animals.

In general, adequate national and regional rural development projects will benefit all peasants and farmers. These policies were discussed in Chapter II and in the previous section. In general, structural changes such as land reform are needed to benefit peasants with integrated rural development projects. Other variables are also important such as: health, education, irrigation and participation of peasants in the decision making and planning of rural development projects.

The development of local resources has been neglected consistently by the government and other institutions interested in rural development. Some extension programs have been interested in introducing new "exotic" products. The development of the following basic resources have been neglected:

- a) native pasture
- b) local fishes
- c) crops: cañihua, oka, isaño, papa liza, lima beans, tarhui, and vegetables
- d) local animals: guinea-pig, llama, hog and poultry

Programs of research and extension geared toward rural development and toward increasing the peasants' production of basic food such as quinoa, barley, cañihua, and tarhui, will benefit them not only by reducing malnutrition, but it may also help to improve their income. Most of all, the creation and introduction of appropriate technologies will help peasants to increase their production of all the crops they farm, since technology used to farm one crop is similar to that used for others, with the exception of potatoes which require more agricultural activities.

Rural development should start with improving the local resources such as quinoa, barley, cañihua, tarhui, llamas, alpacas, guinea-pigs, native pastures, etc. Peasants are willing to work with institutions that aim toward rural development and many of them remember their previous experience with an extension program provided by SIPA, a North Carolina mission to Peru.

One of the main variables to true rural development is political participation; when peasants start participating in the political processes of their country and of their lives then there is the beginning of true rural development.

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The Iowa State University Committee on the Use of Human Subjects in Research reviewed this project and concluded that the rights and welfare of the human subjects were adequately protected, that risks were outweighed by the potential benefits and expected value of the knowledge sought, that confidentiality of data was assured and that informed consent was obtained by appropriate procedures.

APPENDIX 1

C. I. D. A. CONVENIO PERU-CANADA MINISTERIO DE AGRICULTURA Y

ALIMENTACION REGION X PUNO

ENCUESTA PARA DETERMINAR EL CONSUMO Y COSTO DE LA CEBADA EN LAS
COMUNIDADES Y PARCIALIDADES.

CODIGO.....ENCUESTADOR.....FECHA.....

1.- LUGAR DE LA ENCUESTA, EFICIENCIA EN CASTELLANO Y EDAD:

Departamento..... Provincia.....

Distrito..... Comunidad.....

Eficiencia en Castellano: R() B() M()

Edad del jefe de familia.....

2.- NUMERO DE PERSONAS QUE COMPONE LA FAMILIA:

Adultos (mayores de 12 años):.....personas

Niños (menores o igual de 12 años):.....personas

total:personas

3.- LISTADO DE ALIMENTOS QUE CONSUME SEMANALMENTE:

| <u>ALIMENTO</u> | <u>CANTIDAD</u> <u>kilos</u> | <u>ALIMENTO</u> | <u>CANTIDAD</u> <u>kilos</u> |
|------------------------|---------------------------------|------------------------|---------------------------------|
| a) Papa..... | | b) Quinoa..... | |
| c) Cañihua..... | | d) Habas..... | |
| e) Cebada..... | | f) Trigo..... | |
| g) Ocas..... | | h) Chuño..... | |
| i) Tunta..... | | j) Izaño..... | |
| k) Papa liza..... | | l) Sal..... | |
| ll) Queso..... | | m) Maiz..... | |
| n) Arroz..... | | n) Carne de vaca..... | |
| o) Carne de llama..... | | p) Carne de ovino..... | |
| q) Leche de vaca..... | | r) Leche en tarro..... | |

- | | |
|------------------------|--------------------------|
| rr) Harina..... | s) Pescado..... |
| t) Manteca..... | v) Aceite..... |
| w) Azucar (rubia)..... | x) Fideos..... |
| y) Huevos..... | z) Verduras (valor)..... |
| Otros..... | |

4.- GASTO TOTAL FAMILIAR ANUAL:

¿Cual es su gasto total en: ropa, artefactos electricos, útiles escolares, Etc. fuera del gasto en alimentos?

