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THE UNIVERSITY OF ALBERTA

The Organization of Irrigation in the Vilcanota Valley of Peru

Local Autonomy, Development and Corporate Group Dynamics

by

Inge Bolin

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled THE ORGANIZATION OF IRRIGATION IN THE VILCANOTA VALLEY OF PERU - LOCAL AUTONOMY DEVELOPMENT AND CORPORATE GROUP DYNAMICS submitted by INGE BOLIN in partial fulfilment of the requirements for the degree of DOCTOR OF PHILOSOPHY.

Supervisor

External Examiner

Date February 23, 1987

To my Family in North America and in Germany

and

to the Irrigators of the Vilcanota Valley

ABSTRACT

In many of the world's societies irrigation is fundamental to meeting urgent demands for ensuring and increasing agricultural production. Although technological considerations have long been the center of attention, it is now widely recognized that successful irrigation management is not based on technology alone, but depends even more on the organization and cooperative strategies of the people who use the technology.

The social aspects of irrigation are central to this comparative study of three canal systems in the Vilcanota Valley, department of Cusco, Peru. Along the Rio Tigre water is provided by two new canals built through international efforts, while the people along the Rio Chicon and Rio Pucara use unmodified Inca canals to irrigate their fields. Corporate irrigation groups exist in all villages except for Yanahuara where the community regulates irrigation.

All villages along the three canal systems were studied since their water requirements as well as certain social, economic, religious and political strategies relating to irrigation differ, especially between upstream and downstream communities.

The objectives of this research are concerned with both the theoretical and practical aspects of irrigation. Emphasis is placed on understanding the corporate principles upon

which irrigation groups are organized, the relationship between groups both in terms of cooperation and competition, their position vis-à-vis communal authorities and their articulation in extra-local institutions. The question of group autonomy, considered most important by both the indigenous population and many researchers, is at the focus as it affects corporate group integrity and successful irrigation management.

A comparison of the three regions reveals general and idiosyncratic features of irrigation. It also indicates how villages profit from development efforts and where problems arise. The comparison further illuminates elements from the physical and social environments which are conducive to the formation and persistence of irrigation groups versus those which make corporate group formation difficult.

An analysis of the research results in the light of relevant theories of autonomous corporate group organization is performed to develop a better understanding of the general principles of irrigation organization, thereby defining guide lines for irrigation development.

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Many institutions and individuals have contributed to the completion of this thesis, not all of whom can be recognized individually.

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A. The Research Problem

The relationship of irrigation to society has been a subject of considerable theoretical interest to social scientists, especially regarding state organization and evolutionary theory. Wittfogel's (1955) "hydraulic hypothesis" which postulates that large-scale irrigation requires centralized control and political organization has provoked much controversy. Although some criticism regarding this theory is justified, much of it results from misinterpretation as critics have often overlooked the fact that Wittfogel (1955, 1956, 1957) and Steward (1949, 1955a,b,c) addressed themselves specifically to large-scale irrigation in arid environments. Mitchell (1973:532-534) has suggested, and subsequently tested, a reformulation of the hydraulic hypothesis changing the independent variable from the size of the irrigation system itself to the way in which irrigation activities are organized. The modified hypothesis states that: "If there is centralized direction of irrigation activities in an arid or semi-arid environment, then there will be a corresponding increase in centralized political power in other areas of social life. The extent of political power will vary directly with the extent of the irrigation system and its importance to the local economy" (see also Mitchell 1976:25). Further testing of this reformulated hypothesis in different irrigation societies

may reveal general principles or functional relationships between irrigation and socio-political phenomena. Although some studies have dealt with systemic relationships relative to irrigation organization (Fernea 1970, Glick 1970, Gray 1963, Hunt and Hunt 1974, Leach 1961, Mitchell 1972, Sahlins 1962 and others), a cross-cultural model comprising small-scale systems has not yet been developed, but remains a goal worthy of pursuit.

In recent years the practical side of irrigation has received increased attention as a consequence of world-wide population pressures and resulting food problems. The urgency of the water problem is no longer viewed from the local or national level but is now of international concern as well. During the United Nations Water Conference in Mar del Plata, Argentina, in March 1977, the years from 1981 to 1990 were designated the "International Decade of Water".

The great water shortages that now exist in many parts of Peru can be attributed to a number of factors. Due to a considerable decline in population during Peru's colonial period, many of the irrigation systems which originated with the Incas have wholly or partially deteriorated. The present population increase of three percent (Internationales Handbuch, 1981) and resulting food shortages have led to national and international efforts to improve and expand old and develop new irrigation systems.

Initially there has been a strong tendency among

development agencies to disregard traditional irrigation practices in an effort to improve water delivery systems. In recent years, however, partially because of the failure of many irrigation projects, the trend has shifted to the simultaneous consideration of the human organizational factors in irrigation (Fogel 1974).

The abstract nature of discussions among social scientists relative to Wittfogel's hydraulic hypothesis which proved to be highly inconclusive, and the purely technical orientation that had long prevailed among engineers, has led both sides to agree that an investigation of successful irrigation management requires two major steps: 1. a focus on detailed case studies of irrigation management based upon indigenous social relations, and 2. a consideration of the organizational principles derived from these studies which would serve to establish a more coherent theory of irrigation management (Chambers 1980, Coward 1980a, Downing and Gibson 1974, Fano 1978, Hunt and Hunt 1976, Lewis 1980 and in press).

To date, few studies have focussed on irrigation in contemporary society. Studies are especially scarce for the Andean region of Peru. Apart from a small number of studies dealing with contemporary irrigation organization (Fonseca 1983, Gelles 1984, Mitchell 1972, 1976, 1977), irrigation is either only briefly dealt with or limited to its ritual significance (Arguedas 1964, Isbell 1978, Zuidema 1978). Thus, the socio-economic principles of traditional Andean

irrigation groups organized at the community or the inter-community level, are not well understood for the Andean highlands. There is no detailed information on the key factors influencing cooperative behavior or on the specific organizational procedures, rules or practices which have governed communal irrigation systems since pre-Columbian times (Arriaga 1968:154). Although good research has been undertaken in closed corporate Andean communities (Brush 1977, Isbell 1978, Webster 1977 and others) with foci on kinship, descent, locality and property as principles of incorporation, "corporate organization has rarely been carefully considered" (Webster 1977:29). This neglect is at least partly due to the fact that in the Andes we are largely dealing with bilateral societies. Corporate groups have been most frequently identified with unilineal descent and apart from Appell (1976), Lewis (1971 and in press) and Wiber (1986), little attention has been paid to corporate groups in cognatic society.

The omission of investigators in delineating corporate groups is paralleled by the tendency to neglect accounting for, describing and/or analyzing situations where local group autonomy articulates in extra-local decision making. This has caused considerable confusion regarding the locus of decision-making power and its impact on irrigation management.

Corporate organization and group autonomy, although seldom clearly defined and adequately discussed in case

studies, becomes an increasingly important issue in studies of irrigation societies and in efforts to renovate old and construct new irrigation systems (Geertz 1973, Goodell 1985, Hunt and Hunt 1974, Kelly 1983, Tiffany 1979). An analysis of the factors that contribute to local corporate group autonomy versus those where decision-making power is vested with higher levels of authority, may indicate where solutions can be sought in conflict resolution in existing irrigators' organizations and how viable new irrigation groups can be promoted.

This research is an effort to address the above problems which are outlined in greater detail in the following section 'Theoretical Orientation'. It is hoped that the results from the theoretical and practical dimensions of this study will contribute to finding ways of improving irrigation agriculture without causing dependency on outside agencies thereby disrupting successful long term indigenous networks. Furthermore it is hoped that by recognizing and isolating social-anthropological parameters which are instrumental to the proper functioning of irrigation systems, this study can discover broader generalizations about irrigation organization.

B. Theoretical Orientation

In order to discover the social organizational principles of irrigation, the objectives of this research are:

1. To understand irrigation in terms of:

a) the organization of irrigation groups at several levels of decision-making with special emphasis on autonomy and corporate group integrity;

b) the presence of general versus idiosyncratic trends in three different regions of the Vilcanota Valley;

c) conditions and processes which affect the formation of corporate irrigation groups and their persistence over time.

2. To determine more broadly those factors in the social and physical environment which most affect irrigation management in indigenous and newly developed systems through an analysis of the research findings in light of major theoretical paradigms.

The Concept of Corporate Groups

The study of corporate groups has become an increasingly important concern of anthropological inquiry (Goodell 1985:249). In irrigation societies around the world, the close relationship between water, land and a corporate group has been studied in its historical and contemporary dimension (Geertz 1973, Lando 1979, Lewis in press, Mitchell 1972, Netherly 1984, Sherbondy 1982a).

The study of the theoretical aspects of corporate groups reveals that the principles which constitute 'corporateness' and the way in which this concept can be used cross-culturally, have remained subject to considerable controversy and debate. Cochrane (1971:1144) states that

> there are two traditions of usage with regard to the concept of 'corporateness': either a loose construction has been placed on the term or authors have claimed that they were using it in its Anglo-American legal sense.

Goodenough (1951) argues that the use of the Anglo-American concept is valid in cross-cultural analysis. Sir Henry Maine (1931), on the other hand, who introduced the first concept of 'corporation' believed that the property rights of primitive societies could not be described by English legal terms, because the English legal system differs considerably from jural systems in primitive societies.

Regarding the identification of principles of incorporation, Radcliffe-Browne (1950:4) defines a corporate group as "containing members who assemble for collective action and select a chief or council as group representative". This is in agreement with Weber (1947:145-146) who believes that the presence of a person or persons in authority - with or without an administrative staff - and the enforcement of action are criteria which decide whether or not a corporate group exists. Smith (1974:95), however, notes that "despite Weber, there is a wide range of corporate groups which lack stable leaders, much less official heads". He instead considers group autonomy an important principle of incorporation. With respect to group autonomy , Goodell (1985) hypothesizes a causal relationship between initiative - the behavioral expression of autonomy - and corporate integrity.

The question of jural identity has also been raised. Appell (1976:70) insists that "for the purpose of ethnographic description a social grouping can only be isolated as corporate if it has the power as a social entity to enter into jural relations". Goodenough (1951:31) defined the corporation as a juristic person that possesses rights and obligations which are distinct from those of its members, while Stoljar (1973:11) argues that the notion of legal personality hinders rather than helps our understanding of corporation and corporateness.

The characteristics that Brown (1976:20) assigns to fully corporate forms are identity, presumptive perpetuity, closure, membership, exclusive common affairs, autonomy, procedures and organization. "Perpetuity" which implies that the unit is intended to persist despite loss or replacement of members has been especially difficult to reconcile for bilateral societies. Lambert (1977:2), for example, argues that "as long as inheritance is bilateral, a particular descent group seldom persists for more than two or three generations. Once this period has elapsed, more recent ancestors will be selected as the foci of new groups and group boundaries will be shifted accordingly". Appell (1976) and Lewis (in press) do not consider "perpetuity" as a necessary criterion of incorporation while Sather (1976) argues that the structural continuity in a cognatic society is maintained not by the perpetuation of individual social units but by the constant processes of group recruitment.

With respect to property relations Appell (1976:67) believes that because they involve social entities and scarce goods, they are a universal aspect of all human societies and that social structure is primarily founded on the nature of these relations. He furthermore asserts that a consideration of property relations is important for understanding changes in social structure, because

> new types of scarce goods and services are always being created, discovered, or traded into the society and this entails the problem of modifying old forms of ownership or inventing new; of allocating the new types of property to already existent social isolates or devising new ones (Appell 1976:vii).

Previous research in Latin America (Brush 1977, Gilbert 1981, Guillet 1981, Isbell 1978, Lambert 1977) has focused on descent, locality, kinship and common property interests as principles of incorporation. According to Webster (1977:29), kinship in the Andes is ambiguous, because "the kin group is intermediate between the domestic group and community and is corporate only occasionally or in certain contexts". Webster further notes that there is little ideology of descent and where ancestors are considered at all, they are viewed as a group of real or classificatory siblings from whom one's own collaterals have descended.

In accordance with certain criteria propounded by the investigators cited above - mainly Weber (1947), Radcliffe-Brown (1950), Smith (1974), and Appell (1976), this study considers collective action, representative leadership, shared ownership and autonomy as fundamental principles of

water, at the disposal of a group, is an indivisible scarce good and as such requires the collective action of its users to assure proper management. Since local associations of irrigators almost always interact in one way or another with other local or extra-local decision makers, representative leadership is also a necessary requirement. Autonomy, considered in detail below, is instrumental to the existence of any corporate irrigation group.

Although a consideration of the above stated theoretical issues and of a variety of models relating to cooperation and corporate group organization (Appell 1976, Lewis in press, Olson 1965, Weber 1947) preceded my fieldwork, the precise theoretical focus was only conceived in the field. There it became evident that corporate group autonomy was central to the organization of irrigation and, therefore, required close investigation, as discussed in the following section.

The Question of Group Autonomy

A variety of investigators have considered group autonomy an important characteristic of corporate groups (Brown 1976:20, Goodell 1985, Smith 1974:100, Tiffany 1979:72, Weber 1947:148 and others).

Smith (1974:94) argues that in order for groups to obtain full corporate status, they must in addition to other

affairs, corporations presuppose well-defined spheres and levels of autonomy, which are generally no more or less than the affairs these units require for their adequate regulation" (Smith 1974:100). Brown (1976:21) agrees with Smith in his assertion that group autonomy must not be absolute but "must be sufficient to regulate at least some affairs of the unit". Brown further argues that in order for a social unit to exercise autonomous control "organization and relatively stabilized procedures are required" (1976:21).

Goodell (1985:250) hypothesizes "a causal relationship between initiative (the behavioral expression of autonomy) and corporate integrity", a relationship which she asserts is frequently implied in anthropological research but rarely elaborated. She assigns autonomy a predominant role in maintaining group integrity.

Of all the characteristics a group exhibits, Tiffany (1979:72) considers autonomy the most important since "many social modifications are initiated with changes in this property". Weber's (1947:148) preoccupation with corporate group autonomy led to a model by which he expressed the integration of local autonomy with extra-local decision-making as will be discussed below.

The importance these investigators have assigned to the theoretical issue of autonomy was equally stressed in its practical dimension by the indigenous people in the

emphasis the water users in eight of the communities placed on the fact that their irrigation groups (comités de regantes) are autonomous was quite unexpected. "Somos autonomos" (we are autonomous) was an expression that was regularly reiterated during interviews with irrigation authorities. It was not only the frequency with which this statement was made that was striking, but also the sense of pride and self-confidence that accompanied it. Group autonomy is certainly an aspect of irrigation most important to the indigenous population.

The fact that autonomy is considered a fundamental aspect of corporate group integrity by both indigenous irrigators and theoreticians, requires a closer analysis of its expression within local groups and vis-à-vis other local and extra-local levels of decision-making. A further issue that requires clarification is the degree to which local group autonomy extends to the different aspects of irrigation management -construction, maintenance of canals, distribution of water and election strategies.

As is the case with the concept of 'corporateness', there is no consensus regarding 'autonomy', its definition, its locus or its limits. The failure to define a group's degree of autonomy, spheres of autonomy, and its ties to extra-local decision-making institutions has caused disputes among investigators. Thus, for example, Geertz and Geertz (1975:19-20) maintain that the Balinese subak (irrigation

study of the same locale argues that it is under centralized control.

The question of whether local autonomy exists in its pure form without any extra-local influence, has been raised in a variety of contexts. Leeds (1973) argues that autonomy does not express itself exclusively at the local level, since local and extra-local decision-makers enter into a variety of relations ranging from cooperative to oppositional. March (1980:3) suggests that "social groups arrange themselves roughly on a continuum marked by complete autonomy at one extreme and complete integration into a larger aggregate at the other". Whether autonomy is more strongly expressed by having total control over a few important functions or weak control over a large number of functions is an interesting point raised by Hoggart (1981: 23). In basic agreement with Clark (1974), autonomy in this study is defined as 'a group's ability to make particular kinds of decisions without the involvement of other local and extra-local institutions'.

Given the importance ascribed to autonomy at both the theoretical and practical levels of conception, this study hypothesizes that autonomy strengthens corporate group integrity which, in turn, affects successful irrigation management.

Since, as indicated earlier, total group autonomy rarely exists, a paradigm must be devised that explains the

making bodies. Kelly (1983:883) uses the concept 'articulation /autonomy' to characterize the degree to which irrigation is linked to, or independent of the state. Eva and Robert Hunt (1974:133) apply the term 'centralization' to express a local system's articulation into a hierarchy of state supported and legitimized water-control institutions; a decentralized system, on the other hand, has local autonomy.

Max Weber (1947:148) has devised a theoretical framework which distinguishes between autonomous, heteronomous, heterocephalous and autocephalous elements in group organization and extra-local relations. His key concepts have the following definitions:

AUTONOMY - the order governing the group has been established by its own members on their own authority;

HETERONOMY - the order governing the group has been imposed by an outside group;

AUTOCEPHALY - the chief and his staff act by the authority of the autonomous order of the corporate group itself;

HETEROCEPHALY - the chief and his staff are under the authority of outsiders.

Weber's model provides a good starting point for the analysis of the irrigation groups in the communities

local autonomy is affected from without. It requires refinement, however, in order to explain the complex situations in the organization of these groups, as discussed in chapter V.

General versus Idiosyncratic Trends of Irrigation

In order to be able to make more general statements about irrigation management in the regions studied, this research will compare three important issues involved in the organization of irrigation: 1. Canal maintenance (cleaning and repair), 2. the distribution of water and 3. election procedures. Canal building activities as they occurred along the Rio Tigre cannot be viewed in comparative perspective since they did not take place in the other study regions.

The comparison is expected to reveal where we are dealing with general tendencies, where idiosyncratic traits are preeminent and which are the factors underlying the respective similarities and differences.

It is hoped that this analysis will also reveal if, and to what extent, the prevailing degrees of autonomy and corporate group integrity influence ways in which irrigation is handled in the different regions or whether factors other than social-organizational ones take effect.

Formation and Persistence of Corporate Groups

The formation of corporate groups, their operation and

persistence over time are considered crucial factors to successful irrigation management. Studies focussing on the key elements underlying these group processes (Bagadion and Korten 1980, Coward 1980a, Goodell 1985, Olson 1965 and Schwartz 1978) have provided a range of different perspectives on the kind of impact social, ecological, political and economic factors have on group organization. This study considers the following criteria as major agents in stimulating or inhibiting group formation:

1. Local group autonomy versus intervention by extra-local decision makers;
2. Limiting conditions within the physical and social environment such as water scarcity and conflict among water users; and
3. Group size and the articulation of small groups into larger units.

Initiative and decision-making power, expressions of group autonomy, are widely recognized factors favoring the formation and persistence of groups. It has been shown that indigenously formed groups are more effective and appropriate than groups that are based on national bureaucratic principles (Coward 1980a, Lewis in press, Siy 1982).

The impact of national and international aid on group organization and autonomy is much disputed. Investigators have stressed the beneficial and disastrous effects of such interventions. Closely identifying aid with paternalism, Goodell (1985) believes that it has destructive effects on

group autonomy. Austin (1985:258), on the other hand, argues that "people remain in a situation of domination not through lack of initiative to form corporate groups but through lack of resources to maintain those groups as viable organizations". Coward (1980a:16) recognizes the good and bad sides of state intervention implying that some forms of bureaucratic arrangements and some bureaucratic procedures will facilitate the local mobilization whereas others will surely retard it.

A critical issue for the indigenous irrigators relates to situations where state intervention does not lead to an even distribution of benefits within or between villages subjected to the same development project. Siy (1982:154) consistently argues that proportionate distribution of costs, obligations and benefits is of prime importance to assure farmer satisfaction and group solidarity over time.

Changes as they are brought about through development efforts provide an excellent setting for the study of corporate group autonomy since, as Tiffany (1979:72) argues, many social modifications are initiated with changes in this property. Such study is expected to give insights into the shifting tendencies of corporate autonomy, indicating whether and to what degree national and international development strengthens, weakens or destroys corporate group autonomy and how important this property is to successful irrigation management and the persistence of groups over time.

Limiting conditions have also been considered instrumental in group formation as they occur within the social and physical environment in the form of competition and conflict between neighboring villages or ecological pressure on scarce resources such as land and water. These factors have been viewed as an incentive for collective action by a variety of investigators (Jackson 1981:176, Kelly 1983:884, Orlove and Custred 1980:49). Extremely difficult conditions, on the other hand, have been considered destructive to group organization (Klausner 1965).

Some investigators have ascribed the successful operation of a group over time to its size. Generally the small group has been considered more advantageous with regard to its formation and persistence (Homans 1950:56, Olson 1965:166). The inclusion of small local corporate groups within larger units has been studied by Olsen (1978:75) and found to be advantageous providing flexibility at the local level while exercising responsibility within a higher level of decison-making.

C. Methodology

The comparative method which is strongly supported by a great number of investigators (Eggan 1954, Geertz 1972, Hoggart 1981, Hunt and Hunt 1974, Sarana 1975, Smith 1974, Steward 1955 and others) is used in this research. This approach is expected to reveal a clearer

picture of both the similarities and differences in the organization of irrigation, thereby providing a more general explanation of the phenomena examined.

In accordance with Radcliffe-Brown (1952:747), this study deals with regions of "relatively homogeneous culture" and similar ecological and historical conditions. Considerable control over these variables positively influences the factors to be compared. The units of comparison relate to the structure of irrigation groups, irrigation tasks and group autonomy.

Weber's model will provide an initial paradigm for the analysis of the irrigation groups studied. Another dimension, however, will have to be added to this model in order to account for the complexity of organizational principles that prevail in the study regions.

The degree of autonomy with which specific irrigation tasks are handled will be considered in relative terms, that is, in comparative perspective between the groups under investigation. The approach of directly comparing the irrigation groups is more relevant than a comparison against any construct of an 'ideal situation', since the precise dimensions and the determinants of variation in local autonomy are not known (Hoggart 1981:32). Furthermore, although in theory decisions can be assigned degrees of importance and the frequency by which they are made can be calculated, in agreement with Hoggart (1981) this research considers the use of quantitative data inappropriate in the

analysis of autonomy because of the risk of distorting the actual situation. Problems with creating a high degree of abstraction using ideal models have also been considered by other investigators (Radcliffe-Brown 1952).

Local group autonomy will be considered vis-à-vis other irrigation groups, the community, the level of the canal system, of the district, and national levels of authority. The degree to which the irrigation groups in the three study regions operate according to principles of customary or national law will also be taken into consideration.

D. Field Techniques

Fieldwork was undertaken for a period of nine months, from August 1984 to May 1985. A survey of several communities in the Vilcanota Valley, Department of Cuzco, with and without recent development of their canal systems, was followed by the selection of the district of Cusipata in the province of Quispicanchis and the district of Urubamba in the province of the same name[1] (see maps 1, 2 and 4). Intensive field work was undertaken along the Rio Tigre canals in the district of Cusipata from September 1984 until January 1985. During this time the Rio Chicon canal system in the district of Urubamba was visited for a few days each month to observe seasonal irrigation and agricultural activities and concomitant organizational procedures. Headquarters were then moved to the district of Urubamba,

and the district of Cusipata was visited monthly for a few days to determine activities relevant to irrigation during the rainy season. Yanahuara, situated along the Rio Pucara canal system in the district of Urubamba was studied only during March and April 1985 when it became evident that the water management in this community differed greatly from that in the other two regions, shedding much additional light on organizational principles of irrigation. (For a detailed description of the study regions see chapter II).

The comparative approach taken in this study proved valuable with regard to the insights it provided into different organizational strategies in relation to a variety of social and environmental phenomena, as they occur between regions and between upstream and downstream communities. The fact, however, that the research time had to be divided between the three regions did not allow me to investigate certain other areas of interest. Thus, for example, I could not obtain quantitative data for Yanahuara. It would also have been interesting to study this community during the dry season in order to understand more clearly the critical social and economic situation with which the people have to cope due to extreme water scarcity.

The Vilcanota Valley lends itself well for a study on irrigation for several reasons. Irrigation and agriculture in this valley are ancient and widespread and have always been significant due to high population densities. The region was the center of the Inca Empire and has good

historical records reaching far back in time. The cultural-geographical distribution of plants and their use in historic and present times is well documented (Gade, 1975). Documentation on geography, geology and climate is good for some areas as are cartographic records (GTZ Nr.5/79.8). Rapid population growth in this region demands the renovation, expansion and new construction of irrigation systems, a situation that provides the elements for studies of concomitant changes in the socio-economic, cultural and religious spheres of life.

The specific reasons why the three regions were selected for a comparative study are as follows: In each region we find

a) similar geomorphological, topographical, ecological, climatic and demographic conditions.

b) Four communities or sectores (the community of Yanahuara consists of four sectores -see section on Political Organization) with a total population of between 680 and 800 families (3400 to 4000 individuals) who receive irrigation water from two principal canals of an average length of five kilometers. Neither of the regions has a reservoir.

c) A land tenure system and historical events that have affected the regions in similar ways.

d) Similar relationships regarding cooperation and competition between upper and lower communities or sectores.

The fact that important social and environmental variables are closely comparable between the three regions

allows for a more precise focus on some of the main objectives of the study, namely to detect whether, where and to what degree we find similarities and differences in the organization of irrigation between regions and the extent to which recent changes caused by development efforts in one of these areas have affected the communities.

Overview of the Study Communities

Of the four villages (679 families -see table 1 and map 5) which draw water from the Rio Tigre canal system, Cusipata and Colcca are located in the valley at an altitude of 3,314 and 3,300 meters respectively. An unpaved road connects these villages with Cuzco to the north and Sicuani to the south (see map 4). Buses pass through these villages every three to four hours in both directions. Once a day a train stops in Cusipata taking passengers in the direction of Cuzco or to Lake Titicaca via Sicuani.

Cusipata, the district capital, has a central, partially paved plaza where daily and Sunday markets as well as occasional festivities take place. The municipal building, a post office, two small restaurants, four small stores, and several two-story buildings are grouped around the plaza. Five streets without names irradiate from the center. Along these, three carpenters work part-time in their shops, four families bake bread in open wood stoves and some women prepare chicha (maize beer) for sale on the daily market in Cusipata.

equipped with the aid of international developers. There is a small chapel dedicated to Mamacha Asunta, also called Virgen de la Asunción, the patron Saint of Cusipata. A fiesta in her honor takes place on August 15. There is no resident priest in Cusipata; however, a priest living in Quiquijana, 15 kilometers to the north, occasionally visits Cusipata.

All houses are constructed of adobe with an enclosed patio and/or corral. Some are whitewashed and a few have glass windows. Most of the roofs are covered with tiles. Further from the village center the houses are smaller and the roofs are usually covered with thatch. There is no electricity in any of the four villages.

Colcca is located seven kilometers north of Cusipata. The adobe houses of this village are grouped alongside the road that passes through the middle of the village. Colcca has a school building, which is also used for meetings of the communal council, and several stores.

Tintinco and Paucarpata are located uphill from Cusipata (see map 5), at an altitude of 3,491 and 3,400 meters respectively. These villages consist of dispersed settlements. There is a school in each of the villages and a community hall in Tintinco, all of which were constructed with the aid of developers. Tintinco also has a small

Paucarpata. Most of the houses in Paucarpata and all of the houses in Tintinco, however, are one-story adobe houses with thatch roofs, without glass windows and virtually without furniture.

The political relationship between the district capital of Cusipata and the villages of Colcca, Tintinco and Paucarpata will be discussed in the section on 'Local Political Organization'.

None of the villages along the Rio Chicon canal system -Chicon (3093 m), Yanaconas (3028 m), Chichubamba (2,890 m) and Q'atan (2,870 m)- have a village center. The 693 nuclear families (see table 2 and map 6) live in one or two-story adobe houses dispersed throughout village territory. An unpaved road connects the villages with the town of Urubamba. A paved road passes through Urubamba connecting this district with Cuzco to the south and Ollantaytambo to the north. There are unscheduled bus services in both directions.

Chicon and Yanaconas have their own school houses, Chichubamba is presently constructing a three-room school. None of the villages has a community building, kindergarten or first-aid station and there is no electricity. Community meetings take place either in the school building or in the open air. There are a few small stores along this canal

post office, telegraph services, stores and small restaurants in the nearby town of Urubamba.

Yanahuara, situated along the Rio Pucara canal system between 3,000 and 3,300 meters above sea level, is divided into four sectores -Pucara, Chaquihuaycca, Rinconada and Micay (see map 7, table 3). There is no village center and the houses of the 800 families are distributed in dispersed settlements throughout village territory.

A paved road connects this village with Cuzco to the south and Ollantaytambo to the north. An unpaved road passes through the village which has a primary school, and a few small stores, but no community building, kindergarten or first-aid station. During the time of this research efforts were made through Peruvian/Finnish cooperation to install electricity in Yanahuara. Services began in 1986. The houses are constructed in the same way as along the Rio Tigre and Rio Chicon canal system. Yanahuara is an exceptionally clean and well cared for community.

Data Collection

Data collection included several methods:

1. Participant observation was concerned with all activities relating to irrigation, agriculture and marketing. Meetings of local and regional irrigation groups and of communal and

Quechua) celebrations and rituals.

2. Informants included the executive members of all Irrigators' Committees, of the Irrigators' Commission and the Irrigators' Board (see chapter IV for a discussion of irrigators' associations), directors of the Ministry of Agriculture in Cuzco, irrigation and agricultural engineers and development personnel.

Most of the members of the executive boards of the Irrigators' Committees spoke Spanish, although a few of the upstream irrigation authorities of Tintinco and Chicon only conversed in Quechua. All irrigation authorities in the villages studied were Indian peasants who, on the whole, did not own more land and/or animals than the average irrigator. As one of the peasants stated: "we elect people to the board who are like us because only they can understand our situation and therefore can represent our views".

Interviews were also held with the mayors, the community presidents, secretaries and treasurers of the districts of Cusipata and Urubamba. Village elders, market vendors and store keepers were also interviewed by the researcher herself. All these people worked and irrigated their own parcels of land. The keeper of the largest and best run store in Cusipata is an Indian from the highest community of Tintinco.

3. Ten percent of the 679 households along the Rio Tigre

questionnaire. Due to time constraints, interviews in Yanahuara were restricted to communal authorities, elders and a small number of peasant farmers. In order to obtain a representative sample of the population, different categories were established with regard to age group, marital status, educational level, production methods, land tenure, and general economic situation. Within these categories, random sampling took place. In order to get reliable information, up to ten assistants, residents of the respective villages, helped along the Rio Tigre and Rio Chicon canal systems with the questionnaires. Whenever possible, assistants interviewed relatives, friends and neighbors. Often comuneros from other villages or even from the same village are not trusted and hence information is not given or may not be true. The researcher accompanied each assistant on several interviews. Assistants, in turn, accompanied the researcher to the upstream communities acting as interpreters where peasants did not speak Spanish. Although I was able to engage in a very simple conversation in Quechua, my knowledge in this language was not good enough to carry out lengthy interviews.

The acceptance of outsiders into an Andean community has been described in the literature as rather difficult. Fortunately this was not the case during this research, although the people in the higher elevation communities were

been the presence of my children during the initial contact. Having family support raises the esteem in the eyes of the indigenous people, a fact that was also commented on by Isbell (1978). Furthermore, the mayors and community presidents of all three regions were strong leaders, very sympathetic to the situation of the peasants and in favor of this study.

Interviews with peasant farmers had to be scheduled for the early morning hours before they left for their fields. This meant a one to two hour climb in the dark to the upstream communities which had to be reached before sunrise. Interviews after work were not always successful because people were tired or have had too much chicha (maize beer). It was surprising how much concentration the villagers demonstrated during interviews which often lasted for several hours. Although, I am sure, my questions were not always formulated in accordance with the peasant farmer's way of thinking, their answers were generally right to the point.

I soon found out that a humorous comment was the best way to get a conversation started. My Quechua, which is far from perfect, was reason enough to introduce a humorous element. Furthermore, instead of one-way questioning, an exchange of information and opinions about our mutual ways of life was a good way to obtain the trust of the people.

her exposure to outsiders, different ways of interviewing were applied. My methodology, however, was not without fault, especially at the beginning when I used the much advertised strategy of starting a conversation with questions that do not directly pertain to the research topic. Following this strategy, my first informant politely suggested that I use a questionnaire in order to save time, to come to the point, and to get things down in writing. I was happy about his suggestion, especially since I had already prepared a questionnaire. Nevertheless, I could not keep from feeling like a very unorganized foreigner. There were, of course, other villagers who preferred casual conversations and who became somewhat nervous when they saw that their statements were put into writing.

The Andean people do not have the best reputation when it comes to punctuality and, indeed, there were times when my patience was tested. Nevertheless, the villagers were on the average very reliable. Yanahuara was outstanding with regard to the care these people took in keeping up with the busy schedule we set ourselves for interviews, meetings and visiting sites. I was able to undertake a comparative study of this extent only because of the excellent cooperation of the villagers in the study regions.

A. Geographic Setting

The Vilcanota Valley - its natural Setting, Geomorphology and Hydrology.

The Vilcanota Valley is situated within the department of Cuzco in southern Peru (see maps 1 and 4).

The mountain ranges of the Vilcanota Valley are aligned in a northwesterly-southeasterly direction. Along the eastern side of the valley the Vilcanota Range extends northwards from the Vilcanota Knot, between the rivers Apurimac and Vilcanota (Instituto Nacional de Estadística, 1981:IX). The highest snow-capped peaks of this range are Ausangate (6,384 m), Veronica (5,800 m) near Ollantaytambo, Grau (5,700 m) and Chicon (5,200 m) both near Urubamba. A lower mountain range with only few peaks above 4000 meters extends northwards from the Vilcanota Knot, merging with the Vilcabamba Range where the highest peak is Salcantay (6,271 m) (see map 3).

The geomorphology of the Vilcanota Valley is very complex. A great variety of different types of rocks come into contact along the valley and many agents of erosion have been at work forming its mostly U-shaped valley which has an average width of three kilometers. Contact between rocks of different lithical composition are found in both study areas - Cusipata and Urubamba. In both regions we are dealing with glacial, fluvial and pluvial erosion and

soils derived either from sedimentary, igneous or metamorphic rocks (Gade 1975:9). Above 2,600 meters sandstone is common. While residual soils are generally thin because of constant erosion, the soil in the valley floor which is heavier in texture and has a higher calcium content is still highly productive after centuries of cultivation. The prevailing geomorphological conditions in connection with climatic factors - especially heavy rains - make both areas of investigation prone to landslides (Kalofatovich 1977). For a more thorough description of the above features, see Kalofatovich (1977) for the district of Urubamba and Ministerio de Agricultura (1980) for the district of Cusipata.

The hydrology of the Vilcanota Valley is dominated by the Vilcanota River which is the predominant agent in shaping the valley (see map 4). This river takes its source in the Vilcanota Knot in the altiplano between Peru and Bolivia at an altitude of 5,362 meters (see map 3). Fed by glacial meltwaters and lakes, the Vilcanota flows in a southeast to northwest direction (Gade 1975:6). Also known by the name of Wilkamayo or Sacred River of the Incas, the Vilcanota is called Urubamba River downstream from Yucay. On its way to the Atlantic Ocean it is joined by many affluents before it merges with the Ucayali and Amazon Rivers. Among its tributaries, the Salcca River is one of the most important, because it deepens the Vilcanota River

[illegible] causing little change in its width (Gade 1975:6). During the peak of the dry season, from June to September, the Vilcanota River carries much less water than during the rainy season, at the height of which its waters are brown and murky from the sediment it carries on its turbulent course. Very little of the water from the Vilcanota River is used for irrigation purposes due to the low altitude of its course in relation to the agricultural land. Recently, however, irrigation projects using its waters have been initiated in Calca and Yucay in the Sacred Valley of the Incas.

Hydrology and Climate of the Three Study Regions

Three canal systems, located along the Vilcanota Valley in the provinces of Quispicanchis and Urubamba, were selected for the comparative study (see maps 2 and 4).

1. The Rio Tigre canal system is located ninety kilometers south of the city of Cuzco in the district of Cusipata, province of Quispicanchis, department of Cuzco (13° 51′ to 13° 52′30" south latitude, 71° 27′30" to 71° 32′30" west longitude - see map 5). Although there are several permanent and temporary springs in the district of Cusipata, the Rio Tigre, also called Rio Tintinco or Mayu Uno, which takes its source in the glacier of Chilec at an altitude of 5000 meters, provides most of the irrigation water for the four communities Cusipata, Paucarpata, Tintinco and Colcca.

spring water irrigates 32 hectares of land, the Rio Tigre irrigates 444 hectares (Ministerio de Agricultura, 1980). The narrow upper valley of the Rio Tigre widens considerably toward its bottom.

At an altitude of 3,491.6 meters above sea level, an intake (bocatoma) channels water from the Rio Tigre into two principal canals, some parts of which have been reconstructed others are newly built. The 4.6 kilometers long canal to the right of the river has a capacity of 200 litres/second and irrigates 153 hectares of land. The 5.4 kilometers long canal constructed on the left shore has a capacity of 350 litres/second, irrigating 324 hectares of land (Ministerio de Agricultura, 1980). Lateral and sub-lateral canals further divide the water throughout the region. A 5.7 kilometers long secondary canal brings water to the village of Colcca.

The principal canals are built of concrete. Concrete is also used for lateral canals where prevailing soil conditions cause seepage. The principal canals are on the average one meter wide. They are located 0.20 meters above the river in order to avoid detritus. Flood gates for the regulation of water flow are placed in naturally elevated terrain, where they cannot be inundated during high water.

Since the upper part of the Rio Tigre valley is rather narrow (see map 5), units of land to a maximum of 35 hectares are irrigated directly by sublateral canals. In the lower, wider part of the valley lateral canals irrigate

land units of up to 90 hectares (Ministerio de Agricultura 1980:54). Sublateral canals are constructed of materials from the environment -mainly stone and earth. Water flow into the fields is normally regulated by means of strategically placed stones. See table 1 for the maximum capacity of the canals, the number of water users per village and the area irrigated.

2. The Rio Chicon canal system, district of Urubamba, province of Urubamba, department of Cuzco (13° 18´36" south latitude, 72°07´03" west longitude) is located 70 kilometers north of the city of Cuzco (see maps 4 and 6). The four villages Chicon, Yanaconas, Chichubamba and Q´atan receive water from the Rio Chicon which takes its source in the glaciers of mount Chicon at an altitude of 5,200 meters. Above the village of Chicon the river water is captured in an Inca canal system (see Farrington 1983, 1984) consisting of two principal canals from which lateral and sub-lateral canals are diverted. The lower villages of Chichubamba and Q´atan receive irrigation water from five major canals - Tullumayo, Jatun Yarka, Chanchillay, Ccantuyoc and Q´atan. The upper villages Chicon and Yanaconas receive water from the canals San Isidro Chicon and Yanaconas Chicon respectively. (See table 2 for statistics).

The Inca canals of this irrigation system are built of stone, clay and sand. Strategic placing of stones throughout the bed of the canal adjust the flow. Stones and earth are

moved to allow water to pass into lateral and sublateral canals.

The ravine that brings the water from Chicon to the valley is prone to landslides which occur almost annually between August and October from Mount Yahuarmaqui. The most devastating landslide was recorded in 1678 when the debris blocked up the Vilcanota River diverting its course thereby inundating the villages of Urubamba and Yucay (Kalofatovich 1977:20). Another major landslide occurred on January 28, 1942 which blocked up the main street (calle Tullumayo) in Urubamba causing material damage to the town and destroying part of the irrigation system. (For a precise description of the geology of this region, see Kalofatovich 1977).

3. The Rio Puçara canal system, district of Urubamba, province of Urubamba, department of Cuzco (13° 15´30" south latitude, 72°10´15" west longitude) is located 80 kilometers north of the city of Cuzco (see maps 4 and 7). The lagoon Yurajcocha, twelve kilometers above Yanahuara, collects water from the high lagoons Ouroray and Champacocha and from the snow fields of the surrounding mountains. The water from Yurajcocha drains into the ravine Pucara. Above the village of Yanahuara it is diverted into the Inca canals Colca, Uman Churco, Manzanayoc and Chanchiyoc. The canals are built as described for the Rio Chicon canal system. A network of lateral and sublateral canals brings the water to three sectores of Yanahuara -Pucara, Rinconada and Mikay.

The fourth sector Chaquihuaico receives water from a small mountain stream by the same name. The 800 families of Yanahuara irrigate 1000 hectares of land (see map 7 and table 3).

The climate is similar in the districts Cusipata and Urubamba, though temperatures in Urubamba are generally slightly higher. There are two pronounced seasons in the Vilcanota Valley. The rainy season lasts from October to April, the dry season lasts from May to October. The mean annual temperature in the district of Cusipata is 11.8°C (Estación Meteorológica de Combapata del Servicio Nacional de Meteorología e Hidrología). In the district of Urubamba annual temperatures average 14°C (Servicio Nacional de Metereología e Hidrología, Estación no. 609, Urubamba). The dry and rainy seasons are determined more by rainfall than by temperature.

In Cusipata the mean annual temperature of 11.8°C varies from 9.9°C in July to 13.2°C in October and November. An average year has 55 days of frost which normally occurs at night during the dry season between April and September. The coldest month is July when temperatures are below zero for twenty days on the average. Statistics on day-night temperatures could not be obtained. Here, as in many other parts of the Andes, the difference between day and night temperature is greater than the seasonal variation in temperature (see Mitchell 1980:8, Troll 1968). The relative

(256 hours) and February (128 hours). Evapotranspiration, consists of the total water loss from the soil, including direct evaporation and transpiration from the surface of plants. It varies between 95 millimeters in June to 132 millimeters in October (statistics -scientific station Kayra in Cuzco).

Along the Rio Tigre, the annual precipitation has been on the average 688 millimeters, 90 percent of which occurs during the rainy season between September and April (Ministerio de Agriculture, Cusipata, 1980). For monthly statistics on Cusipata, see table 4.

In the district of Urubamba the average amount of rainfall amounts to between 600 and 900 millimeters (Servicio Nacional de Meteorologia e Hidrologia, Estacion no.603, Urubamba). Precise statistics which are available for the district of Cusipata could not be obtained for Urubamba.

B. Historic Setting

In order to better understand contemporary Andean organizational principles as they relate to irrigation, the most relevant features of the relationship between land and water and the people who manage these resources is presented in historical perspective.

Archaeological remains of masterfully designed irrigation systems, sacred sites (huacas) related to water, myths and legends about deities of water and earth and their prominent role in the creation of man and the origin of the Inca Empire, testify to the ultimate significance attributed to water and earth in Andean cultures.

Research on irrigation has mainly been undertaken on the Peruvian coast where pre-Inca civilizations such as the Nazca (100 B.C. to 700 A.D.), Mochica (300 B.C. to 750 A.D.) and Chimu (1100 A.D. to 1460 A.D.) left remains of superb irrigation technology. The 70 kilometers long La Cumbre canal, for example, situated near Chanchan on the north coast of Peru close to modern Trujillo "ranks as one of the most prodigious engineering feats of the Precolumbian world" (Moseley 1977:14). The intricate irrigation systems of Nazca reflect the ingenuity of the southern coastal people and their immense preoccupation with irrigation water, the life-blood of a rainless desert.

Highland irrigation systems, although less studied, are equally sophisticated in construction and design. The Cumbemayo canal in the highlands of Cajamarca was built by the Incas in parts of solid carved rock. To regulate the flow of the water, the builders constructed the canal in zigzag form at various points of its course (Regal 1970:

where two different waterways meet or part.

The most complex irrigation and water-control system was built in and around the Inca capital of Cuzco. The Incas used the two rivers Huatanay and Tullumayo which delimit Sacsahuaman above Cuzco, and several springs surfacing on this site, to build an elaborate covered underground water system which provided Sacsahuaman and Cuzco with water (Rowe 1963:233). The round foundations of the former tower Muyu Marca, composed of eight radial sectors with narrow channels, helped to provide the city below with "much good water" (Garcilaso de la Vega 1966).

The importance of Sacsahuaman in providing Cuzco with a plentiful supply of water is also stressed by the presence of sacred sites throughout the region, many of which are related to water. The ruins of Tambo-Machay, seven kilometers from Cuzco, are known as the "Bath of the Inca". This site with its two springs was a religious shrine and sacrifices were made there (Cobo, 1653:175). The carved rock outcrop of Kenko (or Pantallacta), situated close to Sacsahuaman was connected by a major canal to the Temple of Illapa, the God of Thunder, in Cuzco.

The elaborate canal system built throughout Sacsahuaman and Cuzco was of great political, economic and religious significance during Inca times and is still important today

Throughout wide areas of the Andean highlands the canal systems were much more extensive during Inca times than they are today. In the Vilcanota Valley we find a vast array of Inca canals in all states of preservation; some have almost totally disintegrated, others are unchanged after four and a half centuries and still in use. Some canals are open, others are covered with stone, running underground for long distances. In conjunction with some of the canals in the Vilcanota Valley there are perfectly built terraces in Pisac, Yucay, Urubamba, Ollantaytambo, Moray, Machu Picchu and other places which reflect the great concern of their builders with food production. In order to avoid the erosion of valuable land, the Incas also straightened the courses of rivers (Rowe 1963:233). Clear evidence for this has been found near Pisac where the Vilcanota River was straightened "reclaiming relatively large fields and protecting them from further erosion" (Farrington 1983:229).

Canals were used both for irrigation and for drainage. The building materials were selected from the environment and consisted of stone, clay and sand. These materials were assembled in such a way as to assure longterm usage of the canal system (Jacinto Huaman, pers.comm.). According to archaeologist Zapata, strategic placing of stones throughout the bed of the canals precisely adjusted the water flow.

irrigate pastures and thus to maintain large llama herds for transport and sacrifices and to obtain wool for the manufacture of precious textiles, an important asset of the Inca economy (Murra 1962). Below the elevation of the pastures, the canals watered Inca agricultural crops among which maize, the state crop, was most important. The variety of traditional crops grown during Inca times was considerably greater than it is now.

Irrigation combined both the religious ideology and the practical world view of pre-Columbian Peru. The great importance given to irrigation is thus reflected not only in the carefully constructed irrigation and drainage systems but also through Inca mythology, religion, rituals and irrigation festivals. Land and water were worshiped and personified as propagators and sustainers of life, as the source of all existence. The Incas considered bodies of water such as lakes, rivers and springs as huacas (sacred sites), where human life originated and to where the souls of the dead return. This belief is still alive today in some regions of the Andes (Bastien 1978). One third of all the huacas in the ceque system[2] of Cuzco were in some way related to water (Villaneuva y Sherbondy 1979:xv).

Apart from the life-giving properties of water and its symbolic association with the origin and propagation of life, it was also closely affiliated with the origin and

socio-political division of the Inca capital was determined by the river system of the Huatanay and its tributaries. In other words, hydrological and socio-political boundaries coincided. Water and earth played a decisive role in the mythological foundation of the Inca Empire. The first Inca, Manco Capac, and his sister-wife Mama Huaco chose Cuzco as the center of their realm because of the good quality of its soil and water. Mama Huaco was credited with the usurption of the precious water from the population residing there and its delivery to her own people (Sherbondy 1982b:17). Important hydraulic works such as the draining of the marshy valley bottom upon which Cuzco was built and the construction of waterways into Cuzco were ascribed to Sinchi Roca, the second Inca (Cieza de Leon 1943). Mama Micay, the queen of Inca Roca was greatly honored for her role in providing Cuzco with irrigation water. Under the powerful Incas Pachacuti and Tupac Yupanqui, major irrigation works were built which required considerable knowledge about hydraulic engineering (Sherbondy 1982b:17). Famous canal builders and irrigation deities were worshiped in the form of stone idols. Sacred to everyone was the irrigation goddess Choquesusu in Huarochirí (Avila 1598:51,165).

The coordination of agricultural and irrigation activities and related rites and rituals was done by means of the ritual/agricultural calendar of the Incas which was based on

The rituals to be celebrated throughout the empire related to significant agricultural events such as sowing, hoeing, harvesting, the beginning and end of irrigation cycles, praying for the rains to start and to stop and offerings to those deities which were believed responsible for a good harvest.

Irrigation, in both its sacred and profane expressions, was not only associated with the achievements and activities of the Inca nobility, but penetrated every aspect of peasant life as well. Although the official Inca calendar was observed for the celebration of major festivals, each region and even each village or settlement had its own local calendar adapted to its specific microenvironment, according to which it regulated its agricultural and irrigation activities (Sherbondy 1982a).

Unfortunately little is known about the way in which the people who labored with skill in building these irrigation systems, organized their irrigation activities. A few interesting documents about the organization of irrigation exist from the region of Huarochirí in the highlands of the Department of Lima (Avila 1598, Espinoza Soriano 1971), from north coast Chimu/Inca societies (Netherly 1984) and the highland Incas (Sherbondy 1982a, 1982b, Villaneuva and Sherbondy 1979). Although concerned with different time periods and geographical regions, these documents center on

ship between rights to land and water and a corporate group holding those rights is central to this study its view in historical perspective aids the understanding of contemporary irrigation practices.

In her study of the socio-political organization of the Late prehispanic Chimu and Chimu-Inca polities of the Peruvian north coast, Netherly (1984) found that irrigation activities were organized in a decentralized way. "Particular human groups - parcialidades - were associated with a given canal and the lands watered by it" (Netherly 1984: 239). Netherly further noted that these parcialidades were corporate groups which were integrated into higher levels of ranked moieties headed by personages of increasingly higher rank. The responsibility for cleaning a specific irrigation canal and its maintenance was vested at the level of the group which used water from this particular canal.

The distribution of water occurred in three different ways in accordance with the available water supply:

> During the months of abundant water, irrigators were free to use as much water as they needed without restriction other than that imposed by the size of the canal itself. As the water level in the rivers -and consequently the canals- diminished, a system of proportional distribution seems to have come into use ... apparently by controlling the size of the canals in cross-section rather than by a fixed sluice aperture as was Iberian practice (Glick 1970)...
>
> Extreme scarcity of water prompted the imposition of turns by which irrigators would receive water in succession (Netherly 1984:245).

during Chimu-Inca times. Its resolution normally occurred at the next higher level authority (Netherly 1985:244): Group autonomy at the level of the secondary and tertiary canals provided great flexibility to the overall water management.

During Inca times the relationship between land, water and an official or a group administering rights to these resources seemed to have been carefully regulated. Garcilaso de la Vega (1966) and virtually every text on the subject of land administration state that the Incas created a tripartite division of land. Of the three parts one was for the Inca (the government), one for the Sun (the national religion), and one for the ayllus[3]. But in reality the division of land was more complex as discussed in detail by Moore (1973:17-42), Rowe (1963:265-266) and Wachtel (1977:65-70). Thus, for example, some lands were held privately by curacas (local caciques or chiefs) who governed over ayllus.

After the conquest of each province, the Inca emperor proclaimed his sovereignty over the whole region (Cobo 1956:120). A community could, therefore, only enjoy use rights to territory which was, however, the property of the Inca emperor. In exchange for this favor, the members of the ayllus owed him tribute (Wachtel 1977:66) which was done in collective form working and irrigating the land of the Inca Emperor and the Sun.

use made of the proceeds derived from the lands of the Inca and the Sun. Moore (1973:133) suggests that Inca lands were set aside to support the government. Part of the produce derived from the lands of the Sun went to Cuzco to provide for the "House of the Chosen Women"[4] (Cobo 1956), for sacrifices in honor of national and local deities, and to support the poor (Moore 1973:252 and Valera 1945).

Sherbondy's (1982a) research in the Cuzco region, on which the following discussion is based, also revealed as a most interesting factor of Andean irrigation organization "the close relationship between land rights, the distribution of irrigation water, and the ayllu" (Sherbondy 1982a: vi). Sherbondy further states that

> "On all levels of political organization, from the smallest village to the capital city, the ayllu functioned as the basic unit of irrigation ownership and adminstration. The use, maintenance, and worship of a common canal bound the ayllu together and that cooperation in turn legally reaffirmed the ayllu's and the individual's rights to the canal system. The irrigation schedule for each canal was also a local matter. Ayllu management of irrigation resulted in a flexible economic and political system that survived the rise and fall of various state governments" (1982a:vi).

Although the irrigated land was controlled by the ayllu, it was worked privately by individual families. Canal water and the land it irrigated was to be used only by the members of the ayllu that had control over that particular area of land. Where a canal system was shared by several ayllus, the lower status ayllu was assigned the upper part of the canal

to the descendants of ayllu members. Each ayllu member had the duty to participate in the cleaning and repair tasks which were accompanied by ritual offerings made by priests.

The strong emphasis placed on cooperation and corporate group organization relative to irrigation among the Late Chimu and Inca is also evident in the documents from Huarochirí. These are based on Quechua narratives collected by a priest, Francisco de Avila during the Colonial Period around 1598 in the highlands of the department of Lima (Espinoza Soriano 1971). Avila remarks that the ancient water works of Huarochirí were constructed with the help of the entire population - men, women, old people and children - because only cooperative work made it possible to realize works of such magnitude.

Certain trends in irrigation, such as cooperative work and conflict regulation at the next higher level of authority have either survived to the present time or have been reinstated. Especially the complex task of water distribution, as discussed above, occurs in a similar way in much of the highlands today. This relates to the free distribution of water during the rainy season, to proportional water distribution, or distribution by turns during the dry season and to problems between communities situated at higher and lower levels of the same canal system with regard to the distribution of water.

Following the Spanish conquest of 1532 A.D., the intimate relationship between rights to land and water and an ayllu was disrupted in much of the Peruvian highlands except for some very remote regions. The Spanish conquest brought drastic changes to all spheres of Andean life. The power of the Inca elite was greatly reduced and all public activities relative to religion and ritual were obliterated. Irrigation rituals only continued to be held in secrecy at the level of the ayllus. Changes in the social life of the Indians also severely affected the physical environment. Beginning in 1570, the Indian population was relocated in reducciones, newly created villages where the indigenous people were moved by force from their dispersed and semi-dispersed settlements. These massive resettlement projects allowed the Spanish to exercise closer control of the rural population. Lands formerly owned by the Inca and dedicated to the Sun became property of the Spanish Crown and were allotted to deserving Spanish officials (Ritter 1966:8) and to the church. Land distribution was accompanied by the granting of encomiendas, a system of Spanish administration where Indians of one or several towns had to pay tribute and initially also labor to the conquerors in return for military and religious services (Gibson 1966: 49).

Repartimiento which literally means distribution, partition or allotment, was another Spanish institution, the

essential principle of which was the exploitation of the native capacity to work by the Spanish conquerors. It is sometimes used interchangeably with encomienda and occurs also under the name mita (Gibson 1966:143). Gibson states that after 1550 repartimiento was the main institution for the recruitment of Indian labor.

In an attempt to curb the exploitation of Indian labor after the mid-sixteenth century, properties owned by the King of Spain, called corregimientos, were designed to protect the rights of the Indians by assuring them the use of this land, although they no longer owned it (Gade 1975:24-25). Nevertheless, much of the land in the Cuzco region which belonged to the Indians in 1659 was no longer in Indian hands by 1842 (Sherbondy 1982a). Indians were allotted the poorest agricultural lands. Other factors such as forced labor in mines and mainly disease (plague, smallpox, influenza etc.) reduced the indigenous population from an estimated three million before the conquest to 600,000 by 1630 (Cook 1973).

Large parts of the Andean environment deteriorated following Spanish intervention due to factors such as the forced abandonment of mainly high-altitude settlements, the reduction of the indigenous population through disease, deforestation, and the extension of lucerne fields to feed the growing number of grazing animals, thereby reducing the land for the cultivation of maize (Trelles 1980:179). Abandoned irrigation systems started to dry out and disintegrate

making it more difficult to use the remaining parts. Water shortages were always felt most severely by the Indian population. Often the peasants could not water their fields until after the prime time for irrigation had passed (Villaneuva and Sherbondy, 1979). Water was sold in great quantities to large landholders and factory owners and for the operation of mills. The ties between rights to land and water and a corporate group were broken in many regions and the consequences of this were severe for the indigenous population, for the environment and much of the physical irrigation network.

The distribution of water between indigenous villages which depended on the same canal system was prone to conflict as well. Espinoza Soriano (1971) discusses the problems associated with the distribution of water in three ayllus in Huarochirí at the end of the 16th century. Disputes over the ownership of certain sections of the canal system and over the rights to irrigate during daytime hours were finally settled at the High Court (Real Audiencia) of Lima.

Problems regarding the distribution of water have continued throughout colonial and post-colonial times. Prior to the Agrarian Reform hacienda owners, the clergy and influential people had first right to water without having to participate in cleaning and maintenance activities. Disputes between upstream and downstream communities occurred frequently. The handling of irrigation activities

authorities of a water judge had varying success. In the districts of Cusipata and Urubamba where this study took place, water distribution methods used by the municipal councils were not considered satisfactory by the indigenous population. Water distribution through the varayoc[5] system -an indigenous hierarchical system with an Indian mayor at the top- seemed to have functioned better in Quinua/Department of Ayacucho (see Mitchell 1972).

In the early 1970's following the Agrarian Reform, efforts were made by the Ministry of Agriculture in Peru to reorganize water users into corporate groups called Irrigators' Committee (comité de regantes) at the village level, Irrigators' Commission (comisión de regantes) at the level of the canal system and Irrigators' Board (junta de regantes) at the level of the district or valley. The functions of these groups and their impact on irrigation organization will be discussed in chapter IV.

In its focus on the social, political, economic, and religious organization of peasant life in the Vilcanota Valley generally and the study communities in particular, this chapter is intended to provide the information necessary to understand the matrix within which the organization of irrigation is embedded. The discussion of the particular topics leans toward those aspects of Andean life which affect irrigation most pertinently in a direct or indirect way.

A. Social Organization

The Household

Throughout the Andes, the household is the basic social and economic unit, the smallest corporate group. It consists most frequently of a nuclear family - husband, wife and offspring- but may also contain unmarried siblings or an aged parent. The household has autonomy with regard to production, exchange and consumption (Orlove and Custred 1980:33). Within a household each family member contributes labor in the form of ayuda (Spanish for help) which does not require any specific return. The autonomy of the household is also recognized in ritual context (Isbell 1977, Mayer 1977) and through inheritance patterns (Lambert 1977:12-15).

In the Andes, as elsewhere, it has been noted that as a corporate, property holding unit, the conjugal family relates to other families as a recognized social entity

interrelations between such units with respect to property that provides much of the structure of such societies" (Appell 1976:7).

In the study regions, corporate families constitute the minimal units of villages and irrigation groups, although political, economic, social and religious ties between families may cross village boundaries.

The social and economic activities of the family are rooted in the predominant bilateral kinship system which links every person to a wide network of kinsmen through both parents (see also Lambert 1977:1-27). In the absence of lineages, marriage binds the bride and groom to three families -the newly founded family, the consanguinal and the affinal family of each spouse- involving a set of rights and obligations. Marriage not only involves the formation of a new family in the social sense, but also implies "the formation of a new capital-holding partnership for its support" (Custred 1977:127). In the districts of Cusipata and Urubamba; the property that each spouse contributes normally consists of land, animals, tools and/or a house - items which are kept individually by each partner. The goods which are accumulated during marriage are common property.

It is still common in the Andes for marriage to be preceded by sirvinakuy (Quechua for trial marriage) which may last from several months to many years. Trial marriage

Hispanic authorities (Maclean and Estenos 1952) has not lost its appeal (see also Carter 1977). Although the social functions ascribed to this custom rest on the belief that marriage is more successful when both partners had a chance to know one another well before taking legal steps, the postponing of the actual marriage ceremonies is also due to other factors such as lack of financial means. Precise statistical data are not available on the frequency of trial marriages in the communities under study, but sirvinakuy is still very common and official marriage vows are in many cases never taken.

During trial marriage or following legal marriage, the young couple takes up neolocal, virilocal or uxorilocal residence depending on personal preference, the need to assist a particular set of parents with agricultural activities and the financial situation of the respective family. The parents' economic situation, -mainly the amount of land and animals they own- also determines whether the young couple receives its share of the inheritance at the time of marriage and/or the formation of a new household or at the parents' death. Ideally, inheritance in the communities studied and the Andean region in general, is equally divided among the offspring. The bride and groom receive their share at marriage or with the establishment of a new household from both sets of parents who also retain part of the property for their own use until death. Thus, as the

offspring form their own autonomous households, the household of the parents loses important assets in the form of land and animals as well as labor. It is usually the youngest child -with or without his/her nuclear family- who resides permanently with the parents. This youngest son or daughter will eventually inherit the house and remaining property in return for the help and care given the parents in their old age. Older sons and daughters may help to provide labor for maintaining the parental property. A very old or widowed parent may move into the household of one of their children, thereby liquidating his/her autonomous household.

Inheritance must take different forms where small parcels of land do not allow further partitioning but will be handed down to only one offspring, while the others may receive assets such as animals, an education or money to start a small business. Where land is scarce and financial assets do not exist as is the case among many families in the study communities, traditional inheritance patterns as well as the parents' old age security are in jeopardy. The inability to eke out a living on a small parcel of land has forced young people to move to the cities leaving the parents alone and without help. The present high rate of unemployment in the cities is not conducive to out-migration, however, and many young people are now forced to remain on the small parental property or to return to it from the cities. It is not rare that a family with up to

nine children must subsist on two topos[6] (2/3 hectare) of land or less. This situation is serious and in many instances the survival of a family depends on the efficiency of the network of kin, especially compadres (as defined below), neighbors, and friends which it has been able to establish.

Ritual Coparenthood (Compadrazgo)[7]

A discussion of alliances between households through ties of compadrazgo requires a short introduction to certain socio-cultural aspects of community organization within which the household is a basic and essential unit. Community involvement in the political, economic and religious organization will be discussed later in the sections which relate to these topics.

Indigenous Andean communities have received much attention throughout the literature. Webster (1977) noted that Indian communities can be marked by both dissimilarity and inequality, features which can be readily perceived in the communities studied (see section on Political Organization). Despite a variety of dissimilar traits, however, indigenous communities can be defined "in terms of a bounded territory and a recognized set of households which have rights to that territory" (Orlove and Custred 1980:45).

In order to convey a better understanding of the networks of compadrazgo, which exist among Indians as well as between Indians and Mestizos[8], aspects of ethnicity

within communities must be considered. Yambert (1980:55) suggests that Indian ethnicity is a socio-cultural feature of a community while Primov (1980:153) asserts that "the political boundaries of the Indian community have never coincided with ethnic boundaries". Primov further maintains that due to inter-ethnic ties of compadrazgo, Mestizo interests have penetrated the community. In the regions studied it became evident that although Indian and Mestizo ethnic traits were present in all communities, the Indian element predominated in higher lying communities while lower communities were influenced to a greater degree by Mestizo cultural traits.

Ties between households are strongest among consanguinal and affinal kin. Strategies to further widen the network of reciprocal aid occur mainly through ritual coparenthood (compadrazgo) which establishes symmetrical (horizontal) and asymmetrical (vertical) relationships between partners. Symmetrical compadrazgo creates ties between people of the same social stratum, while asymmetrical compadrazgo forms ritual relationships between members of different social strata. (See also Foster 1961, 1963, Lewis 1971, Malengreau 1974, Mayer 1977, Wolf and Mintz 1967). The godparents (compadres) (madrina - godmother, and padrino - godfather), are ideally selected from outside the exogamous group, a rule which, however, is not always followed. Baptism, first haircut (cortapelo) and wedding (for a close description of these rites of passage in Cusipata see Malengreau 1980:506-

508) are the three major rituals which establish a spiritual relationship between a newly wed couple or between the parents of a child and a godfather and godmother. Thus, any relationship between a godparent (padrino) and a godchild (ahijado) "implies a compadre relationship between the godparents and the natural parents of the godchild" (Lambert 1977:22). This type of relationship can take different degrees of symmetry and asymmetry and depends largely on the difference in respectability and wealth between the godparents and the natural parents of the godchild. Coparenthood structures social and affective security around a child or young adult outside his/her family (Malengreau 1980:505). Apart from gift giving, godparents may help their godchild in times of need, providing food, clothes, and sometimes higher education. A godparent, on the other hand, has the right to demand services such as help in the house or fields from his or her godchild. The type of help and the frequency by which it is solicited depends on the degree of asymmetry that exists within a respective compadrazgo relationship. Thus, for example, in Cusipata a family owning several herds of sheep sponsored a godchild from the high herding community of Chillihuani, granting her shelter, food and education in exchange for her services as shepherdess. Indian godchildren are, however, not always given fair treatment by their godparents.