5.- CLASES DE CEBADA CULTIVADA:

a) K'ara grano, K'ala grano o chili cebada:

- | | |
|-------------|---|
| Morado..... | Area cultivada (Has. o M. ²)..... |
| Negro..... | Area cultivada (Has. o M. ²)..... |
| Azul..... | Area cultivada (Has. o M. ²)..... |
| Blanco..... | Area cultivada (Has. o M. ²)..... |

b) P'orqui cebada grano (desnuda):

- | | |
|-------------|---|
| Blanco..... | Area cultivada (Has. o M. ²)..... |
|-------------|---|

c) Chupayuj cebada grano (cebada comun):

- | | |
|---------------|---|
| Blanco..... | Area cultivada (Has. o M. ²)..... |
| Negra..... | Area cultivada (Has. o M. ²)..... |
| Colorada..... | Area cultivada (Has. o M. ²)..... |

d) Cebada forrajera..... Area cultivada (Has. o M.²).....

e) Otros..... Area cultivada (Has. o M.²).....

6.- COSECHA DE CEBADA EN UNIDADES DE PESO (1977-78):

a) K'ara grano, K'ala grano o chili cebada grano:

- | | |
|----------------------|----------------------|
| N° de costales | peso por costal..... |
|----------------------|----------------------|

b) P'orqui cebada grano:

- | | |
|---------------------|----------------------|
| N° de costales..... | peso por costal..... |
|---------------------|----------------------|

c) Chupayuj cebada grano (cebada comun):

- | | |
|---------------------|----------------------|
| N° de costales..... | peso por costal..... |
|---------------------|----------------------|

- d) Cebada forrajera:
 N° de cargas.....N° de quintales.....
 e) Otros:.....
 N° de costales..... peso por costal.....

7.- CANTIDAD DE CEBADA DESTINADA PARA SEMILLA DE (1977-78):

- a) K'ara grano, K'ala grano: libras..... o arrobas.....
 b) P'orqui cebada grano: libras..... o arrobas.....
 c) Chupayuj cebada grano: libras..... o arrobas.....
 d) Cebada forrajera: libras..... o arrobas.....
 e) Otros..... libras..... o arrobas.....

8.- CANTIDAD DE CEBADA COMPRADA PARA SEMILLA (1978-79):

- a) K'ara grano, K'ala grano libras.....arrobas.....lugar.....
 b) P'orqui cebada grano libras.....arrobas.....lugar.....
 c) Chupayuj cebada grano libras.....arrobas.....lugar.....
 d) Cebada forrajera libras.....arrobas.....lugar.....
 e) Otros..... libras.....arrobas.....lugar.....

9.- COMPRA DE CEBADA GRANO:

- a) Para consumo humano Kg. libras.....lugar.....
 b) Para consumo de ganado Kg. libras.....lugar.....
 c) Para consumo de choncho Kg. libras.....lugar.....
 d) Otros..... Kg. libras.....lugar.....

10.- EN UN AÑO NORMAL VENDE UD. CEBADA GRANO? SI (), NO ().

11.- LUGAR DE VENTA DE CEBADA GRANO:

- a) Feria () cantidad en libras.....
 b) K'ato o plaza() cantidad en libras.....
 c) Otros..... () cantidad en libras.....

12.- CANTIDAD DE CEBADA DESTINADA PARA LA VENTA Y TRUEQUE (1977-78):

- a) K'ara, K'ala o chili cebada grano costales.....
 b) P'orqui cebada grano costales.....
 c) Chupayuj cebada grano costales.....
 d) Cebada forrajera costales.....
 e) Otros..... costales.....

13.- CANTIDAD DE CEBADA GRANO DESTINADA PARA: AVES, GANADO, PORCINOS Y CANINOS (ANUAL O SEMANAL):

CLASE DE CEBADA

| | | |
|-------------|-----------------------|-------|
| a) Chanchos | libras o arrobas..... | |
| b) Perros | libras o arrobas..... | |
| c) Gallinas | libras o arrobas..... | |
| d) Vacas | libras o arrobas..... | |
| e) Caballos | libras o arrobas..... | |
| f) Otros | libras o arrobas..... | |

14.- ALGUNA VEZ HAS VENDIDO CEBADA A ALGUNA COMPAÑIA CERVECERA O MOLINERA? SI (), NO ().

Que cantidad?..... Cual compañía?..... Donde?.....