This type of vertical compadrazgo (godparenthood) is complemented by a horizontal system, mainly expressed in

ayni[9], where compadres help one another in the fields, in house construction, the borrowing of utensils or the sponsoring of a fiesta (see section on Andean Religious Belief Systems). In a horizontal compadrazgo relationship the people who lend help expect to receive the same type of help at a different occasion. (For a more detailed description of ayni see below and section on Work Relationships).

In the district of Cusipata and Urubamba, compadrazgo ties exist not only within or between neighboring communities but extend as far as Cuzco, Lima or other coastal cities and the eastern jungle region. Thus, for example, a comunero (villager) of Cusipata has established a network of trade relationships through compadres in the high community of Chillihuani where he buys sheep and llamas, and the eastern jungle town of Quincemil where he sells these animals to and through trade partners who are also his compadres.

Apart from relatives outside the nuclear family and compadres, neighbors and friends are also engaged in reciprocal work relationships, primarily ayni. Ayni is used extensively in all three study regions. It involves both the exchange of goods and services. Thus a person can, for example, borrow tools in ayni or exchange labour in ayni during sowing or harvest time. Ayni does not necessarily take place between equals (see Orlove and Custred 1980:36). It has been suggested that ayni mainly takes place between males, rarely between females (Malengreau 1980:510). Seaso-

nal migration of the male population, however, which affects 20 percent of the population in Urubamba and 43 percent in Cusipata (statistics obtained by means of interviews), now leaves much of the arranging for ayni to women. In fact during the time when the men migrate to find work elsewhere in order to supplement the meager income of the peasant families, the women must organize all social and economic activities. Migration has affected the corporate household in a drastic way, upsetting the traditional pattern of sexual division of labor. Since male migration mainly takes place during the rainy season after the crops have been planted, women can usually manage on their own. Where, however, the husband is absent at prime agricultural times, as during planting and harvesting, and where the wife must care for young children and/or has problems in the soliciting of male help in ayni, agricultural and irrigation activities have been affected in a negative way. Under these circumstances fewer crops can be planted and/or receive less care. The most detrimental effect of male migration, as stated by the villagers in the study regions is illness contracted in jungle regions of the province of La Convención and the department of Madre de Dios (see map 2). Illness leading to death is assigned to difficulties in obtaining medical help which is beyond the financial means of most peasant farmers.

In order to understand the female role in Quechua society and women's new role as sole decision-makers during

the seasonal absences of men, the following section will provide information on male/female division of labor and power of decision-making in the Andean region with primary focus on the districts of Cusipata and Urubamba.

Male and Female Roles in the Socio-political Life and the Productive Economy

As was mentioned earlier, the Quechua family is the fundamental unit of production, distribution and consumption. Male and female roles are strictly separated with regard to some activities, while in others they are interchangeable. Male activities center on heavier agricultural work, irrigation and large-scale market activities. Female tasks are related to housework, the raising of children, to agricultural activities such as sowing, weeding and hoeing, the pasturing of animals and the local market. The separation of male and female roles creates a strong interdependence between husband and wife providing for a solid and long-lasting relationship (see also Nuñez del Prado Bejar 1975:623).

At first glance an outsider may get the impression that the man dominates in Quechua society. It is the man who speaks up in public most frequently and almost all political positions are taken by men. Inside the house women often sit on the dirt floor beside the hearth cooking and tending their children. Observations of this type have led investigators to ascribe a secondary and even submissive role to

women (Bourque and Warren 1981, Llanque Chana 1972:101).

A closer look into the lives of Quechua families, however, shows that women have considerable power of decision-making, and strongly influence their husband's decisions to the point where he may change his own opinion to that of his wife. Regarding household economics, all decisions are made by the woman. She is responsible for organizing the family budget for the entire year. In matters relating to the wider economic sphere, she decides how much of the harvest is needed for family consumption, and how much of each product can be exchanged or sold on the market and which products must be bought to assure an adequate diet for the family. Specifically in terms of agriculture, she also must select that portion of the harvest that is needed to sow next year's crops. She is in charge of the cleaning, airing and drying of crops and, as also reported from Huaro/Quispicanchis and Santa Rosa de Ocopa (Chira 1985a, 1985b), she is the custodian of the revenue from market activities. The exclusive role of the woman with regard to the administration of family resources may be the reason for the belief that the birth of a girl as first child means prosperity and good harvests, while the birth of a boy as first child will bring along economic problems (Nuñez del Prado, D. 1975:625).

The fact that the decision-making power of the Quechua woman has often been overlooked, has caused considerable conflict during the planning and implementation of develop-

ment projects. During decades of anthropological research and as director of development projects, Oscar Nuñez del Prado (1973) observed that in Quechua society the woman is "the power behind the throne". He suggested that decisions on important issues should never be requested during a meeting of men before they have had a chance to consult with their wives and families. International development agencies working in the Andes have also stressed "the important and often dominant role of women in decision-making", requesting an in-depth study of the role of the Quechua woman (Ministerio de Agricultura 1980:109-110). In order to better understand the strong position of the woman in Quechua society, her role must be seen in historical perspective.

In Inca times the female principle was considered equal and complementary to that of the male. A male hierarchy with the Inca at the top was paralleled by a female hierarchy with the Coya (wife of the Inca) as head. Within the female hierarchy there were priestesses in charge of religious cults. Female curacas (chieftains) administered their own land and made decisions about important issues within the ayllus (David Cahill, pers.comm.). Anahuarca, the wife of the ninth Inca Pachacuti is said to have ruled the Empire from Cuzco while her husband was absent from the capital expanding his empire. The Incas honored women's achievements in the religious, social, political and economic spheres of life. The courage of women as conque-

rors and their innovative abilities are praised in legends and historical documents (Sherbondy 1982b).

The female principle was most intimately related to agriculture and irrigation. The earth, some aspects of water, and all important plants -maize, potatoes, etc.- were female deities which were greatly honored (Rostworowski de Diez Canseco 1983:73). Coyas introduced maize cultivation to the valley of Cuzco. They were considered agricultural experts responsible for seed selection and agricultural experiments (Silverblatt 1978:44).

The Spanish conquest had a devastating impact on Quechua society and also affected the role of women. Women disappeared from the public political and religious spheres of life. The representation of women according to the medieval Christian dogma as weak, evil and prone to temptation (Silverblatt 1982:35) could, however, not be assimilated into Quechua ideology. This may have been the reason why the role of women in the communities was not affected negatively and survived the conquest as did the worship of female deities, mainly Pachamama the Earth Goddess who is still today central to Andean religious thought.

Comparison between the districts Cusipata and Urubamba showed that the role of women in these regions is very similar. When the husband is present, the main spheres of a woman's activities relate to house work, the raising of children and market relations. Wives help their husbands with agricultural work and irrigation. The pasturing of

or regional markets where small quantities of goods are sold, bought or bartered are almost exclusively the domain of women. On occasion female market vendors in Cusipata travel as far as Juliaca and Puno on Lake Titicaca to obtain items needed by cuers, such as small dried fish and shells. Male relatives do occasionally infiltrate the small market scene in Cusipata but only to attend a stand of fruit or household articles during a woman's short-time absence. Men dominate the regional market where large quantities of surplus are sold.

The strict division of labor with regard to small-scale economics can create considerable problems in households without an adult woman. In Chicon, for example, a widower became entirely responsible for the family household and his nine children. Since all except the youngest child were boys, the family was unable to sell or barter the small agricultural surplus they had. Despite their extremely severe economic situation, the older boys, aged 20 and 19, refused to enter the market scene because they feared being ridiculed by the women. For some reason this family does not have the kinship network which would be necessary to sell or barter the small surplus through female vendors.

Women do enjoy their monopoly on the local market and

of Cusipata through the social worker employed by the development agency, in Chichubamba and Yanahuara through the women residing in the villages or women who have returned from the cities. The irrigation committee of Chichubamba has a female secretary and treasurer. Yanahuara has an active women's group. The community of Pitumarca south of Cusipata has a female president.

Despite some female participation in public life, Quechua women, much more than men, cling to traditional customs, such as traditional clothing and the Quechua language, thereby resisting integration into the mainstream of Peruvian society, where they see their position weakened. Frederick Engels (1942:58) noted that the struggle between the sexes as it exists in some levels of Peruvian society today was "unknown throughout the whole previous prehistoric period". Male dominated double standards in work, in play and in sex is a phenomenon of Peru's 'ruling class' (Whyte and Holmberg 1956:5) and according to Stein (1975:41) have, in areas like Vicos, been introduced "through the school and other relationships with members of higher social strata". Stein believes that Quechua women are totally aware of this relationship and for this reason do not want to lose their important role in productive labor "by educating themselves out of the campesina category

The tendency to underestimate the strong role of Quechua women as decision-makers within the social and economic spheres of life and as advisors to their husbands in political matters, has led to controversial statements about women's role in general and has caused difficulties in the course of development projects (Nuñez del Prado, 1973). Although, as stated above, few women directly partake in public decision-making relative to irrigation, their decisions about which crops to plant for family consumption and for barter or sale on the market and whether or not they can or will sell a second crop on the local or regional markets, affects irrigation agriculture considerably.

B. Local Political Organization

The organization of irrigation and local political organization function separately in both the Rio Tigre and Rio Chicon regions, while in Yanahuara the community is in charge of irrigation. Since in all three study regions, irrigation was handled through communal or municipal councils prior to the Agrarian Reform of 1969 and even thereafter, a closer look at the local political organization will place irrigation organization within a more coherent context.

basic unit of political organization was the ayllu which has been defined in different ways, for example as a kinship group, a local group, simply a group with a head or an aggregate of interrelated family groups (Castro Pozo 1963:483). Although there is no consensus regarding the definition of an ayllu, it is generally accepted that during Inca times it constituted a corporate group with claims to a certain territory (Sherbondy 1982a:20) and to a water source (Bastien 1973:221, Zuidema 1973:129). Ayllus thus were autonomous units with regard to rights to land and water. Historical studies have further indicated that during Inca times the division of communities into ayllus was based on the hydrology of the mountain slope (Zuidema 1964:140-148), an observation that has also been made in contemporary Andean society (Mitchell 1976:30). Castro Pozo's (1963:485) research revealed that each ayllu or group of ayllus formed a curacazco, a governmental unit ruled by a curaca (local chief). All local matters, such as the division of water or conflict were settled by the curaca and a council of elders (see also Millones 1979). More severe crimes were resolved by the state. (For more information on the organization of an ayllu, see Castro Pozo 1969, Lambert 1980, Sherbondy 1982a, Spalding 1984, Zuidema 1973).

In some Andean communities the term ayllu is still in use today. In the district of Andahuaylillas, for example

has been replaced by the terms barrio, sector, anexo or sitio.

During the first four decades following the Spanish conquest, the new regime did not have as strong an impact on the socio-political organization of the ayllus as one might expect. "Spanish colonial society at this time encountered little inducement to reorder Indian populations in any fundamental fashion" (Yambert 1980:60). During this time period, Indian communities were ruled by curacas (native chieftains) and encomenderos (former conquistadores who formed an early colonial aristocracy - Gibson 1966:49), whose prime role was to collect tribute from the Indians in the form of money and labour for the Spanish crown and for their own profit. In return the Indians were given military protection and Christianity.

Forced labor, the prosecution of the Indians for their beliefs and the introduction of new diseases by the Spanish did, however, leave the indigenous population weakened and greatly reduced which, in turn, affected indigenous communal organization in a negative way. Drastic changes in the socio-political organization of the Indian population began to take effect under the government of Viceroy Francisco de Toledo (1569-1581). Starting in 1572, under his order, large parts of the native population were moved by force from their dispersed settlements into reducciones, villages

1970:395).

The varayoc system of governing was established in the newly developed communities. "As in Spanish communities, a council (cabildo) of elders (regidores) appointed mayors (alcaldes) and constables (alguaciles) and served as a court of justice" (Simpson 1966:93, see also Mitchell 1972:174-203 for an in-depth discussion of the varayoc system). "The influence of the local elite consisting of curacas and encomenderos was reduced as the indigenous authorities of the varayoc system were given considerable autonomy. The newly created communities corporately owned land and water over which they exercised autonomy (Yambert 1980:62). Yambert further states that

> Spaniards and other non-Indians were forbidden to dwell in Indian communities. Indians were wards of the crown, and the communities in which they resided were protected by law from the encroachment of outsiders. Encomenderos and curacas were excluded from holding municipal office. The intent was thereby to limit the power that these provincial elites could exercise in community affairs (1980:62).

Andean traditions continued mixed with new Spanish elements. The more remote and inaccessible the community, the better it was able to continue in its traditional ways. Although the newly created communities provided some degree of protection for the Indian peasant regarding land and water, massive movements into reducciones "broke many of the links holding communities together by undercutting old

the land (Yambert 1980:64). Haciendas which later took over the place of encomiendas absorbed much of the communal lands. The land that was still worked in common was divided by the well intended efforts of freedom fighters San Martin and Bolivar during the first part of the nineteenth century, whose efforts were directed to erase the legal distinction of Indians from non-Indians (Yambert 1980:65), and to assure that Indians can work as independent farmers. The division of community lands to individual peasant families, however, made it much more prone to alienation.

It was not until the 1920's when under the influence of the indigenismo[10] efforts were made to achieve legal recognition for indigenous communities. As of 1960, 215 indigenous communities were registered and recognized in the department of Cuzco (Isbell 1978:29). In 1980 the number rose to 559 recognized communities (Banco de Credito del Peru, 1984). A recognized peasant community is a corporate land holding body legally protected through the Estatuto de Comunidades Campesinas del Peru, Decreto Supremo No. 37-70 A. - 17 Febrero 1970.

Effects of the Agrarian Reform of 1969 on Local Political Organization

Prior to 1969 the agricultural system in Peru was characterized by large landholdings which were in the hands of a few domestic and foreign land owners while the rural

communities (Petras and Havens 1981:205). The 1969 Agrarian Reform which took place under the military government of Juan Velasco Alvarado greatly affected Peru's social, economic and political spheres of life. Although this land reform was the first that showed concrete results, it had been inspired by previous more modest attempts to land reforms such as Belaunde's 1964 land reform bill (No.15037) and by even earlier events such as numerous peasant rebellions of which there were 367 between 1901 and 1928 alone in the southern departments of Arequipa, Puno and Cuzco (Hopkins 1985:20). Large-scale peasant movements developed from the mid 1950's to the mid 1960's in many parts of Peru, where in their attempt to take over estates, they confronted military and police (Petras and Havens 1981:207).

Radical land distribution began after the announcement of the new land reform law (no. 17716) in June 1969 (Horton 1976:13). The objectives of the Agrarian Reform under the slogan "land to the tiller" were "to increase production by transforming the large capitalistic haciendas on the coast and the highland haciendas into cooperatives; to stop the fragmentation of peasant farms, to improve technology especially among peasants, and to draw the peasants into the national economy and culture" (Isbell 1978:27-28).

The Land Reform has not, however, achieved its goals. Although half of the total cultivable land was affected by the reform, benefitting 356,000 families, more than one

not affected (Petras and Havens 1981:209). Furthermore, cooperatives proved very unsuccessful in most regions, due to the fact that little initiative and decision-making power was vested in the hands of the beneficiaries. Instead, it was a "reform from above" managed in a way that was alien to peasant organizational strategies and that did, in fact, not directly serve their interests (Hopkins 1985, Horton 1976, Petras and Havens 1981).

All communities in the three study regions were affected by the Agrarian Reform. In the district of Cusipata, land belonging to former haciendas was transferred into the cooperatives of Moyobamba, Pocpoccallay, Urubambilla and Japuhuaylla.

Within the district of Urubamba, the uppermost community Chicon originated through the adjudication of hacienda land. Yanaconas, Q'atan, Chichubamba and Yanahuara also drew benefits from the distribution of hacienda land but to a lesser degree.

The Agrarian Reform was appreciated by the peasants in the communities studied for the ideology it carried. According to the informants questioned in this study, Indians were treated with considerably greater respect following its implementation. Land distribution strategies, however, and the establishment of cooperatives which has benefitted only part of the population, have produced much dissatisfaction. As is frequently stated in the literature

prefer private land tenure to cooperative land management. The cooperatives which were established in the study regions are variable in their success of operation.

Contemporary Political and Jural Organization

Peru is divided into 23 departments and the province of Callao. Each department is divided into several provinces each of which includes a number of districts. Cusipata is the capital of the district by the same name. Urubamba is the capital of the district of Urubamba.

Political organization differs considerably among the villages studied, depending on whether we are dealing with a district capital -as in the case of Cusipata-, with officially recognized communities -Tintinco, Paucarpata, Colcca, Chicon and Yanaconas-, or with communities not officially recognized, sometimes referred to as sub-communities (see Orlove and Custred 1980:44), such as Chichubamba, Q'atan and Yanahuara.

Cusipata became district capital on October 5, 1940 thereby advancing into the lowest unit of the national administrative system. Its municipal council consists of the following authorities and committees which are elected for a three year period:

The mayor (alcalde) of Cusipata is responsible for the general welfare of all communities within the district under his jurisdiction. Issues relative to irrigation, however,

are the concern of irrigation groups as discussed in chapter IV. The deputy mayor (alcalde accidental) takes over responsibility during the absence of the mayor. Councilmen (regidores) are in charge of five main committees concerned with questions regarding the economy, commerce, education, social services and development. The governor (gobernador) of Cusipata, who resides in the district capital, is the link between the district capital and the central government by which he has been appointed. His office is as powerful as that of the mayor within the limits of his jurisdiction. He is primarily concerned with the enforcement of the law within the entire district, and works in close cooperation with the mayor (alcalde), the justice of the peace (juez de paz), the police (policia), and the deputy governors (teniente gobernadores) in each of the communities.

Apart from organizing communal work (faena), the governor resolves disputes which are beyond the jurisdiction of the justice of the peace. He has the power to place villagers in jail for not obeying the law.

A peasant community (comunidad campesina) which is legally recognized by the state, is best defined as a legal entity consisting of a group of households which are organized into a landholding corporation, characterized by specific rules of membership, organization and land usage (Keatinge 1973:38). The Estatuto de Comunidades Campesinas del Peru, art. 14, furthermore states that the families making up these households within a community are character-

ized through common social and cultural ties. Within the communities studied it has been found, however, that this is not always the case, but that social and cultural backgrounds of community members can differ considerably. Tintinco, Paucarpata, Colcca, Chicon and Yanaconas are legally recognized communities represented by three main committees:

1. La Asamblea General (General Assembly) is the most important committee. Its membership consists of all villagers registered in the Padron Comunal (Community Register).

2. El Consejo de Administración (Administrative Council) is responsible for the governing and administration of the community. Its governing board includes a president, a vice-president, secretary, treasurer and one or more delegates.

3. El Consejo de Vigilancia supervises the activities of the Consejo de Administración in economic and administrative matters. Its governing board includes a president, a secretary and a delegate.

The executives of the Consejo de Administración and the Consejo de Vigilancia are elected by the Asamblea General for a two-year period.

In addition to these bodies, each recognized community has a deputy governor (teniente gobernador) who represents the central government in a native community, where he also resides, and collaborates with the district governor,

normally by carrying out his orders. The deputy governor, who may be a Mestizo, or an Indian who speaks Spanish, has authority over the enforcement of the national law within the respective community. Matters relating to irrigation, however, are under the jurisdiction of the president of the irrigators' committee or irrigators' commission, as will be discussed in chapter IV. The deputy governor resolves disputes within the community, calls people to faenas and levies fines on those who do not participate.

The lines of jurisdiction of the deputy governor may to some extent overlap with those of the justice of the peace. A justice of the peace is appointed by the central government and usually resides within the community over which he has jurisdiction. He is in charge of minor disputes except for land problems which must be brought directly before a judge (juez de tierra) in Cuzco.

Formerly conflict was settled by councils of elders. Today elders have only advisory power. As long as conflict can be resolved within a community, customary communal law applies. Once it must be brought before regional or national jural authorities, it is subject to national laws.

All authorities, named above, execute the task for which they have been elected or appointed without remuneration.

Chichubamba, Q'atan and Yanahuara are not officially recognized communities. There are a variety of reasons why villages cannot or do not want to obtain legal recognition.

Some villagers expressed the fear that incorporation would result in losing private rights to land. Although the Estatuto de Comunidades Campesinas del Peru (Statute of Peasant Communities of Peru) specifies that land cannot be transferred through inheritance and purchase, this law is not always enforced.

Communities which are not officially recognized may not include all governmental bodies specified above. Thus, Chichubamba, Q'atan and Yanahuara have only one body each, the Asamblea General. This is an official group, elected by the villagers and has full recognition within the community. All villages studied have a community president, a treasurer, a secretary, and one or more delegates. Keatinge (1973:38) has observed in other parts of Peru that Peruvian communities may qualify in all respects as indigenous communities lacking only official government recognition.

Community Membership

Comuneros in the districts of Cusipata and Urubamba stated that in order to be considered a comunero, a person must fulfill the following requisites:

a) be born into the community or be the child of a comunero;
b) be head of a family or be of age, that is 18 years old;
c) reside permanently in the community;
d) subsist mainly from agriculture;
e) do not own a large landed estate within or outside the

community;

f) do not receive major income from outside the community;

g) do not belong to another community;

(See also Estatuto de Comunidades Campesinas del Peru, 1970 articulo 23).

A person can become a comunero through assimilation as long as he/she fulfills the following requisites:

a) be accepted by the absolute majority of votes in the Asamblea General;

b) pursue agricultural activities;

c) reside permanently with a member of the community.

(See also Estatuto de Comunidades Campesinas del Peru, articulo 24).

Although these laws are accepted by officially recognized communities, they are not enforced to the same degree by every community. Regarding the rights and obligations of a comunero, the Estatuto de Comunidades Campesinas, 1970, art. 25 and 26, includes a whole series of laws, the most important ones, as stated by the comuneros are: 1. to assist in meetings; 2. to participate in faenas; 3. to vote and stand for office. Among these, the participation in faenas provides the major focus of organization in the communities and is mainly used in the construction and maintenance of public works - roads, schools etc. The communities studied do not have any funds for these tasks which means that apart from the actual labor, each comunero contributes a small sum for construction costs.

Interest Groups within Community Limits

Several interest groups are found in the villages studied. In the social and educational sphere we find parent associations and women's groups concerned with problems such as education, nutrition and health care.

Peasant cooperatives dealing with agriculture, livestock and marketing have formed in Cusipata (grupo Moyobamba), in Paucarpata (grupos Pocpoccallay, Urubambilla, and Japuhuaylla), and in Yanahuara (grupos San Isidro, Cruz Pata, and Patashuaylla). These groups use former hacienda land adjudicated by the Agrarian Reform, as described above. The groups Huascaray and Ccallaraqui in Yanahuara have formed without the intervention of the Agrarian Reform and farmers belonging to these associations work their own parcels of land. The executive board of a cooperative consists of a president, a vice president, a secretary, a treasurer and delegates. Cooperatives may or may not be officially recognized by the central government. In Yanahuara, the cooperatives San Isidro, Cruz Pata, and Patashuaylla are officially recognized while the village itself is not.

The products - agricultural produce, livestock and fruit - generated within a farmer's association, are sold collectively by members of a cooperative on major markets such as Cuzco, Sicuani, and Quillabamba and the proceeds are divided by the executive board among the members. Cooperatives also buy seed, fertilizer and pesticides collectively and generally have a better chance at obtaining credit than do

individual small landowners. (For an in-depth discussion of cooperatives see Hopkins 1985, Horton 1976, and Petras and Havens 1981).

The most important interest groups in the villages along the Rio Tigre and Rio Chicon canal systems are the autonomous irrigation groups which will be discussed in chapter IV.

C. Economic Organization

This section is intended to provide an understanding of the constraints involved in subsistence farming, livestock breeding and commercial production and of the relationship between these activities and irrigation.

Ecological Zones

The fields a family owns are generally distributed throughout different microregions or even major ecological zones. The "vertical ecology"[11] of the Andes has provided a high degree of self-sufficiency to the farmers since pre-Inca times (Murra 1972) while at the same time minimizing the risk of crop failure due to frost, hail and disease. Gade (1975:104-105) divided the life zones in the Vilcanota Valley into six major ecological zones, the three upper ones of which occur in the study regions. These are:

1. The cold puna, situated between 4,340 and 3,910 meters. This is the region of mainly wild grasses, the predominant

species being ichu grass (Stipa ichu), the basic food of llamas and alpacas. Sheep and occasionally cattle may also graze in this zone which is also the uppermost limit of crop cultivation, where only hardy potatoes and Cañihua (Chenopodium pallidicaule) can be grown. Cañihua grows to a height of between one and two feet and carries small seeds. These are roasted and either eaten as cereal or stirred into soups. The Incas have used it to make a potent chicha (Cobo 1956).

2. Below the puna, a zone known as suni extends from 3,910 to 3,300 meters. In this zone wheat, barley, potatoes, broad beans, carrots, onions and cabbage are planted. Tubers such as oca, olluco, and mashua are grown in the upper ranges of this ecological zone, as well as cereals - quinua and cañihua - and the legume tarwi.

3. The lowest major zone within the study region is the keshwa, ranging from 3,300 to 2,400 meters. This is the predominant zone for the growing of maize although certain species also mature in the lower portion of the suni zone as well. Potatoes, wheat, vegetables and fruit trees are also cultivated in this zone.

Within each of the major ecological zones there are microzones which are affected by altitude, north versus south facing slopes, hours of sunshine, rainfall, wind, frost, hail and soil condition. In the three study regions most of the agricultural activities take place below 3600 meters in the keshwa and lower suni zone, where families

work small parcels of land located throughout different microzones. The communities studied are located in the suni and keshwa zones.

Private and Communal Property - Land Tenure

Most of the land and other property in the villages studied is held under the tenure of the individual and/or the family. Each individual owns what he/she has inherited. Apart from personal effects, however, the entire family has use-rights to the household property. Property that has been acquired by a couple during marriage is considered common family property. Thus, personal belongings, homes and furnishings, animals, tools and the crops harvested are under individual and/or family ownership and control. Land which is a most important but very scarce resource for most peasant families in the Vilcanota Valley is subject to different forms of ownership and control as discussed below.

Community property normally consists of the land along the hillsides, irrigated land, irrigation canals, bridges, foot paths, roads, school houses, first-aid stations and community halls. This research is most concerned with the tenure and use of the resources land and water. Rights to land and water are interrelated in that water is allocated in proportion to the amount of land owned and/or worked by each peasant family. This type of water allocation was coined as the 'Syrian model' by Glick (1970). Thus irriga-

ted land, although under the ownership of an officially recognized community, is worked privately by each family in all regions studied, whereas the allocation and distribution of water is the concern of irrigation groups or the community.

There has been much confusion with regard to legal versus economic rights to land in Peru and other Latin American countries. Having legal rights to land does not necessarily mean having access to land and crops. Adams (1962) observations on this issue agrees with the situation as it exists in the communities studied in this research.

> It is important to distinguish community landholding from a concept of communality and community work. Very little, if any, community land in Latin America is worked communally. There is very doubtful evidence going back into the colonial period as to how much community land was worked communally. Unquestionably today, almost all community land is allocated to individuals or families and occasional reallocations take place. In many areas the land has so long been allotted to a given family that the family regards it as personal property. The only issue involved is that the family may not sell the land; if it ceases to use it, the land reverts to the community....The community has rights to determine the control of the land but, in fact, the land is worked as if it were individually owned. (Adams 1962:420).

Land tenure in the Vilcanota Valley is to a large extent determined by whether or not we are dealing with an officially recognized community. This relationship between land tenure and communal structure is not unique to the Andes. Marx (1965:82) argues that "the property mediated by its existence in a community may appear as communal property

which gives the individual only possession and not private property in the soil..". He further notes that property may appear in the dual form of state and private property or appear as a supplement to private property in which case "the community has no existence except in the assembly of its members and in their association for common purposes."

In the three regions studied we find several types of land tenure:

1. Alienable privately owned and worked irrigated land.

Under this type of tenure which is found in the officially not recognized communities of Chichubamba, Q'atan, Yanahuara, and in Cusipata, the capital of the district of Cusipata, land is under the corporate ownership of each family and can be bought, sold or leased freely to anyone from within or outside the community.

2. Inalienable privately owned and worked irrigated land.

This type of land tenure exists in the officially recognized communities of Tintinco, Paucarpata, Colcca, Chicon and Yanaconas. Here each family has corporate rights to land which is worked privately on a permanent basis. The land can be inherited but it cannot be bought or sold to outsiders, since the community exerts corporate rights over it. This law, as specified in the Estatuto de Comunidades Campesinas del Peru (Statute of Peasant Communities of Peru), is, however, not always strictly enforced by the communities under study. Thus, legally community land cannot be transferred either by contract nor through

inheritance (art. 119, Estatuto de Comunidades Campesinas del Peru). In reality, however, children can inherit irrigated land and also unirrigated land on the steep hillsides, as long as they work the land.

3. Privately worked unirrigated community land.

Under this type of land tenure, which is under the corporate ownership of the community, each comunero has the use-right of one or more plots of land usually situated on the hillside and used for rainfed agriculture. A comunero has the right to the plot(s) allotted to him/her as long as the land is not neglected. When the land is not worked for more than a year (outside the seven-year period of sectorial fallowing), it is alloted to a different comunero. All study communities distribute land to their members under this type of tenure which Guillet (1981:141) defines as divisible use rights. The plots worked by a family can be inherited by the children.

4. Land under the corporate ownership of Cooperatives.

Following the Agrarian Reform of 1969, hacienda land was incorporated into communities where it was generally held in collective form by members of cooperatives (as described above). Often only former hacienda workers became members of a cooperative, leaving other members of a community without benefits whatsoever. The proceeds from collective labor in agriculture or livestock raising are ideally distributed among its members by the cooperative's board of directors. Some of the revenue may be used for administrative purposes,

for legal fees etc., or be placed on the cooperative's bank account. Mismanagement of many cooperatives, however, has resulted in uneven distribution among the members or in no profit for anyone involved.

5. Hillside pastures.

This land is under the corporate ownership of the community and all comuneros have free access to it. The use rights are indivisible under this type of tenure (Guillet 1980:141). Hillside pastures are normally used for the grazing of cattle and sheep.

In the districts studied almost all families are small landowners. Of the 476 hectares of irrigated land in the district of Cusipata, each of the 679 families in the four villages owns on the average 0.7 hectares of land, divided into small plots across different microregions (statistics-development office in Cusipata). (See table 1). The four villages of Chicon, Yanaconas, Chichubamba and Q'atan in the district of Urubamba include 693 families who work a total of 304.96 hectares of irrigated land. Twenty families own no irrigated land, no family owns more than ten hectares and the average amount of land per family is 0.44 hectares. (Statistics - Ministerio de Agricultura, Urubamba, see table 2).

The 800 families of Yanahuara work 1000 hectares of irrigated land which provides an average of 1.25 hectares per family (personal communication elders of Yanahuara).

(See table 3). The Ministry of Agriculture does not have statistics on officially non-recognized communities. As is the case with all communities studied, Yanahuara owns the pasture land along the hillsides. Non-irrigated agricultural land on the hillsides, however, belongs to the cooperatives. Thus, a peasant who is not a member of a cooperative has no right to cultivate this type of land.

Work Arrangements

In the three study regions several types of work arrangements exist which can be divided into two major categories - reciprocal and non-reciprocal labor.

According to Sahlins (1965), reciprocal labor can be either 'generalized' or 'balanced'. The 'generalized' form of reciprocal labor occurs mainly within a nuclear family in the form of ayuda (Spanish for help). This type of work is expected to be carried out by each family member and does not require any specific return. The 'balanced' form of reciprocal labor - ayni - on the other hand, requires that the same type of work be returned at a different time. This arrangement occurs between kinsmen, neighbors and friends and is used both in the exchange of goods and services. Tools may be borrowed in ayni, or people may help one another with the harvest using this type of reciprocal labor.

There are several kinds of non-reciprocal labor in the study communities:

Faena (Spanish for labor or task) is communal labor, also called corvée labor, which is organized by village- or irrigation authorities. It is used extensively throughout the study regions. All adult male members of the community must participate in this form of communal labor or pay a fine. Faena is mainly used in the construction and repair of public works such as roads, irrigation canals, public buildings, and in the cleaning of irrigation canals and of the cemetery before 'All Saints Day'. Faena is also used in agricultural work on community owned land.

Jornal is a type of labor that must be paid for in cash. This term also defines one day's labor, which during 1984/85 was worth between 5000 and 6000 soles, about one US dollar. Only those people who have a cash income of some kind, for example through cash cropping, a teaching job or a small business, can afford to pay jornal.

Al partir (sharecropping) requires that the person working the land under this arrangement gives half of the crop to the land owner. Expenses such as seed and fertilizer are shared equally among participants.

Minka is generally defined as a work party called by a peasant who requires laborers for tasks such as the building of a house. It is a festive occasion where labor is repaid with food, alcohol, music, coca leaves, cigarettes and often money (see also Erasmus 1956, Isbell 1978, Mitchell 1980, Orlove 1977). Minka is by far not as common as ayni and jornal in the communities studied. For the description of a

festive minka see appendix one.

Agricultural Production in Relation to Water Availability

Small-scale subsistence farming combined with some pastoral activities are the predominant production strategies in the three study regions. In the Andes and other parts of the world where we are dealing with extreme environmental conditions, subsistence farming is oriented more toward security than toward achieving a greater surplus (see also Scott 1976, Jones 1984). In order to prevent total crop failure, peasants plant a diversity of crops in different microzones. They also plant a variety of cultigens within the same field in spite of their different requirements for irrigation water. This makes harvesting cumbersome and more time-consuming, but the fact that these plants extract different soil nutrients and, in turn, replenish the soil with nutrients, is an important consideration. Thus, in the study regions and elsewhere in the Vilcanota Valley, maize may be interplanted with peas, kidney beans, broad beans or quinoa (see also Gade 1975:36).

The types of crops that can be grown by each family is determined by the location of their fields within the major ecological zones and microenvironments and by the availability of water. Bilateral inheritance provides each couple with fields at different altitudes, supplying a diversity of produce. Nevertheless, a nuclear family is not self-sufficient but depends on a network of kin, neighbors and friends

for reciprocal exchange of labor and produce (see section on Socio-Economic Organization). Items that cannot be cultivated, exchanged or manufactured within the region, must be purchased in the small stores of the villages.

Agricultural production methods follow the agricultural calendar (see figure 1) which is very similar in the three study regions but differs somewhat in terms of altitude, rainfall patterns and availability of irrigation water.

Given enough water, the lower parts of the three study regions can theoretically produce two crops a year as was the case in many parts of the Andes in Inca times (Orihuela, pers.comm.). Today, only in the district of Cusipata can a second crop be planted while the water shortage during the summer months in the villages studied within the district of Urubamba only allows for the cultivation of one crop per year.

Despite a more plentiful water supply in the higher communities, the planting of a second crop is risky due to the occurrence of frost and hail. Only frost resistant species such as barley and different types of tubers have a good chance to mature.

The most important agricultural crops -maize, potatoes, wheat, barley, beans and vegetables- are planted during the rainy season in the three study regions as in other parts of the Andes (Mitchell 1976:33). Irrigation serves to extend the growing season by permitting land preparation and the sowing of crops prior to the onset of the rains.

season depending on the intensity of the rains and the crops in question. In the case of maize, irrigation is used moderately throughout the rainy season to supplement natural rainfall. During the veranillos (dry periods which occur during the rainy season), all crops may be in need of irrigation. The veranillo de Todos Santos occurs in November while the veranillo del Niño is common during January and may last for several weeks.

Peasant farmers in the three regions are eager to plant crops early, using irrigation water, since this allows harvesting prior to the onset of frosts. Furthermore, early planting also allows the young root system to establish itself before the heavy rains set in. In some regions, where drainage is not sufficient, rain causes young seedlings to rot. These constraints operate in other regions of the Andes as well (Mitchell 1976:34).

The actual task of irrigating proceeds in different ways depending on the type of cultigen to be irrigated, the steepness of the terrain, soil characteristics, and the size of the field. Peasants along the three canal systems studied irrigate either by patches or by furrows. Irrigation by patches is recommended for pastures with a slope of from one to twenty percent. Where wheat and barley are grown on slopes with an inclination of less than one percent, the patches should have a maximum width of 20 meters and a length of from 90 to 250 meters for soils of medium porosi-

should not be wider than 5 meters and longer than 75 meters. The volume of water that is necessary to irrigate depends on the cultigen, the inclination of the slope and the texture of the soil (Ministerio de Agricultura 1980: 85).

Irrigation by furrows is done for cultigens such as potatoes, maize, beans and vegetables. There should be a space of from 20 to 60 centimeters between the furrows which should be between 20 and 30 centimeters deep where we are dealing with soil of average porosity. Furrows can be either straight or undulating; the latter are used in steeper terrain.

Irrigation cannot be applied to community owned land which is usually situated on the steep hillsides. The time for sowing is thus dependent on the onset of the rains and normally occurs between September and December. Harvest time is between March and June. First, potatoes are harvested then wheat and barley and last beans (haba en grano) which are most resistant to frost (see figure 1).

Rainfed agriculture on steep hillsides with inclinations up to 60 percent is considered a risky undertaking by the peasants of the study regions, since extended veranillos (dry periods), as well as frosts and hail may destroy the crops. Furthermore, the physical efforts required in planting crops on steep hillsides and the erosion caused in the process are factors that have been seriously considered

It is hoped that the possibility of planting a second crop in Cusipata due to irrigation development will discourage peasants from using steep hillside plots.

Major Agricultural Crops

"Native Andean agriculture is primarily root and tuber cultivation and only secondarily is it based on plants grown for their seeds" (Gade 1975:61). In his intensive study of wild and domesticated plants, Gade found that among the cultigens in the Vilcanota Valley which have wild species representatives in the same region, are genera such as Solanum (potato), Oxalis (oca), Chenopodium (quinoa and kañiwa) and Amaranthus (kiwicha). It is not certain whether these cultigens were domesticated in this particular region or elsewhere in the Andes. Major agricultural crops of the Vilcanota Valley such as maize, lima beans and kidney beans were most probably introduced from Mesoamerica (Lockhart 1968:199).

Since Inca times, maize has been the most important domesticated plant in the Vilcanota Valley. Different varieties are grown in diverse environments ranging from the edge of the puna to the tropical lowlands (Sauer 1963:490). It is cultivated from about 730 meters to 3,600 meters which gives it a greater altitude range than any other crop (Gade 1975:119). Two main varieties of maize are grown in the Vilcanota Valley: the white variety Parakay sara and the

white maize which grows best between altitudes of 2,800 to 3,300 meters is large-grained. The variety 'Gigante Urubamba' or 'Blanco Imperial' is used primarily for export since production is costly, involving large amounts of fertilizer and irrigation (Glave and Remy 1980:109-110).

The yellow maize can be grown at slightly higher altitudes because it is more resistant to low temperatures. It requires less fertilizer, is therefore less costly to produce and can be distributed throughout the local market. This type of maize predominates in the communities studied.

Ninety percent of the maize in the province of Urubamba is irrigated, although it can be grown in areas without irrigation. In the prime areas for maize cultivation as they exist in the provinces of Quispicanchis and Urubamba, yields range from 2,000 to 6000 kilograms per hectare (Statistics Development Office, Cusipata and Ministry of Agriculture, Urubamba).

Maize is not only the principal source of food for at least 70 percent of the population in the Vilcanota Valley (Gade 1975:126), it is also an important ingredient for chicha (maize beer) one of the principal beverages of the Indian population. (For more details on maize cultivation and food preparation in the Vilcanota Valley, see Gade 1975 and Glave and Remy 1980).

Second in importance as source of food is the potato which is native to the Andes. Its earliest preserved

on the shores of Lake Titicaca (Ugent 1970:1161). The wide range in which it can be cultivated, reaching about 4,500 meters above sea level, and its tolerance of a variety of soils have made it an important part of the diet (Milstead 1927-28:102). Potatoes grow on irrigated and non-irrigated soil, the latter of which should be left fallow for up to seven years.

Potatoes come in many different varieties. Large tubers are eaten fresh, average-sized ones with many eyes are kept for seeds. Above 3,400 meters, small types of potatoes are made into chuño and moraya by a process of alternating freezing and thawing. After the potatoes are softened through this process, the skin is taken off, and dried in this form they can be stored for a long time (see also Milstead 1927-28:102). Moraya is dried at higher altitudes, normally above 3,600 meters at temperatures which fall consistently to -8° or -10° C (Gade 1975:211).

Brush (1980:164) found that the native Andean potato varieties are the most endangered resource of traditional Andean agriculture. This is because of genetic erosion, evidenced in the loss of germplast of ancestral crops. Especially the Cuzco region is characterized by a high percentage of native varieties (63 percent) with some improved and mixed varieties (25 percent and 12 percent respectively) (Brush 1980:165). In the district of Cusipata, development personnel are concerned with the intro-

storing potatoes (see also Rhoades 1984).

Among the native Andean cultigens which have been marginalized following the Spanish conquest and which in recent years have received renewed interest, are tarwi (Lupinus mutabilis), quinoa (Chenopodium quinoa) and kiwicha (Amaranthus caudatus L.). These plants which were used extensively by the Incas, contain important nutritive values, mainly protein and carbohydrates. Tarwi, a legume (48 percent protein and 24 percent carbohydrates), quinua (14 percent protein and 60 percent carbohydrates) and kiwicha (13 to 18 percent protein; percentage of carbohydrates not given), both of which are grains, can be grown in a variety of soils and at different altitudes (Corde Cusco FIPS 1983-84). Tarwi and quinua are cultivated in all three study regions, kiwicha was introduced to Chichubamba two years ago.

Oca (Oxalis tuberosa) and ullucu (Ullucus tuberosus), also traditional Andean cultigens, are tubers that grow at altitudes even above 4,500 meters where only high altitude potatoes can be planted. They provide valuable nutrients for the people in high-lying communities and are exchanged against produce from the lower villages (see also Gade 1975).

Wheat (Triticum spp.) and barley (Hordeum spp.) were introduced from Europe following the Spanish conquest. Although the Indians predominantly grew wheat to satisfy the

grown it for their own use until the late eighteenth century (Jimenez de la Espada 1956:174). Barley is very cold resistant, can be grown above 3,600 meters, requires little or no irrigation, and is resistant to disease. Both barley and wheat are planted in the district of Cusipata, while in the district of Urubamba wheat predominates.

Two types of beans -haba grano and haba verde- and vegetables -mainly carrots, onions and white cabbage- are also important ingredients of the peasant diet and are used for barter and sale. Vegetables have become an important second crop in Cusipata, since irrigation development there has provided a plentiful water supply.

Technology

A peasant's knowledge about his physical environment is the most valuable attribute of Andean technology. This knowledge has enabled him to survive for centuries in an extreme environment while enduring a series of cultural shock waves.

Regarding the actual use of tools, Gade (1975:35) observed that "Indigenous and seventeenth century Spanish farming techniques dominate agricultural activities in the Vilcanota Valley". This observation is still true in the regions under study. The technology employed is almost completely unmechanized. Peasant families either own their tools or borrow them in ayni. The chaquitaccla (Indian foot

whenever work must be done on steep hills and narrow ravines. Oxen and plough are used more frequently in the lower communities and where the terrain is wide enough to allow its use.

Work animals are used for different agricultural activities. Prior to sowing, oxen are used to plough the land. Horses, donkeys and llamas transport seed, natural and chemical fertilizer. During harvest time, these animals are used either for threshing or for transporting the crops. Families who do not own oxen and plough must rent those or borrow them in ayni, normally in exchange for one to three days of agricultural work carried out by an adult male.

Agricultural Production Methods

Where much dry grass and stubble remain on the fields, land preparation is preceded by burning. Subsequently the fields are irrigated to soften the ground and prepare it for plowing. These activities which are usually started in September for the planting of the major crops, require the precise coordination of a variety of activities. Help in the form of ayni must be solicited simultaneously with the arranging of a turn to irrigate and the renting of oxen and plow or their borrowing in ayni if a family does not own them.

Land destined for maize cultivation must be irrigated

is almost always done by women, proceeds in that two or more kernels of seed are placed in a hole together with natural and/or chemical fertilizer. Where dry grass had been burned, the ashes serve as fertilizer and also kill a variety of insects which are harmful to the plants. Natural fertilizer, such as manure (quano de corral) is believed by most peasants to be better for both the plants and the land than chemical fertilizer, which is also too costly for many farmers. Natural fertilizer is, however, only available to those families who own animals. The nitrogen-rich quano de isla from islands off the Peruvian coast is very much valued, but it is also expensive and can therefore be used only by a few farmers in small quantities.

Approximately two months after sowing, the land is irrigated and is ready for the first aporque which consists of tracing deep furrows throughout the entire maize field in order for irrigation water to reach each plant. Earth is piled to give the plants support and weeding is done at the same time. After the first aporque the land is irrigated again and from then on the plants must be watered every two weeks until the rains become heavy enough to satisfy the water requirements of the plants.

Two months after the first aporque -usually in February- the maize field is irrigated again if necessary and the second aporque takes place. It consists of cleaning the furrows, weeding and piling earth around the maize stalks.

June. Due to slightly warmer temperatures the harvest begins earlier in the district of Urubamba than in Cusipata. The maize stalks are either pulled out from the earth or are cut a few centimeters above the ground. They are then put out to dry and several weeks later the ears are broken from the stalks, husked by hand and sorted by size, color and quality. Choclos (ears) are normally dried on a floor, covered with ichu grass to absorb the moisture. Maize that is not sold is stored either on the ear or in shelled form. The dried stalks are used for fodder.

The harvest of maize is a festive occasion celebrated with music and feasting throughout the Vilcanota Valley. See appendix one for an account of the maize harvest.

Livestock Breeding

Although not available to a large part of the peasant population in the study communities, livestock is considered an important and more secure resource than is agriculture. Insufficient pasture land as well as difficulties in obtaining credit set restrictions on the number of cattle that can be kept in the communities. Wealthier peasants of the lower communities graze their cattle on the land of the higher lying communities for a fee. Cattle theft is a common practice in many regions and presents a considerable threat to the owners.

Although cattle are considered the most important

labor, and for their meat and the cash received for sale, sheep are gaining in importance in the study communities. Their value lies in their wool which sells at a good price. Within the district of Cusipata some peasant farmers have successfully engaged in the keeping and breeding of sheep. Pigs, chicken, ducks, geese, and guinea pigs are mainly bred to improve a family's diet. Any festive meal of a peasant farmer must include guinea pigs (cuyes). Efforts are made in Cusipata to improve the breeding of guinea pigs. These animals are valued for their meat which is highly nutritious due to a high protein content, a factor that makes it superior to the meat of cows, sheep, pigs and birds. (Ministerio de Agricultura, 1983a, 1983b).

The animals' health is the biggest problem faced by farmers who keep livestock. Although the development agency in Cusipata has started to give courses about better methods of keeping and breeding livestock, in most communities this service is not available.

Market Relations

Most or all of the crops grown by a peasant family in the study communities are consumed within the household. The small surplus produced by some families is exchanged for other goods within or between communities or is sold on the local markets of Cusipata, Urubamba or nearby villages. Barter (trueque) is still practiced on the local markets in

exchange products such as freeze dried potatoes (chuno or moraya) or wool against produce from the lower zones such as maize or wheat. In the district of Urubamba barter is also used extensively for the exchange of the many different kinds of fruits - strawberries, peaches, pears, cherries (capulli) etc. against agricultural produce.

An exchange of produce or other items is accomplished by means of mutual agreement of the parties involved. Comparable quantity and quality of the items is usually judged by eyesight. Sometimes a measure called chimpu in Quechua is used as a rate of exchange in the form of a bagful of jute or wool.

Agricultural produce -mainly maize, potatoes, beans and vegetables-, fruit from the lowland region of Quillabamba and bread are bartered or sold on the daily market in Cusipata. The lively Sunday market features the above products as well as prepared foods, chicha (maize beer) and spices. Items used in traditional medicine are in high demand by curers (curanderos), most of whom reside in the upper communities. Female market vendors travel as far as Lake Titicaca to obtain certain items, some of which are of purely magical value and include such items as small dried fish (chini in Quechua), and sea shells (mullu in Quechua). The fetuses of llamas and vicuñas, minerals and herbs are also brought from different regions, while coca leaves are generally obtained from Quillabamba.

of Cusipata and in addition offers many varieties of local fruit. People of the communities under study participate in barter, purchase and sales at the local markets.

Larger quantities of surplus which are mainly produced by cooperatives are transported to markets with a greater capacity. The markets of Cuzco, Sicuani and Puno are used by some of the inhabitants of Cusipata, while those of Cuzco and Quillabamba are most important to the people of the district of Urubamba.

The peasant farmers of Cusipata buy and sell livestock on the market in Combapata. In the district of Urubamba the major markets serving the exchange of livestock are Urubamba, Maras and Marcapata. Cattle are the most important livestock; animals are generally bought when quite young and sold at the age of two years or older.

The purchase and sale of animals is accomplished across considerable distances. Every year one of the comuneros in Cusipata buys llamas and alpacas from the high community of Chillihuani above Tintinco in order to sell these as far away as Quincemil in the jungle region of the department Madre de Dios.

The commercialization of livestock is regarded more lucrative than that of agricultural produce which experiences considerable difficulties especially for the individual small-scale farmer. During the study in Cusipata it became evident that although the prices for improved seed, fertili-

short period of time, the sale price for agricultural produce remained low. This is the result of government policy to control prices in order to subsidize urban consumers. At harvest time when much produce is available, it may sell at a price close to or even below the production costs. When too much of the same type of produce is offered on the market, some of it may not sell at all. More distant markets such as Cuzco to the north or Sicuani to the south have a considerably greater capacity. However, the transport is costly and prices vacillate to such an extent that it cannot be determined beforehand whether a profit will result.

Although occasionally intermediaries visit the villages to buy agricultural surplus directly from the peasants which saves them time, effort and the cost of transportation, the prices which these intermediaries pay are even below wholesale market prices.

An exception to the problems involved in the commercialization of agricultural produce relates to barley. The brewery in Cuzco (Compañia Cervecera del Sur) not only guarantees to buy the produce from wide regions including all study areas, but also gives technical assistance to the cultivators and helps to defray costs of production. Thus, whenever peasants do not have or cannot buy seed for other crops, they grow more barley, because of these arrangements. The same type of aid is given to peasants through-

Coordinación de Tecnologia Andina, 1983).

Where development efforts result in a better first crop and a second crop with surplus to sell, knowledge of the market situation becomes especially important. It must be ascertained which crop can be sold in what quantities at what markets. An increase in production beyond the subsistence level is only advisable if the market situation is known. Adequate planning for the commercialization of products also requires that the peasant families who have always decided for themselves which crops to plant, jointly discuss the production of crops in relationship to the anticipated market situation. A socio-economic change of this type cannot be brought about easily in any of the study communities, where the people answered unanimously (100 percent of the families questioned) that decisions regarding agricultural production are made only within the nuclear family. The only exception was Colcca, where 38 percent of the peasants declared that they discuss certain aspects of crop production at least with some other peasant families. Families thus act as autonomous units with regard to production, consumption and distribution. The independence of corporate family units with regard to economic activities of this type has also been observed in other parts of the world (Lewis in press).

Thus, neither local nor extra-local decision-makers have seriously considered the market situation in the district of

were not familiar with the market situation at all and 25 percent had some idea about where to sell their produce once the second crop was well established. Yet, one of the major objectives of irrigation development in the district of Cusipata was the production of a better first crop and a second crop in order to achieve surplus that can be sold on the market. The great efforts that have gone into the construction of the irrigation canals, the organization of irrigation groups and technical aid in agricultural matters has not been equalled in respect to the commercialization of the produce.

Credit Facilities

Scarce financial resources are one of the major obstacles to agricultural and livestock development of the study regions. Different forms of credit facilities are available to individual peasant farmers and to cooperatives in their efforts to improve their economic and social spheres of life. The Banco Agrario del Cuzco which is connected with FIDA - Fondo Internacional de Desarrollo Agricola - offers short and long-term loans. Short-term loans must be repaid after 18 months, long-term loans are due at different dates up to 15 years depending on the purpose for which they have been requested (PEPMI - Proyecto Especial de Pequeñas y Medianas Irrigaciones, May 1984). Short-term loans are used for the purchase of agricultural input (seed, fertilizer,

oxen and plow and machinery, for expenses which occur during harvest time, for the marketing of produce and for the payment of agricultural laborers. Long-term loans are used for the development of pastures and orchards, the purchase of livestock and machinery, the construction of irrigation canals, for construction projects such as small stables and deposits for produce and for land rehabilitation tasks (Pepmi, May 1984).

There are, however, serious restrictions with regard to the availability of credit which affect a large part of the peasant population. In the district of Cusipata, the Banco Agrario facilitates credit only to farmers who own at least 0.5 hectares of land. Credit is not available to peasants who own less land due to the inadequate guarantee represented by a small parcel of land and high administration costs for small credit requests. In Cusipata, less than 50 percent of the families own sufficient land to meet the minimum required by the Banco Agrario (Ministerio de Agricultura, Cusipata). The only possibility for these small-scale farmers is to form incorporated associations which can more easily obtain credit. Informal groups of peasants may also receive credit as long as they possess titles to their land (Ministerio de Agricultura, Cusipata 1980:112). There are few small-scale landowners, however, who have clear land titles, because land which is normally inherited has never been legally registered. Certificates

Banco Agrario. These certificates can be obtained through a notary public, justice of the peace, or the community president.

However, even peasants who do qualify for credit are often reluctant to make use of it for fear that the loss of crops through severe weather conditions or disease will make it impossible to repay the loan plus government approved interest which was 46.5 percent during the period of the study. Furthermore, subsistence farmers whose diet can be improved through better seed and agricultural inputs but who cannot achieve surplus to be sold on the market, cannot repay a loan. The peasants from the upper communities expressed the fear of losing their land if they cannot repay the debt. Although according to governmental agencies this fear is not justified, it still persists among peasants.

The credit situation which hardly serves small-scale farmers adds to the general problem of achieving an equitable distribution of benefits among peasants. In regions with and without development projects it is mainly the peasants from the higher communities who on the average own smaller parcels of land and are exposed to more severe weather conditions. Unless better solutions are found with regard to the credit situation, development projects which may be excellent in some ways will, on the other hand, contribute to a widening of the gap between the poor and the very poor.

reason for putting more effort into the improvement of traditional production methods used by subsistence farmers instead of introducing expensive new technology.

D. Religious Belief Systems

The technological side of subsistence and commercial production, as discussed above, does not reveal the full spectrum of indigenous concerns and strategies employed in an effort to survive and produce surplus. Traditional religious practices as observed in the communities studied, especially pagos a la tierra (payments or offerings to the earth) are considered instrumental by the peasant farmers in producing a good harvest, healthy animals and in maintaining general human well-being. This is also true for other parts of the Andes where pagos are considered by the peasants as "playing just as important a role in production activities as the role played by the technologies of agriculture and herding" (Custred 1980:197).

Primarily in regions where development efforts are underway, Andean belief systems and practices must be given serious consideration if the cooperation of peasant farmers is to be obtained. The following discussion is intended to shed light on the effects of religious beliefs and practices on irrigation agriculture, an aspect that has seldom if ever been considered by developers.

Andean belief systems contain both pre-hispanic and

any change is directed toward christianization, eventually resulting in the extinction of traditional Andean beliefs (Mishkin 1963:462). My own observations were different from this somewhat stereotyped version of the dynamics of Andean religion. Although Andean rites and rituals express characteristics of both religions, the traditional beliefs are rooted deeply within the Quechua people while Catholic rites receive cursory attention. This becomes especially evident during times of hardship such as disease, death, or problems with the jural system and is strongly expressed in subsistence strategies as well. My research in the Vilcanota Valley supports the findings of other investigators such as Flores Ochoa (1971:68-78), who witnessed not only close adherence to the traditional beliefs, but also observed the revitalization of old traditional cults which can be traced back to pre-hispanic times. Reinforcement of and return to traditional beliefs and rituals not only occurs among campesinos; a growing belief in the value of the ancestral religion is also found among people who have left their village to pursue secondary and university education.

Traditional Andean Beliefs

There is a profound relationship between the Quechua people and their natural environment as expressed in myth, ritual, and everyday life. Pachamama - Mother Earth - has

the Andean people since pre-Inca times and the belief in the ties between man and the earth has not weakened since. As one of the residents of Cusipata explained: "Pachamama is our Great Mother who gave us life, who nourishes us throughout our earthly existence until death takes us back to her". Pachamama is omnipresent in the conscience of the Andean people. The first sip of every drink is offered to her. A bad harvest, sickness and death are often ascribed to neglect of duties toward Pachamama. For the Indians the working of the land is not only an economic necessity, but an obligation toward the earth deity in return for a good harvest, luck, health and success. The ties between man and his land are physical and emotional. Without land a man considers himself a wajcha (Quechua for orphan). (See also Malengreau, 1972a). Within the social/religious sphere of life Pachamama is the most integrative force for the Quechua people and as stated by a community member of Cusipata, "she is the mother of all of us, before her we all are equal".

Within Pachamama reside spirits which exercise their own powers. The mountains are the realm of the Apus, powerful male and female ancestral spirits, providers of water and protectors of people and animals, and the Aukis, masters of wind, water and rock. These spirits are believed to live, have a soul, virtue and power (La Revista 1971:17). Their influence may be either beneficial or destructive to the lives of the people. They are worshiped and appeased

are at the center of Quechua religious thought.

Aukis in the Cusipata region and other areas are very much feared when they appear in the form of malevolent winds, called urano huayra in Quechua, which cause illness and death. Especially at night these winds are believed to cause considerable harm and people are advised not to venture at night into the mountains. Women should avoid this by all means and men should only go out in groups. The death of the mother of one of my informants was ascribed to the doings of the malevolent wind spirit which caught her at night. The new irrigation system in Cusipata no longer requires irrigating by night which is considered a blessing in view of these ancestral beliefs.

The potency of the Apus is expressed in a strict hierarchy, generally based on the size, location and significance of a mountain. Very high snow-covered mountain peaks such as Ausangate, Salcantay, Veronica, Grau and Chicon are widely honored. Lower and less important mountain peaks are worshiped by people at the local level. Beliefs regarding the role of the Apus differ slightly between regions. In Cusipata, for example, people commented that at the birth of every child one of the Apus of the region becomes padrino (godfather), protecting the child throughout life. Only a paqo (Quechua for curer) has the ability to reveal to the person which of the Apus is his padrino. In the Urubamba region this particular belief is

district of Oropesa, province of Quispicanchis, the belief exists that every person is protected not only by the spirit of a mountain peak, but also by the spirits residing in springs, rivers, lagoons and large rocks (Espinoza Izquierdo, 1978). These natural phenomena have been considered huacas (holy sites or spirits) since pre-hispanic times.

Lagoons, especially those located at high altitudes, are sacred to the Andean people inspiring both love and fear. In all study regions and other parts visited, lagoons are esteemed for providing the villages with water. They are feared because of the 'ferocity' they may demonstrate at the approach of a person by extending their waves beyond the shores swallowing the intruder, or causing bad luck to pursue him. Illapa, the Inca deity of thunder, lightning and thunderbolt is said to protect the lagoon and according to informants in both districts, Cusipata and Urubamba, has frequently struck people approaching its sacred domain, causing severe injuries and even death. Clouds and fog also protect lagoons by blinding people who approach them. It is considered especially dangerous to tamper with lagoons by throwing in rocks and garbage or by challenging their power vocally. Although some people maintain that apart from the powerful spirit residing in a lagoon it contains nothing else, others believe that lagoons may contain baskets with eggs and that golden bulls emerge from time to time. Lagoons are also the objects of ancient legends which tend

immaculate virgin or her brave suitor who succeed in bringing water from the lagoon to the people in the villages below. (See legend of Yanahuara, appendix two).

Natural phenomena such as springs, rocks, certain sites in rivers and mountain formations which exhibit unusual characteristics are considered sitios encantados (enchanted places) which must be treated with respect. A small rocky island in the Vilcanota River close to Cusipata and a rock high up in the Rio Tigre are believed inhabited by a sirena who may be dangerous to those who approach her abode. The hill Yayamarca above Cusipata which exhibits rock formations of many different kinds and a deserted pre-Inca city is considered enchanted and many legends testify to the powers residing there. The Indians climb the hill to ask for rain or to burn candles on a stone altar imploring their own gods and spirits, the Apus and Illapa, the Inca god of thunder, for the justice which to some extent they are still denied in a Mestizo-dominated society.

Man made structures such as irrigation canals are also objects of ancient belief systems. The Inca belief that abandonment or destruction of irrigation canals would bring bad luck is to some extent still held today.

In order to assure the benevolence of nature's spirits, rules must be obeyed and offers must be brought either directly by the person or family requesting the favour or through an intermediary. Intermediaries in the form of

illness. The principle of reciprocity which manifests itself so intensely in the social sphere of Andean life also encompasses the religious realm.

As indicated above, traditional Andean rituals are carried out at the level of the corporate family, reinforcing its integrity. Throughout the Vilcanota Valley pagos appeal to the Apus for help during magical curing sessions. In a ceremony held at night, the curandero invites the ancestral spirit, usually an Apu, the padrino of the patient, to enter a room in an unlit house. An offering has been prepared for the Apu who some say is short and powerful and who enters the room with much noise. The pago communicates with the Apu requesting his advice with regard to curing the patient or other problems. At this occasion the name of the Apu, godfather of the patient, may be revealed.

Although the Apus can be called upon at any time of the year, there are fixed dates in the calendar when rituals in honor of these and other deities are most common. During carnavales, on the night of February 13 to 14, the Apus are implored to protect the animals - llamas, alpacas and sheep - to let them multiply and be strong and healthy. This ritual, called Ch'allask'a in Quechua, is of great importance in Cusipata where all campesinos who own animals observe it either in their homes or on the mountains where the animals are kept. The ritual requires an offering (despacho) to the Apus accompanied by ceremonial blowing

arranged in a half circle with the green side toward the top. The blowing (k'uay) must be done in the direction of the mountain peak to be implored while pronouncing the Apu's name. Similar rituals are observed on August 1 for the cattle.

Pagos a la tierra (offerings to the earth) are the most important and most frequently held rituals throughout the Vilcanota Valley. They serve many different needs and requests and are carried out with great care and devotion.

In order to achieve a good harvest, prosperity and health for the family, Pachamama must be brought offerings. Individual pagos a la tierra are made at all times during the year when need arises -during sickness, the move to a new house, the safe return from a trip, etc. Offerings may be whole or partial. They differ according to the request made and according to the pago or family who carries out the 'payment'. All offers, whether whole or partial, should contain coca leaves, corn, llama and alpaca fat. According to a curandero (healer) of Chichubamba, offerings can be buried, but burnt offerings are most effective because the smoke is believed to nourish the hills and valleys (see also Custred 1980:197).

The most important pago a la tierra takes place on August 1, when the earth is said to be alive and receptive. This date precedes sowing and ensures the fertility of the land before putting in the seed. These rituals are consi-

agricultural practices. They give the peasant farmers the feeling of control, or at least influence, over their environment. A bad harvest, hail or frost are usually ascribed to a neglect in the obligations to Pachamama. (For descriptions of traditonal rituals in other parts of the Peruvian Andes, see Cayon Armelia 1971, Cuba de Nordt 1971, Delgado Aragon 1971, Delgado Urquizo 1971, Gow 1974).

In some parts of the Vilcanota Valley Pachamama is perceived without Christian attributes, while in others we find different levels of syncretism involving traditional and Christian beliefs. Thus, for example, in Huasao/Quispicanchis, Pachamama is looked upon as the mother of the Virgin Mary, of Jesus Christ, the Holy Spirit and all the angels. She is also considered to constitute, together with Jesus Christ, the universal binomial on which the order of the world rests (Espinoza Izquierdo 1978:39). Sometimes the Virgin Mary is directly equated with Pachamama. Certain aspects of Christianity were difficult to reconcile with Andean religious ideology. The immaculate conception of the Virgin Mary, on the other hand, could be well integrated since Andean cosmology considered the intimate relationship between a woman and the forces of nature responsible for conception, while the existence of the father was important in juridical terms alone (La Revista 3:18).

As discussed above, traditional Andean rituals emphasize the close relationship between Andean man and nature, thereby involving peasants with their physical environment (see also Custred 1980:196). Traditional rituals are normally practiced at the level of the family reinforcing its solidarity and corporate integrity.