15.- ALMACENAJE DE GRANO DE CEBADA:

Cuantos costales de cebada grano por año almacena Ud? (taque, pirwa o sejje).....

16.- CANTIDAD DE FORRAJE DESTINADA PARA EL CONSUMO GANADERO (1977-78):

| | | | |
|----------------------------------|-------------|------------|-----------|
| a) Cebada forrajera (con espiga) | cargas..... | atado..... | peso..... |
| b) Cebada tallo cosechado | cargas..... | atado..... | peso..... |
| c) Otros..... | cargas..... | atado..... | peso..... |

17.- CUANTAS CARGAS DE CEBADA TALLO HAS COSECHADO? (1977-78):

.....

18.- ALIMENTOS HUMANOS TRADICIONALES EN BASE A LA CEBADA:

| | | <u>FRECUENCIA POR SEMANA</u> | <u>CLASE DE CEBADA UTILIZADA</u> |
|-----------------------|-----|----------------------------------|--------------------------------------|
| a) Mazamorra | () | | |
| b) Tostado | () | | |
| c) Jakopito o acopito | () | | |
| d) Phata o phataska | () | | |
| e) Charca o chaque | () | | |
| f) Harina de cebada | () | | |
| h) Otros..... | () | | |

19.- CONJUNTAMENTE CON QUE OTROS ALIMENTOS CONSUME ESTOS MENUS?

.....

.....

20.- DESCRIBA LA PREPARACION DE UNO DE LOS PLATOS DE SU PREFERENCIA:

.....

.....

21.- CAUSAS DEL CONSUMO DE LA CERADA:

- a) Le gusta ()
- b) Porque produce en cantidad ()
- c) No dispone de dinero ()
- d) Como complemento ()
- e) Costumbre ()
- f) Otros..... ()

22.- ADEMAS DE LA ACTIVIDAD AGROPECUARIA, OTRA OCUPACION DEL JEFE DE FAMILIA:

- | | |
|------------------------------|------------------------|
| a) Comerciante de ganado () | b) Curandero () |
| c) Sombreroero () | d) Carpintero () |
| e) Ojalatero () | f) Comerciante () |
| g) Músico () | h) Zapatero () |
| i) Sastre () | J) Artesano textil () |
| k) Artesano cerámico () | l) Otros..... () |

23.- GRADO DE EDUCACION FORMAL DEL JEFE DE FAMILIA:

AÑO

- a) Ninguno ()
- b) Primaria ()
- c) Secundaria ()
- d) Superior ()
- e) Otros.....()

24.- CANTIDAD DE TIERRAS EN CULTIVO DE:

| | <u>MASAS, YUNTADAS O PASOS</u> <u>TRADUCIR A METROS CUADRADOS</u> | <u>CANTIDAD DE SEMILLA</u> <u>USADA</u> <u>LIBRAS O ARROBAS</u> |
|-------------------|--|---|
| a) Papa | | |
| b) Cebada | | |
| c) Cañihua | | |
| d) Quimua | | |
| e) Habas | | |
| f) Ocas | | |
| g) Izaño o mashua | | |
| i) Otros | | |

25.- TENENCIA DE TIERRAS:

| | <u>MASA, YUNTADAS, PASOS</u> | <u>METROS CUADRADOS</u> |
|----------------|------------------------------|-------------------------|
| a) Cultivadas | | |
| b) En descanso | | |
| c) Eriazos | | |

26.- TENENCIA DE GANADO:

| | <u>EN UNIDADES</u> |
|--------------|--------------------|
| a) Vacuno | |
| b) Equino | |
| c) Auquenido | |
| d) Ovino | |
| e) Otros | |

27.- QUE GANADO Y CUANTAS VECES AL AÑO VENDES?

.....