Catholic rituals, on the other hand, are not much concerned with nature but instead deal with the social environment, the public sphere of peasant activity, centering on the worship of Saints, statues of which are found in churches throughout the rural and urban regions. Local patron Saints are honored by individual villages while at the regional level several villages and towns join in the worship of a common Saint. (See Custred 1980:195-209 and Mitchell 1972:184-187 for a close description of this type of worship).

The celebration of a fiesta operates within the context of the cargo system -a political and religious hierarchy- characteristic of a community. (The Spanish term cargo means charge or burden -see note 5). At the end of a religious fiesta, a community member, normally one of the wealthier villagers, is selected as sponsor, known as alfarez, for next year's fiesta. The selection is usually made by the council of community members who have already held cargos. As has been emphasized by Harris (1964:31), Nuñez del Prado (pers.comm.), other investigators and the comuneros along

often are persuaded while drunk. The carguyoc (person chosen to fulfill the cargo) has one year to mobilize aid through his established network of kinsmen, mainly compadres, friends and neighbors. He must provide food, liquor, one or more bands, church services, candles and hospitality for people who are invited from outside the community for one or more days depending on the importance of the event. Within traditional communities this type of celebration functions to level the wealth and to give rise to a hierarchy of prestige with the mayor at the top. The more lavish such celebration and the more frequently a person sponsors such an event, the higher his prestige. It is very difficult to refuse taking on a cargo once a man has been elected carguyoc. Refusal to do so damages his esteem within the community and -according to the priest of Urubamba- brings about the punishment of God. Yet the comuneros interviewed deplore the tremendous costs of sponsoring a large fiesta such as the Fiesta de la Cruz held in May in the district of Urubamba which may leave a comunero and his family in debt for many years to come and may oblige him to sell important assets such as animals (mayor of Urubamba and carguyoc of the previous year's Fiesta de la Cruz, pers.comm.).

The cargo system is described as economically ruinous by the population questioned in this and other studies (see also Auta - Centro Basico de Capacitacion Rural, 1973 and

forefathers have wasted a lot of money. Whenever they did not have money, they had to take a loan, giving their land in mortgage. If they were unable to pay back the loan within a certain time, they lost their land. This is still happening today". A peasant farmer in Cusipata felt that "the cargo is a Spanish custom; it serves to keep the Indians poor. Without property and education, the Indians can be better manipulated". Although one comunero described the cargo as "a custom which we cannot shake off", others stressed the inconveniences and often disastrous effects caused by the enormous expenses, disintegration among the population, drunkenness and violence that follow such fiestas. These observations agree with those of Malengreau (1972b:768) whose study in Cusipata revealed that due to the cargo system "the village fiesta becomes an event of disintegration rather than of integration" (translation mine). They are also reflective of Mitchell's (1972:186) findings that "much of the fighting in Quinua is focused on participation in the cargo system". (See also Wolf 1957:4). Pressure to take over a cargo is generally exerted by the villagers who have already done their duty of sponsoring a fiesta on those who yet are to take over this 'burden'.

Fiestas such as the Spring Festival held throughout the Vilcanota Valley, the anniversaries of Cusipata and Urubamba, or fiestas in honor of less prominent Saints do not

however, which require exaggerated expenses to those who must sponsor the celebration of a high-ranking Saint are considered by the villagers of the study regions prime factors which cause village disintegration (see also Harris 1964, Malengreau 1972:767-768, Mishkin 1963:468).

Effects of Religious Beliefs and Practices on Irrigation Agriculture

Traditional beliefs and the cargo system influence irrigation agriculture in different ways. The traditional worship and personification of earth and water combined with feelings of love, fear and obligation in relation to these phenomena influence the actions of the campesinos. The land is worked in order to survive. At the same time, however, the peasant farmers feel obliged to work the land and tend their animals to satisfy Pachamama and the Apus who, they believe, watch over these activities. Strong belief in the severe consequences of interfering in a destructive way with the land and the domain of the lagoons, springs and irrigation systems is adaptive in view of the conservation of the vital resources land and water.

The peasants' concern regarding earth and water and the spirits residing therein must be taken into consideration in development projects. The refusal of villagers to participate in a certain project can be rooted in their

Tintinco failed because of strong opposition by the people of this village. An intervention of this type is believed to evoke not only the anger of the lagoon but also of the Apus, guardians of men and animals.

The people of Yanahuara have also testified that the belief in the lagoon Yurajcocha has prevented many villagers from considering irrigation development that would utilize its waters. Extreme water scarcity within the last ten years has modified this belief somewhat and villagers are now inclined to solicit help for the construction of a dam at the lower end of the lagoon.

The irrigation project in Cusipata, on the other hand, is considered beneficial by the villagers in view of the fact that a plentiful water supply no longer requires irrigating by night which provokes the malevolent wind spirits.

Although some Catholic rites play a role in protecting crops against the rigors of climate such as hail, frost or disease by sprinkling holy water (Mishkin 1963:425), these beliefs affect primarily the social sphere of life and are not much concerned with physical environmental criteria.

The cargo system, however, does affect irrigation agriculture. Great expenses involved in the sponsoring of major fiestas further depress the already low economic level of the communities and absorb funds which are much

and agricultural development which would benefit from any funds that could be made available. The great concern of the peasants regarding the improvement of irrigation agriculture, for which there is little or no cash available, contrasts with the lavish expenditure of funds on fiestas which are considered a 'burden'. This contradiction has also been addressed by Harris (1964:27) who found that "the irrational, uneconomic aspects of fiesta behavior stand in marked contrast to the economic individualism, constant penny-pinching and obsessive involvement with price which is one of the most pronounced features of highland Indian life".

The time used in the preparation of fiestas is another factor that affects irrigation agriculture. The carguyoc, and his network of kin, friends and neighbors must dedicate much time in organizational activities. Especially the Fiesta de la Cruz in the district of Urubamba which takes place in May during the height of harvest time places the sponsors under considerable time constraints and is known to negatively affect that year's harvest.

The sponsoring of a large fiesta and the debts incurred forces many carguyocs to seek work outside their community. As discussed in the section on male/female roles in subsistence agriculture, prolonged absences of adult males from agricultural and irrigation activities negatively affect

solicit help.

A combination of factors such as increasing difficulty to sell produce at a profitable price, to find work outside the community, rising costs of sponsoring a *fiesta* and the increasing opposition of young *comuneros* to take over major religious *cargos* may eventually cause these events to disappear or to be carried out in a less costly manner.

This chapter has tried to bring together the great variety of organizational principles involved in peasant subsistence. Chapter IV is concerned with the organization of irrigation which, although largely autonomous, is linked to the organizational principles discussed above.

The contemporary organization of irrigation along the Vilcanota Valley is far from homogeneous. Although 'Regulations for Water Users' (Reglamento de Organización de Usuarios de Agua) were issued in June of 1979 by the Ministerio de Agricultura in cooperation with the Administración Tecnica del Distrito de Riego and approved through the Decreto Supremo No. 005-7-9-AA, (Ministerio de Agricultura, 1980:101), the degree to which these laws have been accepted varies between regions and even between neighboring villages. We find a whole spectrum of organizational forms ranging from full acceptance to total rejection of these regulations, a situation well reflected in the three regions under study: 1. The Rio Tigre Canal System in the district of Cusipata, 2. the Rio Chicon Canal System and 3. the Rio Pucara Canal System, both situated in the district of Urubamba. For an overview of the canal systems see map 4.

This chapter is specifically concerned with the way in which irrigation is organized along the three canal systems. The discussion begins with the most traditional irrigation system which exists along the Rio Pucara and terminates with the Rio Tigre canal system where extensive development efforts are taking place. Focus is on the following issues:

A. Irrigation in Historical Perspective in the District of Urubamba.

D. The Rio Chicon canal system.

E. The Rio Tigre canal system and the impact of international development on irrigation.-

In order to better conceive of the circumstances that gave rise to and/or surround the organization of irrigation along each canal system, a short historical review will precede the discussion of contemporary irrigation in the districts of Urubamba and Cusipata.

A. Irrigation in Historical Perspective in the District of Urubamba.

Much of the land within the district of Urubamba belonged to the eleventh Inca Huayna Capac, to his mother Mama Ocllo and other members of the Inca elite. The wide network of canals, some still in use and others partially or entirely deteriorated, the carefully executed terraces of Chichubamba and the ruins of Inca residences testify to the great importance of this region in Inca times. The high standards to which the pre-Hispanic inhabitants worked can also be seen in the precisely inclined fields which allow water to flow at the speed required to penetrate to the root system without causing soil erosion.

The Inca canal system within this district, which can be recognized by its characteristic stone-lined canals, is built of materials from the immediate environment (see also

a mixture of sand from the Rio Vilcanota with other substances not precisely known today. The intakes (bocatomas) were always shaded with trees as were most of the canals to minimize evaporation and keep the water well oxygenated (F.Huaman, pers. comm).

Environmentally, the Chicon river valley has changed considerably since the 16th century when this region had beautiful tree plantations which furnished wood and supported large populations of deer (Villaneuva 1970:52). Deterioration of the environment throughout the centuries combined with the partial decay of the upper Inca canal system, the destruction of the reservoir Ocororuyoc and the recession of the glacier Chicon by sixty meters in fifty years (Kalofatovich, geologist, pers. comm.) are phenomena which no longer permit the once excellent harvests (Vasco de Contreras y Valverde 1649). According to Manuel Orihuela, a local historian, the abundant water supply in pre-hispanic times guaranteed a second and even third crop within this district.

The water distributor (unocamayoc in Quechua) was responsible for the distribution of water to the lands of the Inca, the Sun and the ayllus (see chapter II -Historic Setting- for a discussion of land tenure in Inca times). The lands of widows, the sick and those who were away on the Inca's missions were irrigated before all other lands in an

taken over by encomendêros (Spanish administrators) and by the clergy; the poorest land was left to the Indians for their subsistence. Haciendas occupied a considerable portion of the land that is now under the control of the communities Yanacpnas, Chichubamba, Q'atan and Yanahuara and all of the land that now constitutes the community Chicon. As was the custom, hacienda owners and the clergy had priority to the water which had become a scarce resource due to the recession of the glacier Chicon and the deterioration of the upper canal system of the Rio Chicon and the reservoir Ocuroruyoc. The great water scarcity that exists today along the Rio Pucara is mainly due to partial dessication of the lagoon Yurajcocha, to canal deterioration, and an increase in population.

According to the municipal authorities of Urubamba, during colonial times the distribution of water in the district of Urubamba was supervised by a curaca (an Indian chieftain executing Spanish orders), then by a member of the varayoc (an Indian hierarchy with the mayor at the top), and most recently by the municipal or community councils. Preferential access to water was accorded to hacienda owners and the clergy even after the Agrarian Reform of 1969 when water was sold by the municipal council and whoever could afford to pay most, received most water. Since at that time the water distributor also acted as irrigation judge, the

The Rio Pucara Canal System - Contemporary Irrigation Organization

The people of Yanahuara have not accepted the national 'Regulations for Water Users' issued by the Ministry of Agriculture in 1979 which are discussed in the following section. Neither have they formed irrigators' organizations on their own. Customary law applies to all irrigation matters which are under the control of the community authorities, with the community president in charge of all major decisions. The villagers meet once a year or more frequently if necessary in order to discuss irrigation in conjunction with other communal affairs. Canal cleaning and repairs are organized by communal authorities and the distribution of water occurs on a first-come, first-serve basis. Statistics regarding the number of water users in Yanahuara and the area irrigated can be seen in table 3.

Canal cleaning and maintenance activities are done in collective labor (faena), arranged by communal authorities. The principal canals are cleaned by all water users. Lateral canals are cleaned by only those peasants who use these particular canals to irrigate their fields. The annual canal cleaning takes place between June and August. Attendance is generally very good -close to 100 percent- and whoever cannot attend contributes a small sum for food and drinks. At the end of the faena, one person is elected as

for each lateral canal and provide the workers with chicha, food, and piquante (a special type of spicy food). This task is considered a cargo that brings prestige to the person sponsoring the event.

The inhabitants of Yanahuara do not pay fees for the water they use and consequently do not have an account from which to pay expenses for repairs. When repairs are necessary, each water user must contribute a small amount of cash. According to the villagers of Yanahuara, people who own more land generally voluntarily contribute a larger sum than those who own little. Problems seldom arise with regard to canal cleaning and repair. Drainage during the rainy season does not present a problem either since excess water drains properly through the canal network into the Urubamba River. The distribution of water, however, causes disputes, serious confrontations and even physical aggression, including violent fights. Competition for water is severe during the dry season and at the time of planting. For this reason the task of irrigating fields requires the presence of two or more people. While one person irrigates, family members and friends must guard the canal to prevent other peasants from diverting the water. Women frequently patrol the canal with a stick in their hands because according to the comuneros nobody dares to fight with a woman. Yet, it has happened that not only fighting men but also fighting

it is difficult to imagine that fights of the type described above actually do occur in this otherwise friendly and well organized village. A statement made by one of Hunt's (1974:150) informants in Mexico very well reflects the situation in this community where "water makes people dishonest and peaceful men fight. If there is not enough, even the most honest man will be tempted to get an unfair share for himself and his friends ... if he can find the way".

At the height of the dry season it may occur that all water evaporates before reaching the lower parts of the community. Since water for both, drinking and irrigating, flows through the same canals, the residents of this area must fetch drinking water from a spring at a distance of three kilometers and when it dries up as well, they are forced to consume the polluted water from the Urubamba river in the valley below.

In August and September when the land must be prepared for sowing, water is still extremely scarce. During very dry years, the sowing of crops must be postponed. When water is available at the time of land preparation, the highest lying sector Pucara irrigates first. The three sectores of Chaquihuaico, Rinconada and Mikay (see map 7) irrigate simultaneously which makes it especially difficult to get access to water which, according to unwritten laws,

fields without further problems. As discussed above, the frequent occurrence of water theft requires that two or more people guard the canal while one is irrigating. Water theft occurs most frequently at night, when its diversion cannot be observed from a distance.

The problem of getting irrigation water at sowing time is further intensified by the fact that this activity must be coordinated with the soliciting of help in ayni from kin, neighbors and friends and the borrowing of oxen and plough if these are not owned by the peasant. All the constraints involved in this vital task place much stress on the individual families and, as detailed above, conflict occurs frequently. Despite the severity of the conflicts which arise in response to the tremendous scarcity of irrigation water, settlement is usually achieved within the community with the help of the justice of the peace (juez de paz). After the rains have started, previous conflicts are usually soon forgotten.

The irrigators of Yanahuara felt that the severe water scarcity is the reason for this community's inability to organize its distribution through communal authorities and is also a major factor as to why an irrigators' association has not been established thus far. Nobody could or would want to be responsible for the allocation of water and its distribution, an impossible task given the virtual lack of

associations, irrigation tasks are vested within the corporate community. Representative leadership is established through the community council, shared ownership is expressed in communal rights to land and water, and collective action occurs during elections and the maintenance of the canal system by the villagers, but not in the distribution of water. As will be discussed in chapter V, autonomy vested within the community is strong, since extra-local decision makers do not intervene.

The following discussion of the organization of irrigation along the Rio Chicon and Rio Tigre canal systems requires an introduction to the national 'Regulations for Water Users' (Reglamento de Organización de Usuarios de Agua) which were issued by the Ministry of Agriculture in 1979 and have been accepted to different degrees by the respective irrigators' associations along the two canal systems. The information provided in this section is as stated in the 'Regulations for Water Users' and has been discussed with the indigenous irrigators regarding its applicability to the study regions. Solanes (1983) research on "Irrigation Users Organizations in the Legislation and Administration of Certain Latin American Countries" has also been consulted.

In June of 1979, the Regulations for Water Users were issued by the Ministry of Agriculture (Ministerio de Agricultura) to serve as guidelines in the organization of irrigation throughout Peru. According to these Regulations, indigenous water users have the right and duty to participate at three organizational levels - The Irrigators' Board (Junta de Regantes) at the level of the irrigation district or the valley, the Irrigators' Commission (Comisión de Regantes) at the level of the canal system, and Irrigators' Committee (Comité de Regantes) at the level of each village (see figure 2).

Irrigators' associations, although operating within increasingly larger units -committee, commission and board- are governed by a set of equivalent regulations. Individually or jointly these Irrigators' Associations perform three basic functions -decision making, dispute settlement and executive or administrative tasks (see also Solanes 1983: 56).

All three organizational levels -Irrigators' Board, Irrigators' Commission and Irrigators' Committees are legal corporate bodies under public law. With the exception of the Irrigators' Committees, they acquire legal personality (personería jurídica) by being entered in the Registro de Personas Jurídicas, Libro de Asociaciones (Register of Legal Persons, the Book of Associations). The president of each

1979, art.4). If conflict cannot be resolved by the president of an irrigators' committee, the case is brought before the president of the irrigators' commission or the irrigators' board. If conflict resolution is not achieved at these levels, the representatives of the Ministry of Agriculture for the particular district will intervene.

Some of the requirements that make Irrigators' Associations legal bodies are: compulsory membership which cannot be resigned; rights to require services, and payment from or levy fines on, its members and to issue regulations as detailed below (see also Solanes 1983:4).

Irrigators' Boards are recognized by orders of the Ministry of the Directorate while the Irrigators' Commissions and Committees are granted recognition by the Technical Administrator of the Irrigation District. (Reglamento de Organización de Usuarios de Agua, 1979, art. 17, 18). The Water Authority of the Ministry of Agriculture (Ministerio de Agricultura, Sector de Riego) has the right to supervise the activities of the Irrigators' Organizations (Solanes 1983:47).

The bodies which constitute each of the irrigators' associations are the Executive Board (Junta Directiva) and the General Assembly (Asamblea General). The Executive Board consists of:

- a president (presidente) in charge of all major

- a vice-president (vice-presidente) who takes over the president's functions in his absence;
- a secretary (secretario) who records the affairs of the organization, taking minutes during all meetings;
- a treasurer (tesorero) who is responsible for recording all financial matters and for collecting water fees;
- one or more water distributors (tomeros) who distribute the water during the dry season.
- one or more delegates (vocales) who inform the water users about all relevant matters and replace the board members in case of absences.

Depending on the policies of the respective irrigation committee, a water distributor may or may not receive pay for his efforts. All other board members work without remuneration.

The Executive Board is elected every two years in the General Assembly from its integral members, all of whom are water users. It has the following functions: to call meetings at least twice a year at a fixed date which are to be attended by water users and water authorities; collect water fees; bring books and accounts up to date; present the General Assembly with a budget and work plan; survey required legal actions; administer economic resources;

The General Assembly consists of all water users. It approves the administrative and economic actions of the Executive Board and the work projects suggested by it. It also approves and authorizes loans and their financing, determines the fees that must be paid by the users; establishes the administrative responsibility of the members of the Executive Board; authorizes the president or another person to initiate actions; removes members of the Executive Board if necessary; resolves issues of interest to irrigators that cannot be handled by the Executive Board.

The election of the Executive Board by the General Assembly is one of the most important and fundamental tasks (see also Solanes 1983:17). Election of new members to the Executive Board must take place two months before the period in office of the preceding members ends in order to allow the newly elected members enough time to familiarize themselves with the new tasks. The election committee is presided over by a representative of the Mininstry of Agriculture who cannot, however, oppose any resolution taken by the General Assembly. Any active water user can object to the nomination of a candidate he believes does not fulfill the necessary requirements. Each election must be announced ten days in advance and requires an attendance of more than fifty percent of its members. If attendance is lower, the election must be repeated and will then be held

three different levels of indigenous irrigators' associations (see figure 2).

Irrigators' Board (Junta de Regantes)

The Irrigators' Board which operates at the level of the Irrigation District includes one delegate from each Irrigators' Commission. The Executive Board of an Irrigators' Board consists of a president, vice president, secretary, treasurer and one or more delegates. The functions of the Irrigators' Board are: to represent the Irrigators' Commissions and Committees and to assure that they comply with the obligations imposed by the General Water Laws (Ley General de Aguas) and the Regulations for Water Users (Reglamento de Organización de Usuarios de Agua); to carry out studies on water and soil resources, and to aid in their development; to organize courses in the use of the resources water and soil and in administrative matters to be held in the communities (Reglamento de Organización de Usuarios de Agua, 1979, art. 11-16). The Irrigators' Board also supervises the payment of fees and dues by its members.

Irrigators' Commission (Comisión de Regantes)

An Irrigators' Commission operates at the level of the canal system. Its Executive Board consists of a president, a vice-president, a secretary, a treasurer and several

the Irrigators Board. The Executive Board of the Irriga-tors' Commission represents medium and small agriculturists who meet the requirements for membership (as will be stated below), and cooperatives or associate agricultural enterprises.

The functions of the Irrigators' Commission are: to propose to the Water Authorities (Autoridades de Aguas) the quotas which must be collected to finance the budget; to support the Water Authorities and to study and improve irrigation and cultivation methods; to coordinate yearly work programs with the Technical Administration of the Irrigation District (Administración Tecnica del Distrito de Riego), to report on issues such as economic development, conservation, water-user fees and to intervene in cases where conflict cannot be resolved at the local level; and to supervise the administrative duties of the water users (Reglamento de Organización de Usuarios de Agua, art.11).

Irrigators' Committees (Comités de Regantes)

At the village level, water users participate through Irrigators' Committees in the organization of irrigation. The sphere of activity and jurisdiction of each committee coincides with the physical boundaries of each village. Every two years during the election of a new Executive Board, the General Assembly also elects a delegate from

Besides elections, the main functions of [illegible] Committees are: to arrange for and execute the cleaning and repair of the irrigation canals and the distribution of water, and to settle disputes about irrigation that occur within the limits of the community.

The Articulation of Local Irrigators' Associations in Higher Levels of Decision Making

Apart from adjusting their activities within the organizational framework which consists of increasingly higher levels of indigenous decision making as discussed above, the irrigation authorities must also coordinate their actions with the local representatives of the National Water Authority (Administración del Distrito de Riego del Ministerio de Agricultura). The technical administrators (tecnicos) of this institution who occupy an office within each district, have the right and duty to supervise activities such as elections -although they cannot change the resolutions taken by the indigenous irrigators- call meetings with regard to technical matters such as cultivation and irrigation and settle conflict that cannot be resolved by the Irrigators' Committee or the Commission.

At the level of the irrigation district or valley, the representatives of the Irrigators' Board directly interact with the Water Authority of the Ministry of Agriculture

the water users to participate [illegible]
policies.

Membership in Irrigators´ Associations

A water user is legally defined as a public or private person who uses water for irrigation, is registered in the Padron de Usos de Agua (Book of Water Users) of the Technical Administration of the Irrigation District and has the following rights and obligations (irrigation authorities, pers. comm.; see also Reglamento de Organización de Usuarios de Agua 1979:7).

A water user´s rights are:

- to have access to irrigation water, to canals, bridges across canals and footpaths alongside canals;
- to participate in meetings;
- to elect representatives and to hold office;
- to receive information periodically on the administrative situation of the organization;
- to have access to the books and inventories;

A water user´s obligations are:

- to use water economically and efficiently;
- to contribute proportionally to the construction, improvement and maintenance of the irrigation system; (this rule is presently not enforced along the Rio

- to attend meetings;
- to pay water fees regularly;
- to advise the local water authority if he does not use water or only uses part of the water allocated to him;
- to vote and to stand for election.

A new water user is accepted into an Irrigators' Committee if he/she fulfills the above requirements. Registration into the Padron de Regantes (Book of Water Users) is free of charge and legalizes the action. Newly accepted water users are normally the sons or daughters of irrigators who have inherited land and have set up their own household.

If a peasant holds irrigated land in more than one community, he must be a member of each Irrigators' Committee which distributes water to his fields. Thus, although a person can only be considered comunero in the community where he actually resides, he must be a member (usuario) in various Irrigators' Committees. He cannot refuse to belong to an Irrigators' Committee or resign from it as long as he owns irrigated land within the boundaries of a respective community. In the case of a landowner/tenant relationship, it is the owner of the land who must belong to the Irrigators' Committee, regardless of whether or not he works his own land.

The irrigators in the districts of Cusipata and Urubamba

and furthermore be responsible, esteemed, literate and have resided for at least two years in the community (see also 'Regulations for Water Users', article 54).

Water users who hold office in an irrigators' association are subject to legal action and can be dismissed from office if they take personal advantage of their position, fail to attend three consecutive meetings or eight meetings during their mandate, or are convicted of a crime requiring imprisonment (see also 'Regulations for Water Users, art. 66.1; 66.2, 66.3).

The 'Regulations for Water Users', as discussed above, are effective within the respective irrigators' associations along the Rio Chicon and Rio Tigre canal systems unless otherwise stated.

D. The Rio Chicon Canal System - Contemporary Irrigation Organization

The four villages of Chichubamba, Q'atan, Chicon and Yanaconas have accepted the 'Regulations for Water Users' to the extent that an Irrigators' Committee has been established within each village. The number of water users belonging to each committee and the amount of land irrigated can be seen in table 2.

The regulations governing the committees, their struc-

as described in the previous section. The Executive Board of each committee consists of a president, a vice-president, a secretary, a treasurer, a water distributor and two or more delegates. All authorities are peasant farmers who are elected by the irrigators. They do normally not own more land or animals than does the average villager and may not be involved in activities outside subsistence agriculture. The president of each committee calls meetings twice a year to discuss the cleaning and maintenance of canals, the distribution of water and water fees. Once a year the irrigators' committees of the four villages along the Rio Chicon canal system meet to discuss these issues jointly. A separate meeting takes place every two years to vote for a new executive board. Neither an Irrigators' Commission at the level of the canal system nor an Irrigators' Board have been established, a fact which concentrates a considerable degree of autonomy at the local level as will be disussed in more detail in chapter V.

A high degree of autonomy is vested within each irrigators' committee vis-à-vis the community. Apart from extensive repairs of the irrigation canals, which have not occurred since the landslide in 1940, as discussed earlier, the irrigation authorities can make decisions about all routine irrigation tasks without soliciting the consent of

Irrigation Sector of the Ministry of Agriculture, who occupy an office in Urubamba, are almost entirely restricted to technical matters. Although these governmental representatives are supposed to intervene in case of organizational problems and the occurrence of conflict, their assistance in these matters has rarely been required. According to the local authorities these representatives generally intervene only when it is time to collect ten percent of the water fees.

Each of the four Irrigators' Committees has a bank account at the Banco Agrario del Cuzco where water fees, fines for water theft and for not participating in canal cleaning and maintenance, as well as loans, donations and the accumulated interest are kept. In this district each water user pays 200 soles for irrigating one topo of land, regardless of whether his land is located at the upper or lower part of the irrigation system. Ninety percent of the water fees are allotted to the committee's bank account, ten percent go to the Ministry of Agriculture. The funds are used for repairs of the canal system and for the water distributor who works for three months - August to October - every year. During the time when this research took place, the water distributor received the sum of 15,000 soles (equivalent to between three and four US dollars) a month.

times. Major repair work became necessary following a landslide in 1942 which destroyed part of the lower irrigation canal in Urubamba. Repairs were organized and executed through local and regional efforts.

The irrigation canals are cleaned once a year during five Sundays, starting in July. Participation is generally very good and, according to irrigation authorities, was close to 100 percent in 1985. The presidents of the Irrigation Committees call the work faenas. According to local regulations, all water users (usuarios) must contribute equally to maintenance activities regardless of the amount of land they own and irrigate. Those families which are unable or unwilling to participate in canal maintenance must pay a fine which equals the amount of wages received for from one to three days of labor. The mayor of Urubamba, however, encourages all water users to participate themselves in the faena to enhance group solidarity. The upstream communities only engage in cleaning and repair activities up to the point where the canals leave the community.

The yearly cleaning activities are no longer accompanied by a fiesta, although in some neighboring communities music is still played at that occasion (N.Caceres, pers.comm.). All participants, however, enjoy a meal and drink chicha

(maize beer) prepared by their wives.

Water Distribution

Along the Rio Chicon canal system water is distributed by a tomero during the months of August, September and October when the farmers prepare their fields and get ready for sowing. These are the months of greatest water shortage, although water may be very scarce already in May and June. Five days before a farmer intends to irrigate, he must make arrangements in writing with the water distributor who meets the people every day at 5 A.M. and 5 P.M. high up at the water intake. Water is sold for 200 soles per topo in all communities and water is distributed to those who have made arrangements for a specific day on a first-come, first-serve basis. In order for a peasant to get a second turn to irrigate, he must wait until all other water users have had a chance to irrigate their fields.

This system of water distribution is very time-consuming, since the people may have to climb many times to the intake before they can get their turn. During periods of great water shortage the peasants may have to wait up to four weeks to get their turn, during which time the crops may perish.

The cooperation among water users in the Rio Chicon region is good with regard to their participation in meetings, in decision-making and in cleaning and repair activities. Water drainage does not present a problem along

this canal system where excess water during the rainy season drains through the network of canals into the Urubamba river. During 1984/85 all water users participated in maintenance activities. The irrigators remarked that considerable conflict with regard to access to water, however, arises during the dry season and especially at the time when the land must be prepared for sowing. Disputes and fighting are also likely to occur during the veranillos, dry spells which occur during the rainy season in November and January when the water distributor is not working. At these times tremendous competition for the scarce water arises within and between communities. Water theft, which is punished by the president of the Irrigators' Committee, who also acts as water judge (juez de agua), carries a fine from 15,000 to 20,000 soles, a sum which is placed on the committee's account at the Banco Agrario de Cuzco. Conflict that cannot be resolved locally through either the committee president or the representative of the Ministry of Agriculture in Urubamba is brought before a judge in Cuzco who fines the thief with a sum up to 500,000 soles. This sum is not added to the committee's bank account but instead goes to the Banco de la Nación. The laws involved in conflict resolution strongly mitigate for its settlement at the local level, since the costs for extra-local handling are extremely high and out of the range of most peasant farmers, and because the amount to be paid is not attributed to the committee's own account.

Ready access to irrigation water during the dry season has become more difficult especially during the last twenty years due to population pressure and environmental constraints such as the recession of the glacier Chicon. As is the case in Yanahuara, the people along the Rio Chicon believe that their problems could be solved by rebuilding the irrigation system as it existed in Inca times. This would mean improvement and partial reconstruction of the upper canal system which would provide the upstream communities of Chicon and Yanaconas with more water, especially for their pastures. The villages of Chichubamba and Q'atan need reservoirs to store and better distribute the water throughout the year. This type of development would permit the peasants to keep more livestock upstream and to cultivate two and perhaps three crops in the downstream communities. Despite repeated efforts on the part of the villagers to obtain help from outside the communities in the development of their irrigation infrastructure, they have thus far not been able to receive it.

Assistance from outside in the form of International Development, however, has been provided for the Rio Tigre canal system, as discussed in the following section.

E. The Rio Tigre Canal System - District of Cusipata

Irrigation prior to International Development

Spotty archaeological remains of ancient canal systems indicate that Inca and perhaps pre-Inca cultures had

canals and intakes on the hill Yayamarca above Cusipata, in Tintinco, Paucarpata, Colcca and in Silletayoc on the way to Chillihuani have been dated by Carbon-14 between 1400 A.D. to 1800 A.D. (J.Maza, archaeologist, pers.comm.). These canals provided irrigation water not only to the district of Cusipata but as far as the town of Quiquijana, situated eleven kilometers north of Cusipata. Maza's research has further indicated that on the hill Yayamarca modern canals have now been constructed where ancient aqueducts existed before.

Documentation about irrigation activities prior to the inception of the international development project is very scarce and the history of the region begins with the oral accounts of the people who cultivate the land along the Rio Tigre.

Before 1973 the people along the Rio Tigre derived irrigation water from an earth work canal -Mayu Uno- which is believed to date from about 1800 A.D. Oral history declares nothing more of this canal than that "it was built by our forefathers" and there are no written records of its construction. Irrigation tasks were organized by the community council of each village. Cleaning and repair of the canal system was carried out in faena (communal labor), and labor was supplied by each community for only that section of the canal which irrigated the land within communal limits. The village of Colcca was connected by a

3.7 kilometer long lateral canal to the new project. Prior to that time the village depended on rain-fed crops.

Formerly the distribution of water occurred under agreement between villagers that every water user would receive a turn to irrigate before any one could have a second turn. A member of the communal council had to meet the irrigators at the main intake to assign turns to the people who were waiting. When water was plentiful, peasants were allowed to irrigate all their fields. When it became scarce they only could irrigate part of their land, in proportion to the water available. During the rainy season (October to April) problems seldom occurred with regard to access to water except for the veranillos calorosos, which are dry periods that occur during the rainy season. During the dry season (May to September), the highest lying community Tintinco and the upper part of Paucarpata still had enough water. There was some water shortage in the lower part of Paucarpata. Water shortage was often severe in Cusipata and Colcca.

Conflicts concerning access to irrigation water often arose during the dry season and especially at the time of land preparation (August to September). Those people who needed to irrigate their fields had to assemble every morning at the main intake starting at 3:00 A.M., until they finally got their turn to irrigate. Disputes about access to water often escalated into serious physical fights, primarily between people of different communities, and were

however, did not necessarily mean that a peasant could actually irrigate his fields. Other peasants who were in urgent need of water, often diverted the water to their own fields. Minor conflict that arose in response to access to water, was normally settled within each community by the justice of the peace (juez de paz). Severe cases were brought before extra-local authorities such as the governor or district judge.

Although competition over access to irrigation water existed within communities, it was most pronounced between them. The people upstream considered themselves dueños del agua (owners of the water) and were reluctant to allow the lower communities its use prior to having satisfied their own needs.

The problems involved in getting a turn to irrigate and in preventing water theft were further aggravated by the fact that the Mestizos (mistis in Quechua) who are influential people such as large land owners, the clergy, judges etc. did not line up for their turn but diverted water to their fields whenever they wished, regardless of whether or not another person was irrigating at the time. Mestizos did not participate either in the cleaning and repair of the canal system. Following the Agrarian Reform in 1969 and land distribution among the peasants, the Mestizos could no longer divert water without announcing in advance the time at which they intended to irrigate their fields. Now they

not attending canal cleaning and repair activities.

Within villages irrigators cooperated in different ways. Thus, for example, to avoid water theft, two or more family members guarded the canal while another was irrigating. A second strategy of cooperation required every peasant farmer to help the person preceding him in his turn to irrigate. The assisting farmer was subsequently helped to irrigate his own fields by the person who had the turn after him (Malengreau 1974:195). This system of cooperation also guaranteed that the irrigators made efficient use of water and restricted irrigation to only those parcels of land to which water was actually allocated.

A first attempt to expand the canal system in order to provide Cusipata with more water was made during the 1960's by the Institución de Ayuda Tecnica de Comunidades Campesinas (Institute of Technical Aid to Peasant Communities). At the prospect of having canals built through their scarce land, the people of Tintinco vehemently opposed this plan which eventually had to be abandoned (Malengreau 1972a:199). Incidents of this type further divided the communities. The people of Tintinco also felt that they had to affirm their control over water against the district capital Cusipata, for which they had to provide collective labor on tasks such as road building that did not benefit them directly.

Finally in 1973 the inhabitants of Cusipata with the help of some of the people residing in the lower part of

irrigation canal Pucara Punco despite some opposition from Tintinco. The construction took until 1976 during which time an Irrigators' Commission (comisión de regantes), sub-sector Cusipata, was formed. It was responsible for the organization of irrigation along the entire canal system. Its executive board consisted of a president, vice-president, secretary, treasurer, water distributor (tomero) and delegates (vocales). Canal maintenance was done in collective labor (faena). Those water users who did not participate in the work activities had to pay a fine. The distribution of water was handled in such a way that each family was given a turn to irrigate, but the Mestizos, because of the influential positions they held, still had the right to schedule their turn before the Indian peasants. The Irrigators' Commission, once established, had autonomy vis-à-vis the communal councils and the municipal council of Cusipata with regard to canal maintenance, the distribution of water, and election procedures.

The construction of the canal Pucara Punco through communal efforts slightly improved the water situation and thus agricultural production for the lower part of Paucarpata and Cusipata, but water was still very scarce, and verbal as well as physical fights for the precious liquid continued, mainly between villages.

The construction of a new canal system which started in 1981 through international efforts (as will be discussed

year later for Colcca. But the upper villages continued to consider themselves the 'owners of the water' despite the publication of the 'General Water Laws' (Ley General de Aguas) in 1970 which dictate that all water in Peru belongs to the state. Living closest to the source, the people of the upstream communities have always had first access to the water and in case of disputes with the lower communities could shut the water off by diverting it into lateral canals further upstream or at least make access to it more difficult. This strategic position conferred a feeling of power to the upland residents who otherwise were at a disadvantage vis-à-vis their competitors below who enjoyed better soil, more favorable climatic conditions and easier access to markets.

In order to maintain control over water, the only power at their disposal, the communities situated at the upper slopes along the Rio Tigre canal system have not wished to accept the 'Regulations for Water Users', nor have they been in favor of irrigation development projects which reinforce these regulations. Upstream communities along the Rio Tigre and in other parts of the Vilcanota Valley consider the effects of these laws as weakening their socio-political and economic position, mainly because they dictate that each water user has the same right to water regardless of his residence in relation to the water source. Furthermore, according to the 'Regulations for Water Users', water must

standing these kinds of concerns, factors such as the rapidly increasing population in the Andean Highlands of three percent (Internationales Handbuch, 1981), combined with high unemployment rates in the cities and extremely low wages, have led to both national and international efforts to improve existing irrigation systems and to build new canals.

Irrigation following International Development

International development efforts were initiated in 1980 in the district of Cusipata. Irrigation development in this region consisted of the construction of two principal canals (4.6 and 5.4 kilometers long respectively) along the right and left shore of the Rio Tigre. Part of this new canal system had existed previously but required improvement, part of it was newly constructed. These, as well as several lateral canals - one of which extends over a distance of 5.7 kilometers to Colcca - conduct water from the Rio Tigre to four villages - Tintinco (3,491 m), Paucarpata (3,412 m), Cusipata (3,314 m) and Colca (3,300 m), irrigating a total area of 476 hettares. (See map 5).

The objectives of the development efforts were to improve the first crop, to encourage the planting of a second crop and to improve pastures through a more plentiful supply of water and new and improved methods of agricultural production and livestock raising. These measures should

most of whom are small landowners with a better and more varied diet and cash income through market activities. It was also hoped that by creating more work within the agricultural domain the standard of living would be raised within the communities, making seasonal and permanent migration to the overcrowded cities less prevalent.

The municipal authorities of the district capital of Cusipata, who had expressed concerns regarding the scarcity of water, were approached by international developers working in the Vilcanota Valley regarding irrigation development for the villages Cusipata, Paucarpata and Tintinco. They consented to the construction of the canals and accompanying projects. The community Colcca, situated six kilometers north of Cusipata, requested irrigation development on its own behalf after the construction of the canals to Cusipata had already been started. Both Cusipata and Colcca, which are located at the lower part of the irrigation system, were in urgent need of water and welcomed the opportunity to improve old and construct new irrigation canals.

The inhabitants of the higher lying communities Paucarpata and Tintinco, many of whom speak only Quechua, were not, or only very superficially, tied into the negotiations regarding the construction of the canals. They were not in favor of canal construction, since they did not suffer from water shortage. The canals, however, were built providing

better first crop as well as a second crop. Canal building was accompanied by an instruction program in agriculture, in the raising of lifestock, in health, hygiene and credit facilities. Complementary measures such as schools, kindergartens, community halls, and a first aid station were built in some or all of the communities and were very much appreciated by the recipients who provided most of the work required for their construction. Furthermore, the severe conflicts that used to break out over access to water within, and even more markedly, between communities no longer occurred due to the plentiful supply of water and the precise regulation of its distribution, which requires every peasant family to arrange for a turn one day prior to irrigating. Institutional arrangements were now much more strongly enforced.

During the construction of the new irrigation canals in Cusipata, efforts were made to organize irrigation as closely as possible in accordance with the 'Regulations for Water Users' which aim at optimizing the organization of water users and at obtaining "the active participation of the people involved in the development, conservation, preservation and rational use of the water and soil resources" (Reglamento de Organización de Usuarios de Agua, art.3 - translation mine).

The procedures used in the maintenance of the canal system remained essentially the same as prior to develop-

to the distribution of water. A precise schedule was now devised allowing each water user a turn to irrigate at a time of his choice, as will be discussed in more detail below.

Irrigators' Associations along the Rio Tigre

In accordance with the 'Regulations for Water Users', irrigators along the Rio Tigre canal system participate at three organizational levels: through Irrigators' Committees (Comités de Regantes) at the level of each community; through an Irrigators' Commission (Comisión de Regantes) at the level of the Rio Tigre canal system and through an Irrigators' Board (Junta de Regantes) at the level of the irrigation district (see figure 2). As was mentioned earlier, efforts are made by the international developers to enforce the regulations as closely as possible. Although some peasants remarked that rigid enforcement is not beneficial to all water users, most agree that water distribution works much better according to the new regulations. Class and power are criteria which in the past have largely determined who gets first access to water. Now these characteristics, although still prevalent in other areas, have little or no effect on irrigation.

The Executive Board of each of the three levels of organization consists of a president, a vice-president, a secretary, a treasurer, one or more delegates and, in the

distributors. As was described for the Rio Chicon canal system, the irrigation authorities along the Rio Tigre are peasant farmers who do normally not hold office in spheres outside that of irrigation. Some of the authorities on the executive board of the Irrigators' Committee in Tintinco only speak Quechua. The regulations governing the Committees, Commission and Board, their structure and functions, membership rules, water rights and election procedures are as described in section C of this chapter unless stated otherwise.

An Irrigators' Committee has been established in 1983 in each of the four villages - Tintinco, Paucarpata, Cusipata and Colcca. The number of water users belonging to each committee and the area irrigated within its limits can be seen in table 1. The sphere of activity and jurisdiction of each committee coincides with the physical boundaries of each village.

The main functions of the Irrigators' Committees are: to organize and execute the cleaning and repair of the irrigation canals (see appendix three for minutes of meeting), to allocate and distribute water, to settle disputes about irrigation that occur within the limits of the community and to elect representatives.

An Irrigators' Commission has been created on March 26, 1984 at the level of the Rio Tigre canal system in cooperation between the development personnel, the Ministry of

ta- belongs to the Irrigators' Board with headoffice in Quiquijana, 15 kilometers north of Cusipata. In accordance with the 'Regulations for Water Users', each of the Irrigators' Committees sends a delegate to the Irrigators' Commission which, in turn, sends a delegate to the Irrigators' Board.

The indigenous irrigation authorities along the Rio Tigre work more closely in accordance with the rules specified in the 'Regulations for Water Users' than is the case along the Rio Chicon. Yet, in some cases, the rules are adapted to the prevailing local perceptions of the irrigators along the Rio Tigre as will be specified below.

At the time of this research, the members of the Executive Boards of the Irrigators' Committees and the Irrigators' Commission started to familiarize themselves more thoroughly with their new tasks through discussions with representatives of the Ministry of Agriculture and the development personnel. Official meetings of the Irrigators' Commission take place twice a year and are called by the president of the Irrigators' Commission in conjunction with the development personnel. All irrigation authorities are expected to attend these meetings, where issues on water allocation, cleaning and maintenance of canals, courses about irrigation agriculture and livestock breeding and other matters are discussed. Every two months the president

of irrigation, agriculture and livestock. Attendance in any of these meetings is not always good and mainly the irrigation authorities of the upstream communities have shown little interest in cooperating at the level of the canal system since the benefits they have derived from development have thus far been minimal.

As the preceding discussion has shown, local water users can participate in increasingly higher levels of decision making (Irrigators' Committees, Irrigators' Commissions and Irrigators' Boards). Since the Irrigators' Board is in direct contact with the Water Authority of the Ministry of Agriculture (Autoridad de Agua del Ministerio de Agricultura), the local irrigators are meant to participate in the formulation of water policies as stated in section C of this chapter. Actual water user participation in policy making, however, has neither been confirmed by the irrigators in the districts of Cusipata and Urubamba, nor has it been observed by Solanes (1983:49) in his studies of irrigation policies in Peru. Thus, the National Water Authority issues the basic legislation under which the irrigators' associations must operate. These laws are in basic agreement with indigenous views on effective irrigation, although in some ways opposed to the views and requirements of upstream irrigators as will be discussed in more detail below. The

tional flexibility which is of paramount importance in the regions studied due to the great variety of micro-environments and socio-economic variability (see chapter III).

The existing organizational structure thus provides linkages along a chain extending between local water users and the National Water Authority, and allowing water users some insight into water policies. In order to obtain the active participation of the irrigators, the different levels of irrigators' associations are assigned various degrees of autonomy. Because, as we have seen above, small local units of irrigators' associations articulate in higher levels of decision making, autonomy cannot be expressed exclusively at the level of the Committee, since decisions affecting the local level are also made through the Irrigators' Commission and the Irrigators' Board. This important issue will be further discussed in chapter V.

Due to the irrigation development project in Cusipata that requires the assistance of national and international decision-makers, the autonomy assigned to each level of the irrigators' associations is shifting in accordance with the degree to which the indigenous irrigators take over the new tasks which have previously been undertaken in cooperation with development personnel. As stated above, efforts are being made on the part of the developers to prepare the indigenous water users through a variety of instruction

Relations between Community and Irrigators' Committees

The above discussion has indicated that the degree of corporate group autonomy is not stable but shifts in accordance with changes in local and extra-local decision making and varies vis-à-vis different authorities and organizations. In relation to the community within the limits of which an Irrigators' Committee is established, it has full autonomy regarding all irrigation tasks with the exception of the construction of canals, bridges across canals and footpaths alongside canals. It also exerts autonomy regarding the expenditure of its funds, as will be discussed in the following section. Issues relative to construction must be discussed with the respective mayor and the town or village councils.

The fact that irrigation authorities maintain full legal corporate autonomy vis-à-vis village or municipal authorities in all routine irrigation tasks, assures that local power groups can no longer interfere with irrigation as was the case in the past.

Irrigation authorities in the districts of Cusipata and Urubamba do not occupy any important positions in the municipal or local community government. Decision-making about communal and municipal affairs and irrigation matters is thus separate. This situation is much in contradiction

are linked with instrumental decisions in irrigation".

In Yanahuara, on the other hand, where irrigators have not formed separate groups for the management of their irrigation affairs, communal authorities are in charge of canal cleaning and repair tasks.

Institutional Funds

As detailed above, irrigators' organizations have use rights to water, canals, bridges across and footpaths alongside canals. The operation of the various levels of irrigators' associations also requires funds, which are mainly obtained through the imposition of water fees. In the district of Cusipata, fees have been calculated in relation to the benefits the respective users derive from the new irrigation canals. Irrigators in Tintinco pay 200 soles (equivalent of two cents) for each water application to one topo of land (one topo equals 0.33 hectares). In Paucarpata and Cusipata they pay 300 soles and in Colcca 1000 soles per topo. The water fee is paid in cash once a year and must be delivered to the house of the treasurer. According to the 'Regulations for Water Users', the Irrigators' Commission is responsible for the collection of fees. In reality, however, each committee handles its own funds. Ten percent of the total amount collected goes to the Ministry of Agriculture and ninety percent is deposited

not participate in collective labor tasks, as well as loans and donations are added to the bank account. Accumulated interest remains on the account. Although presently the international development agency still pays for costs such as repairs and the salary of the water distributors who work along the principal canals, these expenses will have to be covered through committee funds after the project has been taken over by the indigenous population.

Maintenance of the Irrigation System

Once a year the presidents of the Irrigators' Committees and the Irrigators' Commission together with the development personnel call for collective labor (faena) to clean and if necessary repair the irrigation system. Water user participation in 1985 has been close to 100 percent. Cleaning is done prior to the preparation of the land for sowing. Formerly the canals were cleaned at the end of July, now cleaning takes place in June because of the planting of a second crop. Each family must participate in the cleaning of the canals, either by sending an adult male family member, a substitute, or pay a fine in the amount of 5000 soles which is considered equivalent to one day of labor. Primary and lateral canals are cleaned in collective labor, while the sub-lateral canals are cleaned by the families who use them for their particular fields. Although theoretical-

generally only participate in the cleaning of those sections of the canals that pass through their land. Water users in the lower-lying communities start at the very top of the canal system working downwards. According to unwritten customary laws, all water users must dedicate the same amount of time to the work activities regardless of the amount of land they own and irrigate, although the 'Regulations for Water Users', article 6.3, demand participation in proportion to the use made by each individual irrigator. Regarding canal repair work, however, which may occur during the cleaning activities or at a different time, irrigators who own more land, normally contribute more time and effort in repair tasks on a voluntary basis.

Whereas in other parts of Peru irrigation festivities are associated with considerable ritual, costumed dance groups and traditional music, (Holzapfel, pers. comm., Isbell 1978, Mitchell 1972, see also Barthel 1959 for irrigation festivals in Chile), this type of festivity does no longer accompany the cleaning of the irrigation canals in the study regions. A few years ago flute music was still played during this event, today it occurs only occasionally in the traditional village of Tintinco. The highlight of the cleaning activities are a meal and chicha (maize beer) brought by the wives of the participants in the faena. It is not known why the cleaning of the irrigation canals is

this event less significant. Irrigation water and water generally is considered of great importance in the communities studied. "Agua es vida" (water is life) is an expression that was not seldom heard in Yanahuara. As was discussed in the section on religion in chapter III, water in its different forms - springs, rivers, mountain lagoons - is worshiped within the privacy of each family in the regions studied.

Water Distribution

Of all the irrigation related activities, the distribution of water requires the highest degree of cooperation and coordination and has been associated with conflict within and between communities. In the district of Cusipata water is distributed daily along the new canals by two water distributors (tomeros), residents of Cusipata, who are appointed and paid by the development agency. Each Irrigators' Committee with the exception of the village of Cusipata, has its own water distributor who is elected from among the irrigators and works free of charge along the lateral canals. Water distributors normally work between July and November when most irrigation water is needed. When the development personnel leave, the Irrigators' Committee of Cusipata must elect and pay its own water distributors. One day before a peasant intends to irrigate his

tors appointed by the development agency who visits the communities daily. There is no shortage of water and a farmer can get a turn to irrigate every five, seven or ten days depending on the time of the year he requests water. These regulations were established by the developers in coordination with the irrigators. After the developers leave, the indigenous irrigation authorities will have to make all necessary arrangements to assure efficient water distribution.

For the people of the lower communities water distribution according to the 'Regulations for Water Users' is very convenient. They no longer must assemble at dawn high up at the intake trying to get their turn to irrigate. Irrigating at night is no longer necessary either.

With regard to the drainage of water, few or no problems ever arise along the Rio Tigre because the existing canal system drains all excess water into this river during the rainy season. Since, however, some of the peasants do as yet not fully understand how to handle the plentiful supply of water, they have caused flooding on their own fields and to some degree on those of their neighbors.

The above discussion has shown that irrigation along the Rio Chicon and Rio Tigre canal systems is based on corporate organization. The characteristics which are considered instrumental in this research for corporate groups to exist

canal systems and will be discussed in more detail in chapter V.

Impact of the Irrigation Project on the District of Cusipata

At first sight the project appears a full success. The water supply is plentiful now, its distribution is equitable along the entire canal system, agricultural methods have improved and complementary measures like schools and kindergartens are very much appreciated by the inhabitants of this region. And, indeed, the people of the lower communities are generally very happy about the benefits they have derived from the development (see figure 3 for production increase). Their participation in the Irrigators Committees is good.

Investigations in the upper communities, however, showed that the construction of the irrigation canals brought fewer benefits to the people there and some direct disadvantages. The people of these high lying communities have always had enough water and, therefore, did not need new canals. Although the farmers whose land was affected by canal construction were recompensed for the inconveniences caused, they still regret these actions which divided their already small parcels of land even more and made access to them more difficult. These people, who could formerly irrigate at their own convenience, must now make arrangements before-

enforced, require payment for water used. The fees are calculated according to the developers' views on benefits derived. Nevertheless, even the small sum to be paid for the water used - two cents (200 soles) per topo in Tintinco - represents a hardship for subsistence farmers.

Apart from certain frost-resistant species such as barley, wheat, and beans, the cultivation of other cultigens is very risky at higher altitudes due to a harsher climate, and frequent frost and hail. Most crops from higher altitudes are generally of poorer quality and thus more difficult to sell or exchange on the market, which is far away. The use of improved seed, fertilizer and pesticides is connected with considerable costs which cannot be covered if the crop does not turn out or cannot be bartered or sold on the market. Fertilizer and pesticides are too expensive for many of the subsistence farmers upstream and credit is difficult or impossible to obtain, as has been discussed in chapter III.

Despite an increase of nineteen percent in the harvests of frost-resistant species in the uppermost community of Tintinco (statistics obtained through interviews) and the hope that the pastures will show enough improvements within the next few years to allow for more extensive raising of livestock, the discrepancy of economic benefits between upper and lower communities remains considerable and in fact

development been to the advantage of the people in the upper communities. The strategic position that they once held by living close to the water source is no longer of importance. The scale has definitely tipped still further in favor of the people living at the lower part of the irrigation system upsetting the power balance between villages.

This situation has caused bad feelings among the people along the upper part of the canal system, seriously affecting inter-village relationships. The people upstream frequently state that they have not benefitted from the project while the people below drew all the benefits.

Interviews indicate that 56 percent of the people questioned (38 families out of a total of 68) in the four communities believe that once development personnel leave and local authorities are alone responsible for the entire organization, the upper communities may not participate. The people of the upper communities appreciate the efforts made by the development agency such as the information they receive about agriculture, livestock and health. Due to tremendous economic constraints under which these people live, however, they are not very much inclined to use the new technology offered. They know that to take any risks may worsen their already precarious situation.

The uneven distribution of benefits between communities

possess a good water supply, to start planting a second crop and to be rid of the conflicts that occurred during the dry season and at the beginning of sowing time over access to water. Furthermore, the development agency is still at work in the region trying to improve the overall situation. It is difficult, however, to obtain the full cooperation of the people upstream given their initial opposition to the project and their disappointment regarding the distribution of benefits thus far.

The preceding discussion has indicated that a development program can encounter unforeseen difficulties if indigenous patterns of cooperation, competition and conflict between villages are not fully considered. Since the loss of control over water suffered by the upper communities was not compensated elsewhere, the people upstream lost an important basis for negotiating with the people downstream while as yet receiving few or no economic benefits. Prior to development the people downstream depended to some extent on the good will of the people upstream to receive water in times of scarcity, a situation which conferred a considerable degree of power on the people upstream. This power had to be taken into consideration by the municipal council of Cusipata when people were recruited from all communities to assist with tasks such as the building or improve-

be done by each community had to be calculated carefully by the district authorities in order to maintain a good relationship with the upper communities. Furthermore, the feeling of holding some bargaining power in the distribution of water was very important for the people upstream. Thus, the situation which developed following canal construction has created an atmosphere of discontent among the irrigators of the upper communities. Conflict, as expressed in fighting over scarce water, which existed prior to canal construction has been replaced by feelings of hostility over the fact that an equitable distribution of water has caused many more benefits to the people downstream than to those upstream. Thus, for example, the water users of the upstream communities are often reluctant to participate in meetings and work tasks, since the benefits of most efforts accrue to the lower communities. This situation has negatively affected the autonomy and integrity of the corporate Irrigators' Commission that had been established at the level of the canal system and that requires the consent and cooperation of all four Irrigators' Committees for the execution of its tasks.

To achieve an equitable distribution of benefits is one of the most crucial and difficult aspects of development. In many parts of the world development projects have distributed resources along lines of existing inequality

(Quiroga 1980:521, Schwartz 1978:248-249), widening the gap between the rich and the poor or the poor and the very poor. As investigations elsewhere have suggested, in order to avoid counter-productivity and the reinforcement of prior inequalities, a community development project may have to be accompanied by "radical massive institutional changes including land distributions" (Schwartz 1978:249). Radical changes are not possible in the region under discussion where land is scarce and the population consists almost entirely of small landholders. The constraints under which all participants of the development program operate do not allow for any easy solutions to the problem.

The people upstream who live under very difficult economic conditions, understandably cannot consent to any proposal they may consider risky to their subsistence. The people downstream who desperately needed more water cannot be blamed for consenting to or requesting irrigation development. Although they are somewhat better off than their neighbors upstream, the living standard of these small landholders is still very low.

There are, however, some alternatives which have been devised in consultation with the indigenous population of the district of Cusipata and which are believed to lead to better overall farmer satisfaction, thereby strengthening group autonomy and corporate group integrity. These recommendations are analyzed in chapter V in view of other Andean and cross-cultural research with the desire of

placing these problems within a wider framework, of finding solutions to these problems, and of stimulating further research.

V. DISCUSSION

The following analysis of the different organizational strategies used in irrigation is intended to define more closely the reasons behind a specific way of organizing irrigation and to reveal the factors responsible for organizational similarities and differences between the three study regions. It is also meant to shed light on the circumstances which allow for prevailing degrees of group autonomy and facilitate corporate group formation versus those which oppose it. Ultimately an analysis of the research findings in the light of major theoretical paradigms is intended to view in a comparative perspective those elements which affect irrigation management most profoundly.

A. Corporate Group Integrity and the Question of Autonomy

As was indicated in chapter I, investigators have different views regarding the conditions that are necessary for corporate organization. The present study considers representative leadership, shared ownership of property, collective action and autonomy as the fundamental principles of incorporation. It must be noted here that the definition of corporate groups used in this study and, in fact, any concept of a corporate group does not exist for the indigenous irrigators. The irrigators, however, consider each of the corporate group characteristics dealt with in this

research as an important organizational factor in the management of irrigation.

The discussion of The Organization of Irrigation (chapter IV) has shown that representative leadership by indigenous irrigators is found in all groups not only at the local level through the executive boards of the Irrigators Committees, but in the district of Cusipata also at the level of the canal system through the Irrigators Commission and at the level of the irrigation district through the Irrigators Board. The leaders have the power to make decisions about all routine activities without interference by other local or extra-local decision-makers. Along the Rio Tigre canal system the power to make these decisions will be regained when the developers leave. In Yanahuara community authorities are in charge of irrigation activities with the exception of water distribution.

Each level of the irrigators organizations -committees, commission and board- controls common property in the form of monetary funds which stem primarily from water fees to be paid by each irrigator. In addition, as members of irrigators organizations, peasant farmers have use rights to irrigation water, to the canal system, to the bridges across and paths alongside canals. This shared ownership of and use-right to assets constitutes the second principle of incorporation.

The execution of irrigation-related tasks, such as the construction and maintenance of canals, the distribution of

water and the election of representatives to the Executive Boards, are carried out by means of collective action on the part of the water users. This third principle of incorporation has been found in this study to be a strong factor in group integration.

The fourth condition, that of group autonomy requires closer analysis for several reasons. As stated earlier, great importance is assigned to group autonomy in both the theoretical work of Goodell (1985), Tiffany (1979), Smith (1974), Weber (1947), and others and by the indigenous irrigators themselves. It is a phenomenon which manifests itself in different ways and to different degrees within the irrigation groups under study and acts as an important incentive in group formation.

Given the definition of group autonomy as "a group's ability to make decisions in certain spheres without the involvement of other local and extra-local institutions" (see Clark 1974), the preceding discussion has indicated that full local group autonomy is rarely exercised in the management of irrigation in the regions studied. This is because local Irrigators' Committees articulate in higher levels of decision-making (Irrigators' Commission and Irrigators' Board). Furthermore, government authorities intervene where irrigation matters cannot be handled at the local or regional level or where irrigation development requires outside assistance. The question that must be more closely analyzed is the degree to which we are dealing with

an ideal versus a real autonomous situation. In other words, approximate degrees of autonomy must be defined in order to suggest whether and to what extent they affect corporate group integrity and the management of irrigation.

The fact that along the Rio Tigre and Rio Chicon canal systems the 'Regulations for Water Users' have been accepted by the indigenous irrigators and are enforced to various degrees (see chapter IV) and that extra-local decision-makers (development authorities in the Rio Tigre regions or representatives of the Ministry of Agriculture in the Rio Chicon region) intervene, provides for a whole spectrum of situations where indigenous and national elements intermingle, affecting group autonomy to different degrees.

Although in much of the literature the autonomy of the decentralized local water users versus centralized elite control is described as a simple dichotomy, a variety of investigators have made attempts to account for the interlocking of local autonomy with extra-local decision-making (see chapter I, Theoretical Orientation). Kelly (1983:884), for example, suggests that "the shifting tensions among and between local water users and elites ... should be at the center of our investigation". The model he devised on 'articulation/autonomy' focuses on the degree to which irrigation organization is linked to the state or is independent of it.

The autonomous aspect of irrigation organization as it

presents itself in the study regions can be understood most readily in view of Max Weber's (1947:148) model which distinguishes between Autonomy, Heteronomy, Autocephaly, and Heterocephaly (see chapter I, Theoretical Orientation, for definitions).

Weber accounted for a whole spectrum of possible situations where, for example, a heterocephalous group is autonomous and an autocephalous group is heteronomous. "It is also possible in both respects for a corporate group to have both characters at the same time in different spheres" (Weber 1947:148). Thus, all these elements may be present in the same situation to some degree. Weber further maintains that "a corporate group which is at the same time completely heteronomous and completely heterocephalous, is usually best treated as a 'part' of a more extensive group" (1974:148).

Weber's model provided an initial paradigm for the analysis of the irrigation groups studied in this research. Yet, in order to accommodate the full range of relationships affecting group autonomy, another dimension must be added to Weber's model, as discussed below.

The following analysis in view of Weber's model is done with the intent of defining approximate expressions of autonomy, heteronomy, autocephaly and heterocephaly as they are found in local irrigation group organization along the three canal systems studied. The criteria used in making the rankings - weak, medium, strong and full (see figures 4a and

4b) reflect the relationship between decision-making power exerted from within and from without the irrigation group. Where we are, for example, dealing with a medium ranking, decision making is approximately equal between indigenous irrigators and government authorities.

Analysis of Irrigation Organization in View of Max Weber's Model

Both along the Rio Tigre and Rio Chicon canal systems, the Irrigators' Committees are strongly heteronomous according to Weber's model since "the order governing the group", which are the "Regulations for Water Users", has been imposed by an outside agency, the Ministry of Agriculture, as detailed in chapter IV. As has been shown throughout chapter IV there are, however, instances where the "Regulations for Water Users" are not precisely followed but are adapted to local conditions, or where indigenous ways of handling irrigation predominate. Furthermore, the national regulations by which the groups operate are not as closely adhered to in the villages along the Rio Chicon canal system as they are along the Rio Tigre, where contemporary development efforts have taken place, where three levels of indigenous decision making (board, commission and committee) have been established, and where water distribution takes place in accordance with national regulations (see figure 4a for an approximate representation of Autonomy and Heteronomy in local Irrigators' Committees).

The irrigators' groups along the Rio Tigre and Rio Chicon canal systems are, at the same time, autocephalous in a sense that the Executive Board acts by the autonomous order of the corporate group itself in all routine activities (election of representatives, canal maintenance and distribution of water), and heterocephalous in that the Executive Board is under the authority of extra-local decision-makers (the Ministry of Agriculture), primarily in the domain of non-routine activities such as construction work as well as conflict resolution where local resolution is impossible. Here, another more subtle distinction must be made between the two regions. Although autocephalous and heterocephalous elements are present in both regions, autocephaly is more strongly expressed in the villages along the Rio Chicon where the members of the Executive Boards of the Irrigators' Committees are less exposed to higher-level indigenous and national authorities, than is the case in the villages along the Rio Tigre canal system where most decisions are made in cooperation with indigenous irrigators and the development personnel.

Thus, although the Irrigators' Committees are similar in structure and function both along the Rio Tigre and Rio Chicon, the fact that an Irrigators' Commission exists at the level of the Rio Tigre canal system with linkages to an Irrigators' Board, and that development personnel are still working in the district, provides for a lesser degree of autonomy and autocephaly to the local Irrigators' Commit-

tees in this region (see figure 4a). It is expected, however, that autonomy and autocephaly will increase along the Rio Tigre at all levels of indigenous decision-making when the irrigators take full project responsibility into their own hands. This issue, with primary focus on the question of Weber's heteronomy, will be further discussed later in this section.

The situation differs considerably in the village of Yanahuara, situated along the Rio Pucara canal system. In the absence of national regulations, customary laws are prevalent and village authorities alone are in charge of irrigation. Despite considerable conflict over water which arises during the height of the dry season, its resolution has always been done locally by the justice of the peace (juez de paz) in cooperation with the community president.

In view of Weber's model, the situation as it presents itself in Yanahuara is autonomous in that 'the order governing the group was established by its own members on their own authority', and autocephalous in that the community authorities act 'by the autonomous order of the corporate group' (Weber 1947:148) without interference from the outside (see figure 4a).