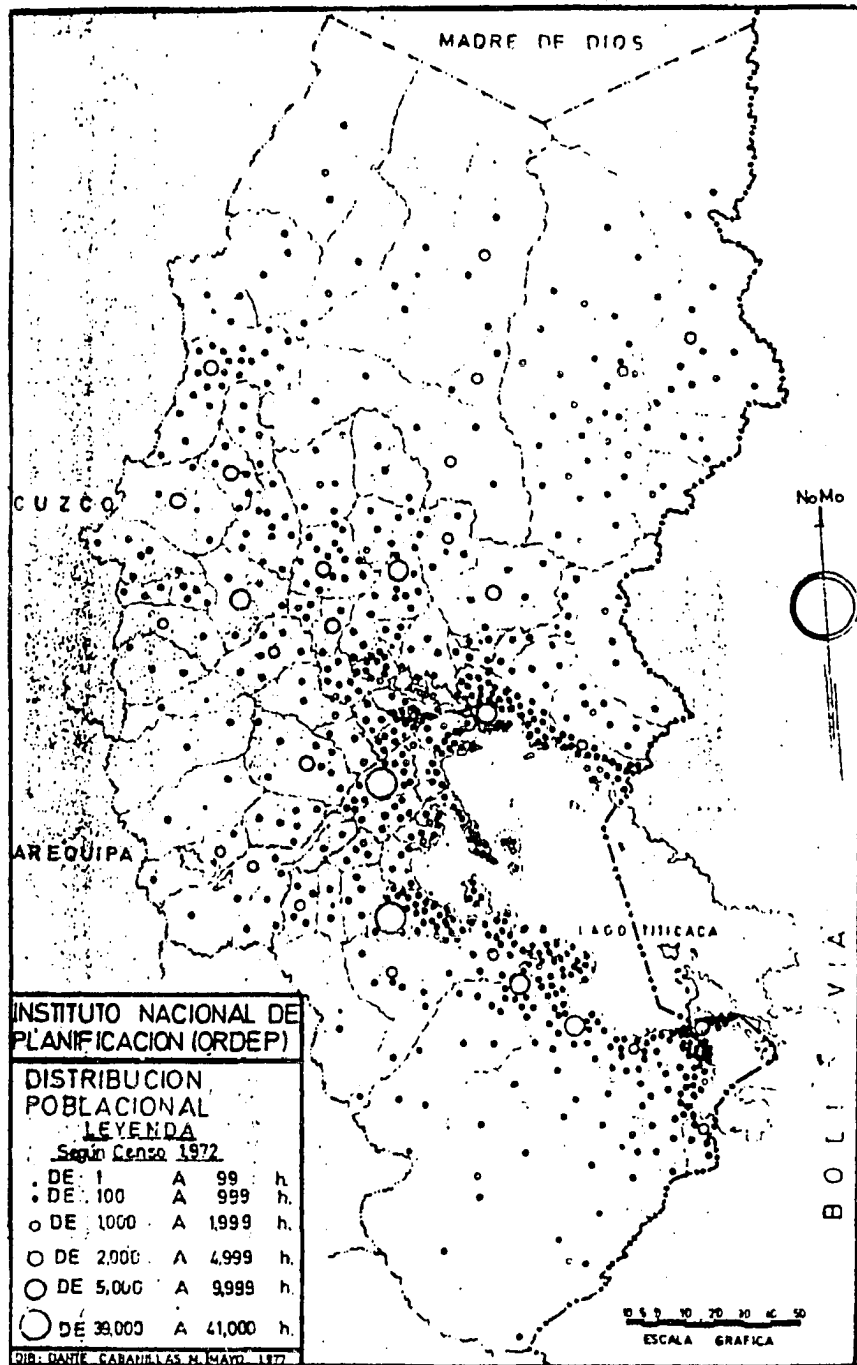
28.- INVENTARIO DE HERRAMIENTAS POR CLASE DE ORIGEN:

| <u>HERRAMIENTAS USADAS</u> | <u>CANTIDAD</u> | <u>COMPRADO HECHO O MIXTO</u> |
|----------------------------|-----------------|-------------------------------|
| a) Reja | | |
| b) Escarbador | | |
| c) Desterenador | | |
| d) Golpeador | | |
| e) Hoz | | |
| f) Látigo | | |
| g) Soga | | |
| h) Tira-pie | | |
| i) Yugo | | |
| j) Arado | | |
| k) Lazo | | |
| l) Azadón | | |
| ll) Pico | | |
| m) Pala | | |
| n) Rastrillo | | |
| n) Barreta | | |
| o) Carretilla | | |
| p) Cuero | | |
| q) Toldo | | |
| r) Cernidor | | |
| s) sacos | | |
| t) Otros..... | | |

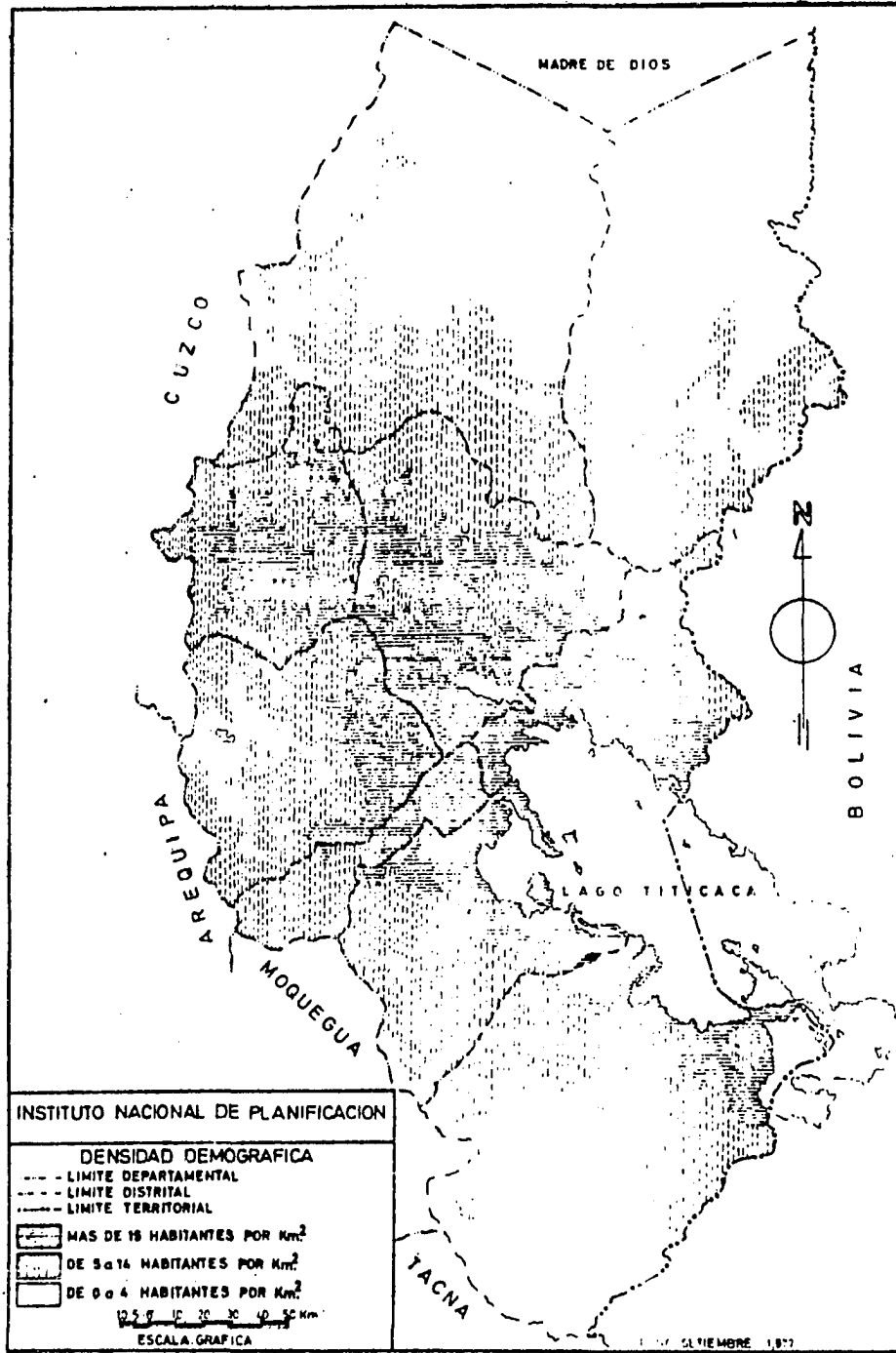
29.- COSTOS DE PRODUCCION DE LA CEBADA POR HECTAREA:

.....

APPENDIX 2



Map 5. Distribution of population in the Departamento of Puno



Map 6. Demographic density in the Departamento of Puno