The above analysis in the light of Weber's model was applied with the intent of conveying a better understanding of the complex situation of corporate irrigation group autonomy versus extra-local decision-making in the three

study regions. There is, however, an important aspect relative to the expression of heteronomy within corporate groups which Weber's model does not account for and which, therefore, does not explain in an adequate way the situation as it exists in the study regions or wherever national laws and regulations apply within a traditional society. Therefore, in order to represent the effects of extra-local intervention -especially as they occur in development situations- in a more appropriate way, another dimension has to be added to Weber's model. The present research suggests that Weber's concept of 'heteronomy' must distinguish between 'the order governing a group' that is based on indigenous ways of organization and cooperation and that has been requested by, or given the consent of, the indigenous people, versus 'the order governing a group' that has been imposed by an outside agency against the will of the indigenous people and counter to their perceptions of usefulness and applicability. In the case of the irrigation groups studied, 'the order governing the group' is contained in the 'Regulations for Water Users' issued by the Ministry of Agriculture.

This distinction is not only omitted in Weber's model but finds little consideration in case studies. Goodell (1985) in her paper on the effects of national and international development on corporate group integrity stresses the destructive effects of government intervention on indigenous group autonomy. It is true that imposed development

projects the world over have negatively affected the initiative and the cooperative spirit of indigenous populations thereby seriously harming or even destroying local group autonomy (Coward 1977, Gibson 1985, Lees 1974, Mazrui 1975). If, however, a development project has either been requested by the indigenous irrigators -as was the case in Colcca where the local people went as far as Lima to solicit help- or is given the consent of the irrigators -as it occurred in Cusipata- and where in addition the written national laws and regulations conform with indigenous needs, a project is likely to be successful. If, furthermore, the indigenous people either direct the project or strongly participate in decision making, the chance for success is high. In this case, although group autonomy and autocephaly is temporarily weakened through outside intervention, as is the case in the irrigation committees along the Rio Tigre, it is likely to be strengthened in the long run. This view is supported by Kleinig (see Goodell 1985:248) who found that government measures taken in accordance with a group's initiative are an expression of their autonomy and not a threat to it. Thus, the 'Regulations for Water Users' which are to a large extent based on a group's indigenous ways of managing irrigation and are, therefore, in agreement with their own views, are expressive of the autonomy of that particular group. This type of situation requires a shift in emphasis in Weber's model from heteronomy toward autonomy (see figure 4b for expressions of these conditions).

A major problem arises when government regulations and/or a development project serve only part of the population that depends on the same irrigation system. As has been discussed in chapter IV, the fact that the irrigation project in the district of Cusipata brought more benefits to the lower communities than to the upper ones and that the 'Regulations for Water Users' also favor the lower villages by prescribing equitable distribution of water along the entire canal system, contributed to a lack of initiative and little cooperation in the project among the people of Tintinco and Paucarpata. Especially the fact that the 'Regulations for Water Users' request payment for the irrigation water used, is detrimental to the people upstream who have always had enough water free of charge and who have little or no cash to make such payments.

The situation as it presents itself along the Rio Tigre canal system therefore suggests that heteronomy -the order governing the group imposed by an outside agency- may be beneficial to one village or group while simultaneously disadvantaging a neighboring one. Thus, along the Rio Tigre the 'Regulations for Water Users' are in general agreement with the indigenous perceptions of the lower communities, while in some respects they are in opposition to the views of the people upstream (see chapter IV). The impact of applying the same set of rules upon groups of people living under different circumstances, will be further discussed in the Conclusions.

A consideration of this new dimension to Weber's model may prove important for purposes of academic research, in the application of government laws and in the implementation of development projects.

Group Analysis according to approximate Degrees of Autonomy vested in Specific Irrigation Tasks

This section is concerned with the analysis of autonomy in terms of four specific issues, considered most important to irrigation management by this study. These are, the construction and maintenance of canals, the distribution of water, and the election of representatives. Autonomy over particular irrigation tasks is expressed in relative degrees ranging from weak to full (see figure 5 throughout this discussion). As was true for figures 4a and 4b, the criteria used in making the rankings weak, medium, strong and full in figure 5 reflect the relationship between decision-making power exerted from within and from without the irrigation group.

Here it is important to note that autonomy, as it is commonly defined and is used in this thesis, unless otherwise indicated, includes Weber's 'autonomy' and 'autocephaly'. In other words, it subsumes both conditions, 1. where 'the order governing the group is established by its own members on their own authority', and 2. where 'the chief and his staff act by the authority of the autonomous order of the group itself'.

The analysis will begin with a look at the situation as it exists along each canal system with regard to group autonomy vested in specific irrigation-related tasks. The three canal systems will then be compared in view of these irrigation tasks in an attempt to examine where we are dealing with general versus idiosyncratic trends of irrigation.

The Rio Tigre Canal System - Tintinco, Paucarpata, Cusipata and Colcca

The construction of two new irrigation canals in the district of Cusipata accompanied by improvements in the sectors of agriculture and livestock, is largely in the hands of the development personnel, while the indigenous irrigators contribute to the manual labor of canal construction. Since development measures proposed from outside have been agreed to by Cusipata and were requested by Colcca, autonomy regarding construction tasks is more strongly expressed in the Irrigators' Committees of the lower lying villages than the higher ones where canal development was welcomed only by a few families in the lower part of Paucarpata. Thus, from the beginning of the project corporate group integrity was positively affected through decision-making from within the Irrigators' Committees of the lower villages.

In comparison with construction, group autonomy is on the whole more strongly expressed through canal maintenance

activities (including canal cleaning and repair) which, although called for by both the indigenous authorities and development personnel, are executed by the irrigators themselves at least once a year at a time of their choice. Repairs are done jointly through indigenous and development efforts; materials and technical guidance through engineers are provided by the development agency.

The distribution of water is also under the control of both local and extra-local decision-makers. Of the five water distributors within the district, three are elected by the Irrigators' Committees of Tintinco, Paucarpata and Colcca while two are appointed and paid by the development project.

The rules according to which water is now distributed are based on national laws. This situation is beneficial for the lower communities which prior to development efforts were to some extent dependent on the good will of the people upstream to get enough water during the dry season. It is, however, disadvantageous for the upper communities, since they no longer enjoy the privilege of getting first access to water nor have they benefitted economically as yet. The uneven distribution of benefits negatively affects the autonomy and corporate group integrity of the Irrigators' Commission, since the upper communities show little interest in cooperating at the level of the entire canal system. Between Irrigators' Committees, the degree of autonomy is approximately the same for the various irrigation-related

tasks (except construction). Cooperation within committees is considerably higher than between committees as detailed in chapter IV.

Full local group autonomy is vested in the elections of a new Executive Board which take place every two years. Although local representatives of the Ministry of Agriculture can make suggestions regarding the candidates to be elected, the indigenous irrigators alone have decision-making power in this sphere of activity, as long as the candidate fulfills the necessary requirements (see chapter IV).

Development efforts in Cusipata strive towards preparing the indigenous irrigators to eventually handle all irrigation-related tasks. Instruction through workshops, written materials and videotapes aim at these goals. Therefore, the degree of local group autonomy changes constantly relative to the extent to which the indigenous irrigators take over new tasks which were formerly executed in cooperation with development personnel.

The Rio Chicon Canal System - Chicon, Yanaconas, Chichubamba and Q´atan

Local water user autonomy is more strongly expressed along the Rio Chicon than the Rio Tigre canal system (see figure 5). As mentioned above, the 'Regulations for Water Users' in this region only apply to the Irrigators' Committees, since no higher-level organizations have been estab-

lished. Furthermore, as discussed in chapter IV, we find only weak supervision through the representatives of the Ministry of Agriculture in Urubamba of the activities executed by the local irrigation groups.

Maintenance of the irrigation canals and the distribution of water are organized through the Executive Boards of each Irrigators' Committee, which pays for the water distributor, for repairs and other expenses from its own funds. The collective action taken in maintenance activities strengthens the corporate group integrity. Conflict over access to water, especially as it occurs within the same community, presents a threat to local group autonomy. Occurrences of violent conflict over water during the height of the dry season and at planting time, however, have thus far always been resolved locally by the committee president. The fact that extra-local decision-makers did not have to intervene contributed to the maintenance of the prevailing degree of group autonomy and corporate group integrity.

As is the case in the Rio Tigre region, the election of the Executive Boards of the Irrigators' Committees along the Rio Chicon is under the control of the water users. This condition also positively affects corporate group autonomy in all four villages along the Rio Chicon.

The Rio Pucara Canal System - Yanahuara

In Yanahuara, where development measures have never been

undertaken, Irrigators' Organizations are non-existent. The 'Regulations for Water Users' issued by the Ministry of Agriculture have not been accepted, and irrigation matters are handled exclusively by communal authorities elected by the villagers, as discussed in chapter IV.

The maintenance of the irrigation canals is under the control of the community and functions well. The same is true regarding the election of communal authorities. In the absence of any extra-local decision-makers these tasks vest a high degree of autonomy within the community of Yanahuara (see figure 5).

The distribution of water, however, presents considerable problems. As detailed in chapter IV, the great water scarcity during the dry season does not allow for fair distribution to all water users and often makes it altogether impossible. This task is therefore beyond the capacity of the community and has been quoted by villagers as the reason for their inability to form an irrigator's organization. The numerous conflicts that arise over the water distribution threaten village solidarity during the height of the dry season. Conflict, however, is normally resolved within the community, and in the absence of extra-local decision making within this sphere, has kept its corporate autonomy intact.

The above analysis has focused on local irrigation group autonomy versus extra-local decision-making. The

local irrigation groups studied are also autonomous in certain spheres vis-à-vis other local institutions, such as community and/or municipal councils. As was discussed in chapter IV, the autonomy vested in the irrigation groups along the Rio Tigre and Rio Chicon canal systems is strong in relation to the local government. Therefore, with regard to the maintenance of irrigation canals and the distribution of water, irrigation authorities have full decision making power. Conflict resolution as well is under the jurisdiction of the president of the Irrigators' Committees or, if conflict cannot be resolved locally, of the Irrigators' Commission's president. Irrigation and communal authorities, however, make joint decisions with respect to canal construction, the building of footpaths along canals and bridges over canals.

As has been shown throughout the above discussion, group autonomy cannot be considered in its pure form but the extent to which it expresses itself varies in accordance with the prevailing irrigation tasks and depends on whether it is viewed vis-à-vis other local or extra-local institutions. Furthermore, it must be taken into account that autonomy is not static but shifts constantly, becoming more pronounced as is the case along the Rio Tigre where the indigenous population starts to take over more of the irrigation tasks which are required by the newly constructed system. Likewise, as argued earlier, the degree of group

autonomy diminishes when conflict cannot be resolved locally but must be brought before higher levels of decision-making, as was frequently the case in the past and is common today in this region and elsewhere (Mares 1980:487, Netherly 1984). The resolution of conflict can thus be considered an important factor which determines to a large extent whether the prevailing degree of autonomy can be maintained within a group.

B. General versus Idiosyncratic Trends in the Organization of Irrigation

Certain aspects of irrigation organization are similar in all three study regions while others vary to different degrees between regions. The following comparison is intended to summarize those elements of irrigation which are of general significance versus those which are idiosyncratic, regardless of the prevailing constraints of each particular region. The relationship of these trends to group autonomy will be examined.

The comparative analysis concerns itself with three major issues discussed in the preceding section:

1. Maintenance (including cleaning and repair) of irrigation canals.
2. The distribution of water.
3. Election of representatives.

Due to the fact that canal construction took place only along the Rio Tigre, this aspect cannot be viewed in

comparative perspective.

Prior to the analysis of the above issues, the internal structure and external relationship of the groups which handle irrigation activities in the three regions will be summarized to convey a clearer picture whether and to what degree these factors affect the irrigation tasks to be compared.

As discussed in detail in chapter IV, the structure and function of Irrigators' Committees along the Rio Tigre and Rio Chicon canal systems are based on and subject to the same laws specified in the 'Regulations for Water Users' (Reglamento de la Organización de Usuarios de Agua), and consist of an Executive Board and a General Assembly. At the level of the canal system and the irrigation district, however, idiosyncratic tendencies emerge. Along the Rio Tigre an Irrigators' Commission has been established at the level of the canal system and an Irrigators' Board at the level of the irrigation district, providing strong ties between these organizations. Along the Rio Chicon, on the other hand, only Irrigators' Committees exist at the level of each of the four villages. (See figure 2).

Likewise, differences exist in the relationship between Irrigators' Committees and national bureaucratic representatives in the two regions. The ties between the development personnel of the irrigation organizations along the Rio Tigre are strong and enforced on a continuous basis. Interactions between the technical advisers of the Ministry

of Agriculture (with office in Urubamba) and the Irrigators Committees along the Rio Chicon, on the other hand, are infrequent and of much less importance.

Idiosyncratic trends are most strongly expressed in Yanahuara, where the 'Regulations for Water Users' have not been accepted by the indigenous irrigators. Irrigation activities are regulated through communal authorities without ties to or reinforcement by higher levels of decision-making.

Maintenance of Irrigation Canals

Maintenance of the canals, which includes both cleaning and repair, is done in collective labor (faena) and the rules for participation in the three study regions are very similar. Canal cleaning takes place at a specific date each year agreed upon by the water users. One member of each family must either participate in the activities, send a replacement or pay a fine. During the 1985 canal cleaning, the participation of water users in these activities was close to 100 percent in all three study regions (statistics - presidents of Irrigators Committees along the Rio Tigre and Rio Chicon, village elders of Yanahuara). Within the areas studied, all water users carry the same work load regardless of the amount of land they own and irrigate. Disputes are rare and the fact that the people living in the upper parts of the canal system generally only participate in maintenance activities to where the canals leave their

territory is a traditional way of carrying out this activity and is basically accepted by the people below.

Within these general trends there are only minor differences. In order to encourage participation in the maintenance activities, the development personnel in Cusipata provide food and drink. In Yanahuara a sponsor (pendonero) provides refreshments to the workers. In an attempt to strengthen group solidarity along the Rio Chicon, the municipal council of Urubamba, which consists of strong and trusted leaders, encourages all water users to participate in the collective work projects, instead of sending a replacement or paying a fine.

Furthermore, along the Rio Tigre the irrigators are called upon for collective labor by both the indigenous authorities of the Irrigators' Commission, the Irrigators' Committees and the development personnel. Along the Rio Chicon the presidents of the four Irrigators' Committees call for the collective work party while in Yanahuara communal authorities take on this task.

Payment for materials needed in the repair of the canals is made by the development agency along the Rio Chicon canal system, through Irrigators' Committees along the Rio Chicon and by means of a contribution of each water user in Yanahuara.

Despite minor idiosyncratic tendencies described above, canal maintenance activities show strong general trends in the three regions regardless of structural

differences in the irrigation groups, of environmental and social constraints or development efforts. These tasks receive very good participation by the water users -close to 100 percent- partially because of the strict enforcement of fines for non-participants, and are always executed without delay in all three regions. Canal maintenance thus contributes considerably to maintain corporate group integrity, by vesting a high degree of autonomy in these activities in the village Yanahuara and the irrigators' committees along the Rio Chicon, and a fair degree of autonomy in the irrigation groups in the Rio Tigre region (see figure 5).

Distribution of Water

The distribution of water, on the other hand, is much more reflective of idiosyncratic than general tendencies in its organization and execution.

Water distribution along the Rio Tigre canal system is precisely organized according to the 'Regulations for Water Users' and enforced by the development personnel in cooperation with the Executive Board of the Irrigators' Committees and the Commission. Since the water supply is plentiful throughout all seasons, scheduling each water users turn to irrigate does not present problems.

The same laws apply to the distribution of water along the Rio Chicon and efforts are made by the Executive Boards of each Irrigators' Committee to enforce these rules according to which each water user has equal rights to his

turn. (See chapter IV for detailed description). The prevailing water scarcity during the dry season and at the beginning of planting time, however, makes this task difficult or even impossible. The people must assemble frequently at the intake spending long hours waiting for their turn to irrigate. Disputes about access to water and water theft are therefore common and cause considerable conflict which, however, is normally resolved within each committee.

Although in Yanahuara canal maintenance activities are arranged through communal authorities with very good results, the distribution of water does not occur in an organized fashion but proceeds on a first-come, first-serve basis. Extreme water scarcity during the dry season and especially at planting time makes adequate distribution impossible. As is the case in the villages along the Rio Chicon, irrigators must spend much time waiting at the intake and irrigation continues day and night requiring several people of the same family to guard the canal in order to discourage water theft. Conflict over the scarce water rises high in this otherwise well organized village. Here, as in the other regions studied, conflict about irrigation matters is normally resolved locally.

A comparison of group autonomy between the three regions indicates that a high degree of group autonomy does in itself not result in successful water distribution as will be further discussed in chapter VI.

Election Procedures

There is a strong general trend for election procedures to be handled effectively and to proceed without problems along the three canal systems.

As discussed in the section above, full group autonomy is vested in the bi-annual events where the General Assembly of irrigators elects representatives to the Executive Board of the Irrigators' Committees both along the Rio Tigre and Rio Chicon canal systems and to the Irrigators' Commission and the Irrigators' Board along the Rio Tigre.

In Yanahuara full autonomy is vested in the community for the election of the communal representatives who deal with both community and irrigation matters.

The preceding comparative analysis indicates that regardless of factors such as differences in group structure, group autonomy and the availability of water, tasks such as election procedures and the maintenance of the irrigation canals are handled efficiently in all three regions, representing strong general trends. Water distribution, on the other hand, shows highly idiosyncractic tendencies in the regions studied. These findings and the factors underlying them will be discussed in more detail in chapter VI.

C. Processes affecting the Formation of Irrigation Groups and their Persistence over Time

The importance of viable irrigation groups in the successful management of irrigation agriculture has been stressed on many occasions (Bagadion and Korten 1980, Coward 1980a, 1980b, Lewis 1980 and in press, Siy 1982). In recognition of this concern, the research in the Vilcanota Valley was undertaken with the objective of discovering those criteria which facilitate the formation of groups and their successful operation over time versus those which hinder these processes from taking shape. In order to place the findings of this research in a broader perspective, they will be analyzed in light of investigations in other parts of the world.

The criteria that were found to be instrumental in this research in stimulating or inhibiting group formation are:

1. group autonomy as expressed in local initiative and decision-making power versus extra-local intervention;
2. limiting conditions from within the physical and social environment;
3. group size and the articulation of small groups into larger units.

1. Initiative and decision-making power on the part of the local population are criteria which have been shown to favor the formation of groups and their effective operation

over time. Groups that have been created through indigenous efforts are more appropriate at the local level than organizations that are based on national bureaucratic principles alone (Coward 1980a, 1980b, Lewis in press, Siy 1982). Some investigators have argued that it is important for local populations to make their own decisions, since this conveys a sense of mastery, the need for which is innate in human nature while a lack of control results in a lack of self esteem (Goodell 1985:251, Schwartz 1978:237) which, in turn, tends to erase any interest in pursuing a goal. Thus, a group is more likely to take shape and to persist over time if its members determine its policy.

The above statements agree in principle with my own findings. The fact that the Irrigators' Committees along the Rio Tigre and Rio Chicon canal systems were officially designated as autonomous in the 'Regulations for Water Users' greatly contributed to attaining the cooperation and support of the indigenous irrigators. Along the Rio Tigre canal system, the degree of initiative and decision-making power of the four villages can be used as a measure of success in autonomous group formation. The village of Colcca which requested development on its own behalf formed the strongest and most coherent Irrigators' Committee. In Cusipata, where the initiative came from the development agency but was welcome by most of the villagers, group formation proceeded at a fair pace without problems. In Tintinco and Paucarpata, on the other hand, where irrigation

development was neither requested nor voluntarily accepted, interest in forming groups was very low.

The degree to which local initiative to create and maintain autonomous groups is affected by the intervention of national and international decision-makers is much disputed. Closely identifying aid with paternalism, Goodell (1985) believes that aid from outside has destructive effects on group autonomy. Austin (1985:258), on the other hand, argues that "people remain in a situation of domination not through lack of initiative to form corporate groups but through lack of resources to maintain those groups as viable organizations." The good and bad sides of state intervention are recognized by Coward (1980a:16) who believes that the results depend on the way in which help is administered. Furthermore, where there is indigenous initiative and strong leadership, state intervention may strengthen rather than weaken corporate group integrity.

As was mentioned earlier, there are different ways in which the state can intervene and different results can be expected. It has been observed that where they do not derive social and/or economic benefits, villagers are not inclined to join in groups. Weber (1947:318) hypothesized that the remuneration of the staff is a strong incentive for group formation. Without some kind of benefit -salary, land, extra water, prestige, power, etc.-, it is hard to get people to serve on a water committee (Hunt 1976:397). Except for a few of the water distributors, however, none of the

irrigation authorities in the study regions receives remuneration for the tasks to which they were elected. Both along the Rio Tigre and Rio Chicon canal systems, the indigenous irrigators remarked that, apart from the hope for economic benefits in the form of improved agriculture and animal breeding, a major incentive to form corporate irrigation groups was the fact that they are assigned local group autonomy through the 'Regulations for Water Users'. This important topic will be further discussed in the Conclusions (chapter VI).

2. Limiting conditions from within the physical environment and the high degree of competition that arises among villagers over a very scarce resource, have been shown to affect group formation in the regions studied. Investigators are generally in agreement that competition for a scarce good stimulates the initiative to form groups, to protect the scarce good against other groups and against natural entropy (Jackson 1981:176, Kelly 1983:884, Orlove and Custred 1980:49).

Where limiting conditions on resources, however, are either absent or exist in extreme form, group formation may not take place. Thus, where, for example, water is plentiful at all times, there is little need to cooperate in its allocation or distribution. On the other hand, when water is very scarce or non-existent during part of the year, groups rarely form because, as also observed by Lewis (in

press), "there is nothing there to be corporate about".

Extreme scarcity of water, as it existed in Colcca prior to canal construction, when the villagers were only able to plant rainfed crops, did not encourage group formation. Following development efforts which provided for a good water supply, a strong corporate irrigation group formed in this village. Water scarcity is especially pronounced in Yanahuara where despite the organizational skills which these villagers have demonstrated in other areas (formation of cooperatives, parents' associations, women's groups etc.), Irrigators' Committees have not taken shape. This study supports observations by researchers (see Klausner 1965) who found that stress serves as an organizing principle when it is moderately expressed, but may destroy organization when extreme. Limiting conditions constitute one of the factors on which the recommendations in chapter VI are based.

3. The question whether small or large groups operate more successfully and show better persistence over time, has been raised a number of times in the literature. Homans (1950) believes that small groups have shown much more durability throughout history than large groups. Because only when groups are small or when they are fortunate enough to have an independent source of selective incentives, will they organize or act to achieve their objectives (Olson 1965: 166).

It has been shown throughout history that in the Andes small groups tend to be more successful since they can operate more effectively within the prevailing microenvironments (Sherbondy 1982a). Small groups serve the needs of their individual members more by allowing them closer insight into group assets and the strategies employed to achieve the group's goals, as well as granting them greater impact on decision-making.

In the Vilcanota Valley the small size of the Irrigators' Committees is advantageous since small groups can deal more effectively with the continuously varying constraints of the social and physical environment. The fact that there is one Irrigators' Committee per village allows for decision-making at the local level in response to the respective environmental and social milieu. Small irrigation groups at the village level permit the water users in the higher lying villages, for example, to function in Quechua, the language which all the people understand and in accordance with their own social, economic and religious perceptions.

The inclusion of small autonomous local Irrigators' Committees within a larger Irrigators' Commission and its inclusion into an even higher level -the Irrigators' Board- provides less autonomy at the local level, yet permits local water users to exert influence at higher levels of authority through local representatives. This type of system is considered advantageous by Olson (1978:75) who believes that

organizations should take responsibilities as parts of a larger social entity, yet at the same time retain a certain amount of autonomy in order to remain flexible and thus be able to "deal with constantly changing situations and demands".

With regard to the distribution of water, an Irrigators Commission takes over responsibility at the level of the entire canal system. This has proven advantageous along the Rio Tigre canal system by providing a more equitable distribution of water to all villagers and better coordination of irrigation activities along the entire canal system, although this has not been able to erase inter-village conflict as discussed in chapter IV.

The integration of small groups into larger units has also been considered successful in other parts of the Andes and is believed to "underlie the strength of the productive capacity of Andean society" (Spalding 1984:42).

In summary, this research has indicated that in order for a corporate irrigation group to form, strong economic and social incentives must be present. In the case of Colcca prior to development and Yanahuara, corporate irrigation groups had not formed since due to extreme water scarcity there was nothing to be corporate about. Regardless of whether there were strong or weak economic incentives for the groups that formed in the other villages studied, the fact that they were designated as autonomous,

has had a stimulating effect on their formation and has contributed to their persistence thus far.

The questions raised in this discussion will be further examined in the following chapter relative to issues considered throughout this thesis, especially as they relate to the research hypothesis.

VI. CONCLUSIONS

The central premise of this study has been to understand the organization of Andean irrigation in its cultural, socio-economic and political dimension with special emphasis on autonomy and corporate group integrity.

This chapter will summarize the research findings, examine them in view of the questions raised and the hypothesis proposed and offer suggestions as to how this information can be used to improve the probability of success in a development project.

Autonomy, Corporate Group Integrity and the Management of Irrigation

The analysis of the irrigation groups relative to Weber's classification of corporate groups as autonomous or heteronomous, autocephalous or heterocephalous indicated that we are dealing with a broad spectrum of situations. In Yanahuara, autonomy and autocephaly is strongly expressed since decisions regarding irrigation are made exclusively within the community. In the irrigation groups along the Rio Tigre and Rio Chicon canal systems all four of Weber's categories are found, although in the Rio Chicon region heteronomous and heterocephalous elements are not as prominent as along the Rio Tigre where extra-local decision-making through development personnel is more pronounced (see figures 4a and 4b).

Apart from these general differences in group structure, there are differences in the degree to which autonomy is expressed relative to specific irrigation tasks within each group.

The comparative analysis of irrigation organization in the three regions studied (see chapter V) proceeded from the hypothesis, stated in chapter I, that autonomy strengthens corporate group integrity which, in turn, affects successful irrigation management.

Analysis of the irrigation groups has shown that the first assumption of the hypothesis can be validated. In Yanahuara and the Irrigators' Committees along the Rio Chicon, a high degree of autonomy fosters corporate group integrity. In the Irrigators' Organizations along the Rio Tigre autonomy is less strongly expressed at the local level due to the fact that certain decisions are made at the level of the canal system, the irrigation district and/or by the development personnel. Yet, the prevailing degrees of autonomy vested in different irrigation activities are high enough to regulate the necessary affairs and to provide for corporate group integrity.

The observations from the present study agree with the findings of other investigators (Goodell 1985:250 and Tiffany 1979:27) who consider autonomy to be instrumental in the maintenance of group integrity. The situation as it exists in the district of Cusipata is also reflective of Smith's (1974) and Brown's (1976:21) research on spheres

and levels of autonomy "which are generally no more or less than the affairs these corporations require for their adequate regulation" (Smith 1974:100).

The present study thus suggests that autonomy is important in order to maintain corporate group integrity, although the degree to which it must manifest itself is instrumental only in as far as it is sufficiently high to regulate the necessary affairs at each level.

The situation as it exists in Yanahuara differs considerably from the other two regions. Autonomy vested in the corporate community structure of Yanahuara is strong since no other local or extra-local decision-makers intervene. Yet, extreme water scarcity does not allow communal authorities to act on behalf of their autonomy regarding the task of water distribution which, therefore, proceeds in an unorganized fashion, normally on a first-come, first-serve basis, giving rise to considerable conflict.

The analysis of the groups studied has further pointed to the importance of recognizing autonomy as a phenomenon that is not static but shifts in relation to the different levels at which local and extra-local decision-makers interact, providing conditions of heteronomy and heterocephaly. Where the indigenous irrigators take over more and more of the activities which have until then been undertaken in cooperation with development personnel, as in the district of Cusipata, corporate group autonomy increases correspondingly.

The fact that national laws dictate that irrigation organizations must be given autonomy, has been an incentive for the irrigators along the Rio Tigre and Rio Chicon canal systems to form such groups. In the Peruvian Andes Indian peasants have seldom, if ever, been assigned autonomy. The power to make decisions has always been the prerogative of the Mestizo elite. The extent to which prevailing degrees of autonomy affect the successful operation of groups over time cannot be determined as yet given the comparatively short time they have been in existence in the study regions. Irrigation groups have operated both along the Rio Tigre and Rio Chicon prior to the publication of the "Regulations for Water Users" in 1979. Along the Rio Chicon the Irrigators' Committees have maintained the same degree of autonomy at the local level, while in the Rio Tigre region the degrees of autonomy vested in the Irrigators' Committees decreased as the Irrigators' Commission and the Irrigators' Board were established above the local level.

The second assumption of the hypothesis which postulates that autonomy and corporate group integrity are instrumental in successful irrigation management cannot be validated as such given the research results. In other words, although autonomy and corporate group integrity seem to be important to irrigation, the research indicated that there are other factors which exert influence upon the management of irrigation as discussed below.

The analysis of irrigation tasks in the three regions studied has shown that regardless of the degree of autonomy and respective corporate group integrity, tasks as diverse as the election of the Executive Boards and the maintenance of irrigation canals function well in all study groups showing positive general trends. The results are not surprising since these tasks are neither very much affected by the respective environmental constraints, nor by competition for a scarce resource. The situation is, however, quite different with regard to water distribution. In the study regions and elsewhere it has been shown that "it is with the distribution of water that the largest number of organizational alternatives occur" (see also Chambers 1980). The unpredictability of water flow and the problem inherent in its distribution cause conflict (Kelly 1983:884) and major village quarrels (Leach 1961:122), the resolution of which often determines whether autonomy can be maintained at the local level or must be transferred to higher levels of authority.

Thus, the distribution of water in the three regions reveals a spectrum of situations ranging from well organized along the Rio Tigre, via difficult in the Rio Chicon region, to chaotic in Yanahuara. There is thus an inverse relationship between corporate group autonomy and successful water distribution. In other words, along the Rio Tigre where autonomy and corporate group integrity are less expressed, but water is plentiful, its distribution functions well

while in the villages along the Rio Chicon and in Yanahuara, where decision-makers above the local level seldom or never intervene and corporate group or communal integrity is strong, the distribution of water is problematic or does not function at all. Therefore it cannot be assumed that the more corporate a group, the better it functions, an observation that has also been made with regard to corporate villages in the Phillipines (Lewis in press:156-157).

The inverse relationship that was found to exist between autonomy and water availability does not suggest that the lower the degree of autonomy and group integrity, the more successful the management of irrigation. It merely indicates that apart from autonomy and corporate group integrity there are other factors which require consideration. Thus, in the case of the distribution of water, the crucial factor involved is water availability. Where there is little or no water, its distribution cannot be successful regardless of how strong autonomy and corporate group integrity are expressed. A similar situation has been observed in Cajamarca in northern Peru where "despite the relative strength of the communal institutions ... and well functioning irrigation committees" environmental constraints, in this case the harsh climate, did not allow for favorable results from irrigation (Wilkinson, 1984:F-29).

The situation as it exists along the Rio Chicon and in Yanahuara suggests that in order to improve the distribution of water or to make it possible at all in these villages and

plentiful supply of water must be procured. Since the villages in neither of these regions have the financial means nor the technical knowledge to improve their irrigation systems, the indigenous population of these communities has considered soliciting help from 'outside' despite threats to their autonomy.

As was discussed earlier and has also been observed in other parts of the world (Coward 1980a, Lewis in press, Ritter 1966:45), indigenous people are not generally against help from 'outside', but they are against measures that are taken without their consent and against their own perceptions of appropriateness. The fact that within the regions studied here, indigenous initiative for development is strong along the lower parts of the canal systems and local leadership is responsible, provides the prerequisites for successful irrigation development. Yet, despite certain precautions taken in this respect and generally good intentions by the developers in the district of Cusipata, the project did not provide satisfaction to all water users and, in fact, has thus far brought few benefits to the upstream irrigators. This situation suggests that the question to be raised is not whether development should or should not take place, but as Goodell (1985:264) has suggested, "how to reconcile assistance with beneficiaries' initiative and corporate integrity".

The conditions as they prevail along the Rio Chicon and

development along the Rio Tigre as well as pertinent findings from investigations in other parts of the world will serve as the basis on which the following recommendations for more appropriate development are made:

1. Involving all local people in the planning and implementation of a development project has been of greatest concern to the irrigators in the study regions. As has also been noted in irrigation development elsewhere, "simply conferring with a few leaders is an inadequate approach" (Bagadion and Korten 1980:282). The need to integrate the indigenous population into decision-making processes from the very beginning of a project has been widely recommended (Coward 1980b, Dobyns, et.al. 1971, Doughty 1965, Goodell 1985, Holmberg 1952, 1965, Horton 1986, Hunt and Hunt 1974, Siy 1982 and others), yet has seldom been done in practice. As the research in the district of Cusipata has shown, the omission of involving peasant farmers from all communities into a close dialogue has resulted in a lack of perceiving the precise needs of the upper communities. Neglect in examining the prevailing patterns of cooperation, competition and conflict along the Rio Tigre canal system, of the phenomena underlying these patterns and the circumstances which give rise to them, has created new sources of conflict by upsetting the power balance between villages. The upper communities lost their control over water following canal

socially.

Involving the water users as major decision-makers in a development project is not only advantageous in view of their extensive knowledge of the local physical environment, of social strategies, and prevailing religious belief systems, but is also important from a psychological point of view (Bolin 1985). As this study has shown, and research elsewhere has indicated, the assignment of decision-making power instills pride and self-esteem in the people who are responsible for carrying out a task (Goodell 1985:251, Schwartz 1978:237) and for bringing it to a successful conclusion.

The importance for indigenous job accountability has been stressed by Coward (1980b:341). He suggested but has not tested the hypothesis that "indigenous irrigation leadership roles can be mobilized to perform in modern irrigation projects even if task activities and relationships are altered, if accountability for job performance is linked to the local water users and not the water bureaucracy exclusively".

Coward's hypothesis is well reflected along the Rio Tigre canal system in the district of Cusipata where indigenous irrigators perform leading roles in the newly developed project and are assigned increasingly higher degrees of accountability for job performance. This hypothesis can be tested more rigorously when development

personnel leave Cusipata and indigenous leaders alone are responsible for all irrigation tasks.

2. The problem of 'modernizing' indigenous people into dependency has been recognized by investigators worldwide (Brokensha et.al. 1980, Coward 1980a, Gibson 1985, Lees 1974, Lewis in press, Mazrui 1978, Siy 1982), but little has been done to avoid this often catastrophic process.

The fear of becoming dependent on outside assistance has been expressed by the indigenous irrigators in all communities studied and was most pronounced by the subsistence farmers of the upstream villages. The extreme caution with which the farmers in the Peruvian Andes approach change has been ascribed to their "great conservatism" and even "backwardness". Closer observation, however, shows that their fears are justified in the Andes and elsewhere (Scott 1976:13). In regions where development efforts produce little more than a better diet for the subsistence farmers without guaranteeing any surplus, dependency is created through the use of expensive technology - cement for canal construction, the application of fertilizers, pesticides etc. While it is difficult for many peasants to pay for repairs that become necessary on the canal system, other factors such as changing the pH of the soil through the application of chemicals cause profound problems since inability to continue using these costly products results in inferior harvests. These problems are well characterized by

Tintinco "we better return to our old technology before we get ourselves too deeply into debt". The situation as it exists in Tintinco is reflective of Lees' (1974:125) view who observed that "by installing new irrigation devices whose construction and maintenance is beyond the capacity of the local peasant community, the state government both reduces local village autonomy and causes the local community to become responsive to non-local perturbations". Jones (1984:162) study in Bolivia has also revealed problems associated with the introduction of 'advanced' technology in view of "the limitations peasants face in the management of their farms".

Thus, in the case of subsistence farming any development efforts should be concerned with the improvement of the traditional technology, a process that requires in-depth research in cooperation with the indigenous population. Efforts invested in this type of research are much more complex and time-consuming and have, therefore, received much less consideration in irrigation development than the imposition of modern technology. (See also Chayanov 1966).

Where the economic, social and environmental situation differs considerably between villages subjected to the same development project, dependency of at least one sector of the population can be created where "standard procedures to situations and groups that are very diverse" are applied (Coward 1977:232). This situation occurs frequently in the

and downstream communities are exposed to different environmental constraints. If the factors mentioned above were given serious consideration in development, indigenous dependence on help from outside the community could be minimized or eliminated once a project has been completed and corporate group autonomy can thereby be maintained or restored.

3. The importance of creating viable irrigation organizations which will ensure the successful management of irrigation over time is widely recognized (Bagadion and Korten 1980, Kelly 1983, Lewis in press, Siy 1982).

As this study has shown, even within a relatively small region, the structure of such groups and the manner in which they function can vary considerably. Given the fact that two crucial variables - the structure of the irrigation groups and the availability of water - vary between the three regions studied, makes it difficult to determine the precise impact of group structure on irrigation management. Nevertheless, certain trends became evident in the regions studied that can serve as basis for recommendations.

With regard to group size, this study agrees with related research, suggesting that small groups serve their members better than large groups by allowing them closer insight into and stronger decision-making power over group affairs (Coward 1977:228, Fisher 1974, Homans 1965:56,

tors' Organizations in Latin American countries remarks that "it is generally accepted that the smaller the area under control of a body, the greater the cohesion among its members, and this is reflected by facilitating the taking of decisions and the execution of the common task". In the Peruvian Andes where we are dealing with a great variety of microenvironments and where social and cultural strategies differ considerably between villages, small irrigators' groups which are established in relation to the prevailing local constraints, can serve their purposes well.

Whether the situation as it exists in the Irrigators' Committees along the Rio Chicon, where a high degree of autonomy is vested in each local group, contributes more to successful irrigation management than that found in the district of Cusipata where local units articulate in higher levels of decision-making (Irrigators' Commission and Board), cannot be determined as yet with any degree of certainty. With regard to the distribution of water to various villages along the same canal system, however, the group structure as it exists in the Rio Tigre region seems to have definite advantages. The establishment of an Irrigators' Commission with autonomy at the level of this canal system permits a more equitable distribution of water. The existence of an Irrigators' Board also has certain advantages, allowing indigenous representatives direct communication with the Irrigation Sector of the Ministry of

Agriculture. By projecting local indigenous autonomy to higher levels of decision-making irrigators exert at least some influence on irrigation policies.

The integration of small groups into larger units has been considered successful in other parts of the world (Coward 1977:234, Olson 1978:75, Spalding 1984:42). Solanes (1983:14) found that in Latin American countries the integration of irrigators' organizations within more comprehensive bodies "makes it possible to benefit from the technical and economic advantages of large groups and at the same time, although indirectly, from the advantages conferred by small groups". Freeman and Lowdermilk (1981:153) believe that "programs to improve the management of irrigation water -either in existing or newly structured systems - must center on the design and improvement of irrigation organization at local, regional and national levels".

As indicated at the beginning of this thesis, the research undertaken was meant to contribute both theoretically and practically to the organization of irrigation.

On the practical side the recommendations are expected to bring about a greater overall satisfaction to those peasant farmers who are involved in irrigation development projects and thus to contribute to long-term project success.

On the theoretical side it is hoped that this comparative study will provide further insights toward the estab-

lishment of a theory of small scale irrigation organization, especially with regard to the relationship between autonomy, corporate group integrity and successful irrigation management.

Changes as they are expected to occur along the Rio Tigre canal system in the district of Cusipata and are likely to take place along the Rio Chicon and in Yanahuara will set the stage for further research and for the type of studies required to test the hypothesis set in this research in a more rigorous way. Thus, when the development personnel leave the district of Cusipata and the indigenous irrigators alone are responsible for the organization of the irrigation tasks, it should become evident whether and to what extent a higher degree of indigenous autonomy will affect group integrity and overall irrigation management. It will further be of interest to find out whether all four Irrigators' Committees along the Rio Tigre canal system continue to function smoothly or whether the upstream irrigators who have not vested much initiative in the formation of their groups will refuse to cooperate, especially at the level of the entire canal system.

It is also expected that more light will be shed on the questions raised in this research when the people in the villages along the Rio Chicon and in Yanahuara are able to improve their irrigation systems thereby obtaining enough water to allow for its equitable distribution. In the absence of the strong determining variable represented by

water scarcity, it should become much clearer to what extent the prevailing degree of corporate group autonomy along the Rio Chicon or community autonomy in Yanahuara contributes to successful irrigation management.

In this context it will be of further interest to discover whether the Irrigators' Committees along the Rio Chicon will continue to vest autonomy exclusively at the local level or if a more plentiful water supply will allow for the formation of an Irrigators' Commission at the level of the canal system.

Whether the provision of an adequate water supply in Yanahuara will stimulate the formation of corporate Irrigators' Committees or whether communal authorities will include the distribution of water under their jurisdiction would be revealing with regard to the accompanying changes in group autonomy.

My prediction is that the trend evident along the Rio Tigre canal system and observed in other parts of the world (Goodell 1985, Heinen 1984, Lewis in press, Siy 1982) has general validity. Indigenous initiative and decision-making power are basic ingredients to irrigation organization. Although autonomy alone does not determine successful irrigation management, it has a strong if not dominant role in fostering corporate group integrity and in the absence of adverse conditions such as extreme water scarcity, contributes to successful irrigation management.

Rio Tigre Canal System - District of Cusipata

Data on Irrigation Canals, Water Users, and Irrigated Land Area

Name of Village	Name of Canal	Maximum Capacity liter/second	Number of Water Users	Area irrigated in hectares	Average size of Holding
Cusipata	Right Principal Canal	200	290	207	0.71
	Left Principal Canal	350			
Paucarpata	Right Principal Canal	200	59	94	1.59
	Left Principal Canal	350			
Tintinco	Right Principal Canal	200	209	81	0.39
	Left Principal Canal	350			
Colcca	Lateral Canal LD1	200	121	94	0.78
Total			679	476	0.70

Data from: Ministerio de Agricultura
Distrito Riego Cusco
Subsector Riego Cusipata, 1985

Table 1

Rio Chicon Canal System - District of Urubamba

Data on Irrigation Canals, Water Users, and Irrigated Land Area

Name of Village	Name of Canal	Maximum Capacity liters/second	Number of Water Users	Area irrigated in hectares	Average size of Holding
Q'atan	Q'atan	60	132	46.47	0.35
Chichubamba	Tullumayo	50	72	43.44	0.60
	Jatun Yarcca	50	156	53.82	0.35
	Ccantuyoc	50	56	20.58	0.37
	Chanchillay	50	78	24.26	0.31
Yanaconas	Yanacona Chicon	30	131	43.37	0.33
Chicon	San Isidro Chicon	80	68	73.02	1.07
	Total		693	304.96	0.44

Data from: Ministerio de Agriculture
Distrito Riego Cusco
Subsector Riego Urubamba, 1985

Table 2

Rio Pucara Canal System - District of Urubamba

Data on Irrigation Canals, Water Users, and Irrigated Land Area

Name of Village	Name of Canal	Maximum Capacity liters/second	Number of Water Users	Area irrigated in hectares	Average size of Holding
Yanahuara	Pucara) Chaquihuaicco) Colca) Chanchiyoc) Umanchurco) Manzanayoc)	not known	800	1000	1.25

Data from: villagers of Yanahuara, 1985-
no official records exist
for officially not recognized
communities

Table 3

CLIMATIC DATA - DISTRICT OF CUSIPATA

Month	Temperature Average °C	Temperature Minimum °C	Temperature Maximum °C	Days with Frost	Relative Humidity %	Hours of Sunshine	Evatranspiration mm	Precipitation Average mm
January	12.1	4.8	18.5	0	64	137	110	123
February	11.8	5.8	18.3	0	70	128	99	132
March	12.0	5.6	18.6	0	69	156	110	109
April	12.0	4.0	19.5	0	64	199	111	48
May	11.2	0.9	19.7	6	62	234	107	10
June	10.3	-1.0	19.5	19	56	242	95	3
July	9.9	-1.1	19.2	20	55	256	103	5
August	10.9	0.3	19.8	9	54	229	111	10
September	12.0	3.1	20.4	1	53	195	116	22
October	13.2	4.6	21.0	0	54	198	132	41
November	13.2	4.9	21.1	0	57	180	128	70
December	12.7	4.9	19.5	0	60	155	119	115

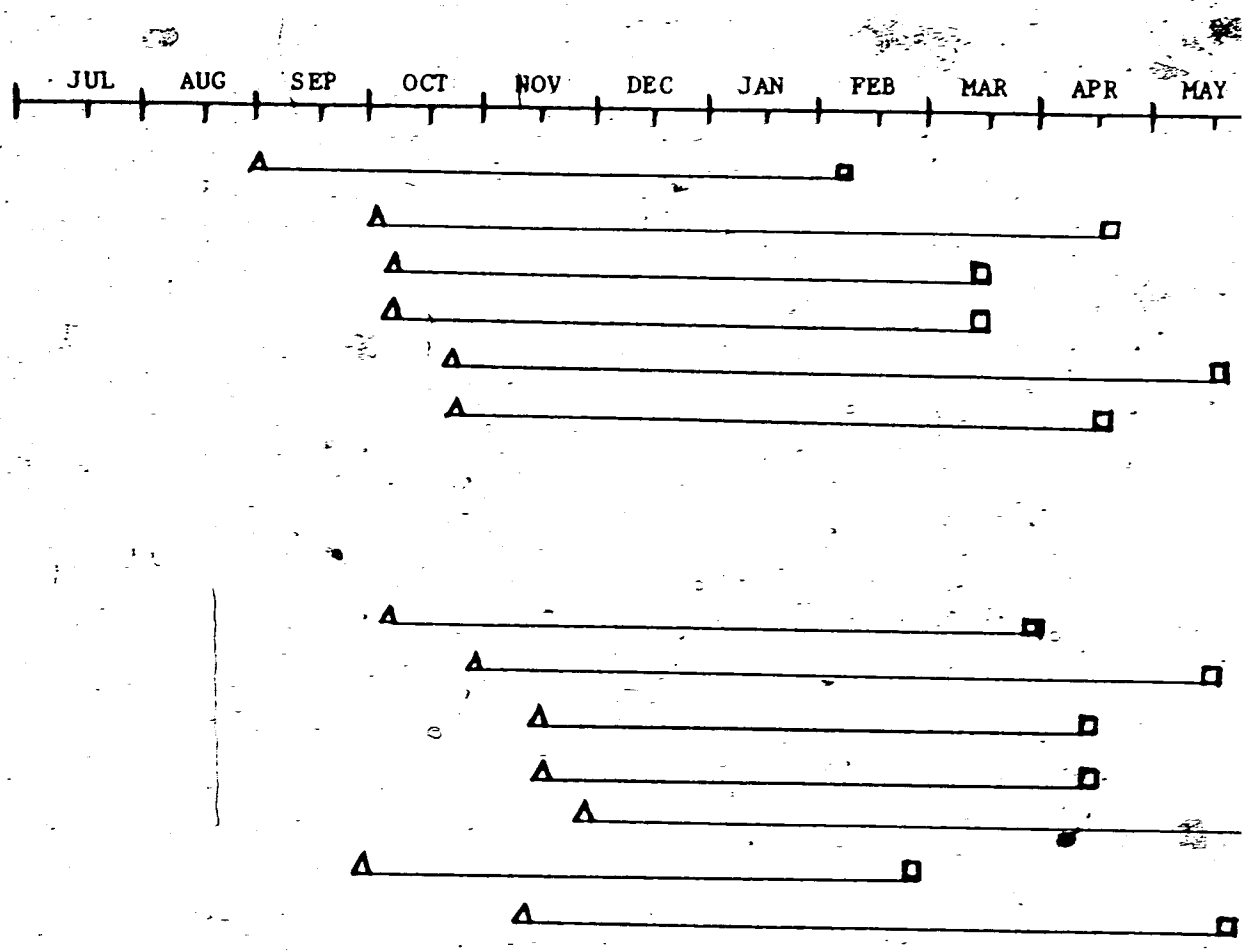
Data from: Ministerio de Agricultura
Proyecto Cusipata, 1981

Table 4

AGRICULTURAL CALENDAR - SOWING AND HARVESTING

Irrigated	Duration of vegetative cycle
Potatoes	160
Maize	190
Wheat	150
Barley	150
Beans	210
Tarwi	180

Not Irrigated	
Potatoes	170
Maize	200
Wheat	150
Barley	150
Beans	210
Vegetables	150
Tarwi	180



Legend: Sowing Harvesting

Statistics: Ministerio de Agricultura, Cusipata 1981

Figure 1

ORGANIZATION OF IRRIGATION

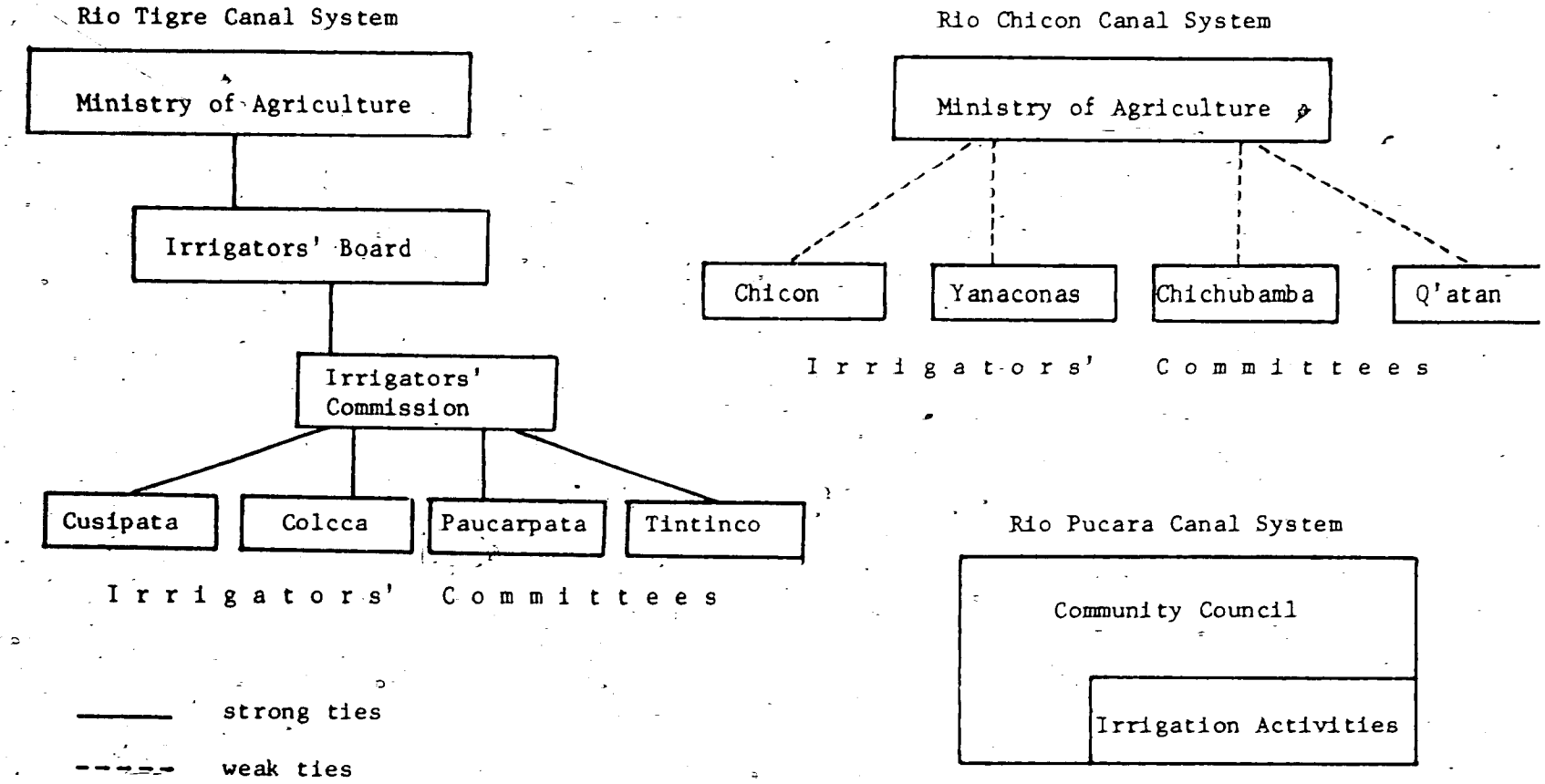


Figure 2

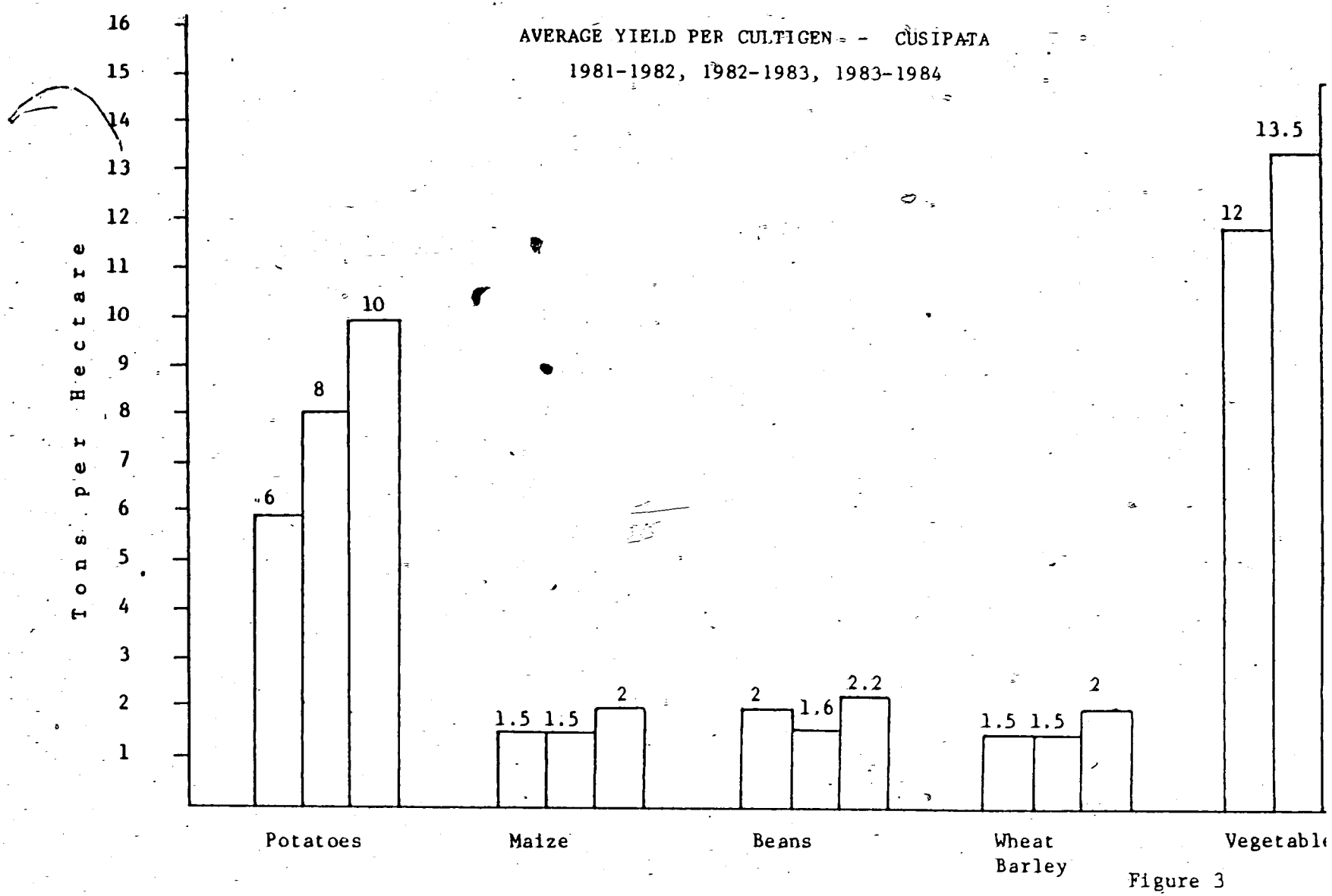

AVERAGE YIELD PER CULTIGEN - - CUSIPATA
1981-1982, 1982-1983, 1983-1984
Tons per Hectare
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
6
8
10
1.5 1.5 2
2 1.6 2.2
1.5 1.5 2
12
13.5
Potatoes
Maize
Beans
Wheat
Barley
Vegetable

Figure 3

EXPRESSIONS OF AUTONOMY, AUTOCEPHALY, HETERONOMY AND HETEROCEPHALY
ALONG THREE CANAL SYSTEMS
Representing Max Weber's Model

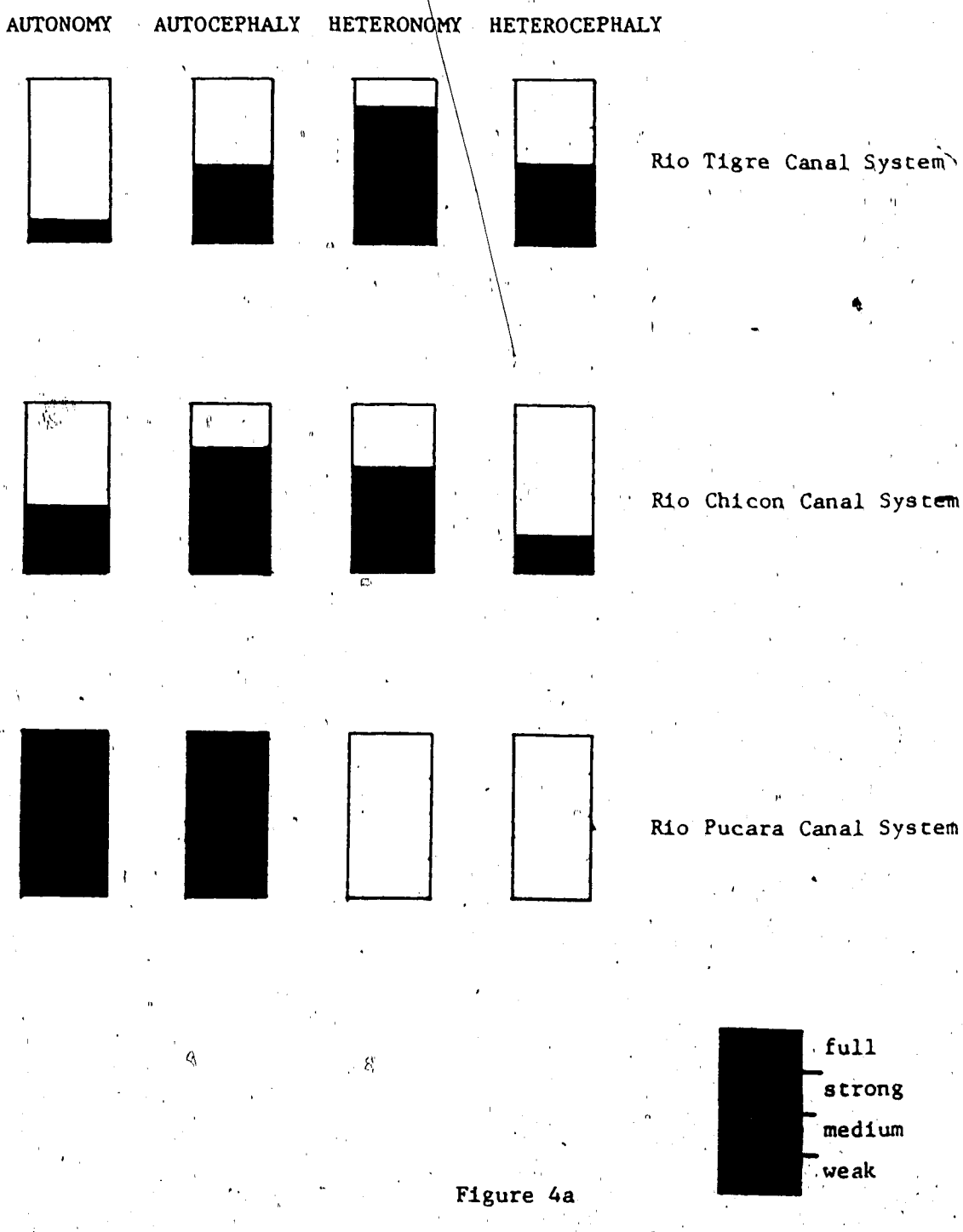


Figure 4a

EXPRESSIONS OF AUTONOMY, AUTOCEPHALY, HETERONOMY AND HETEROCEPHALY

ALONG THREE CANAL SYSTEMS

Representing new Dimension to Max Weber's Model

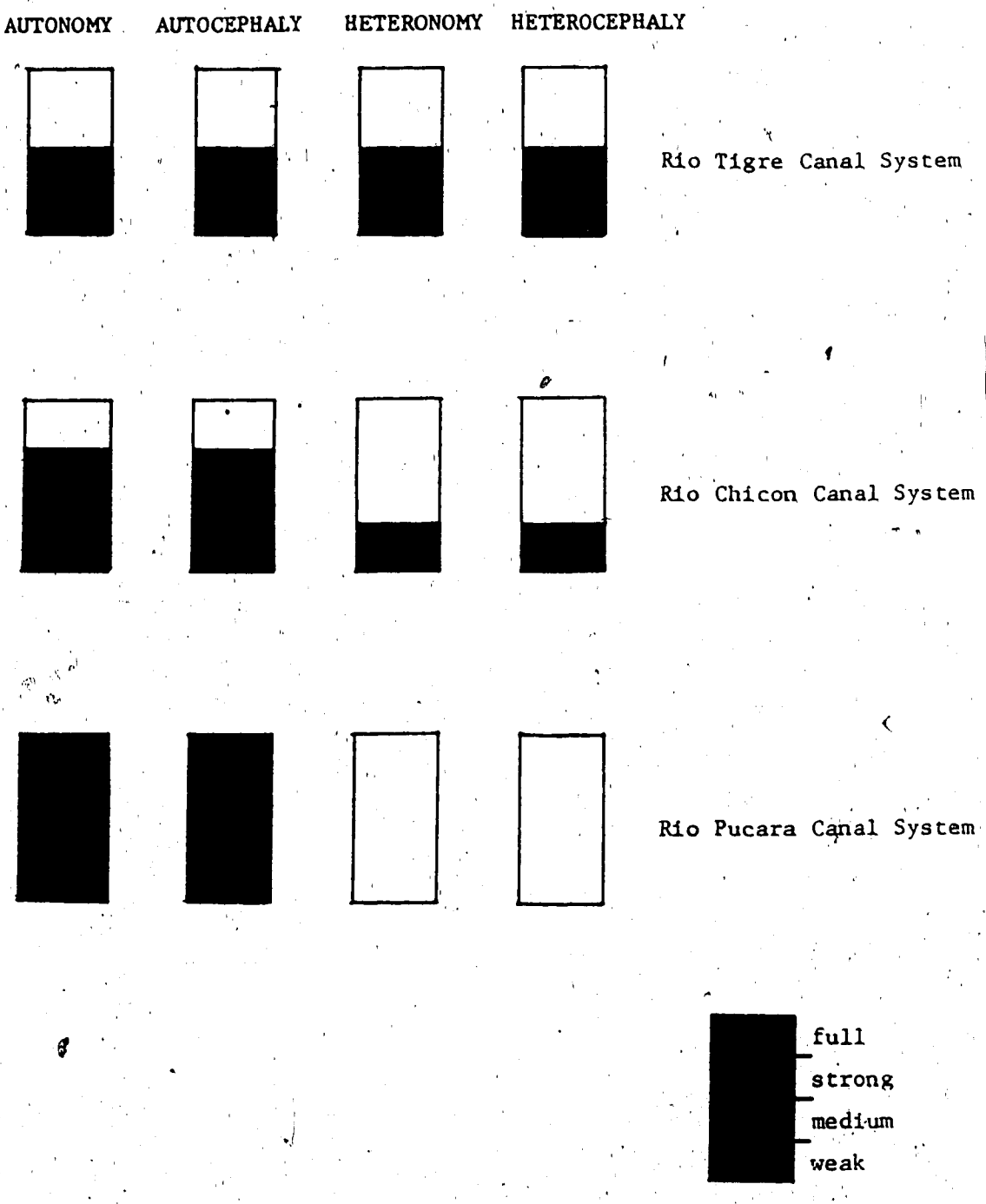


Figure 4b

EXPRESSIONS OF LOCAL GROUP AUTONOMY IN RELATION TO IRRIGATION TASKS

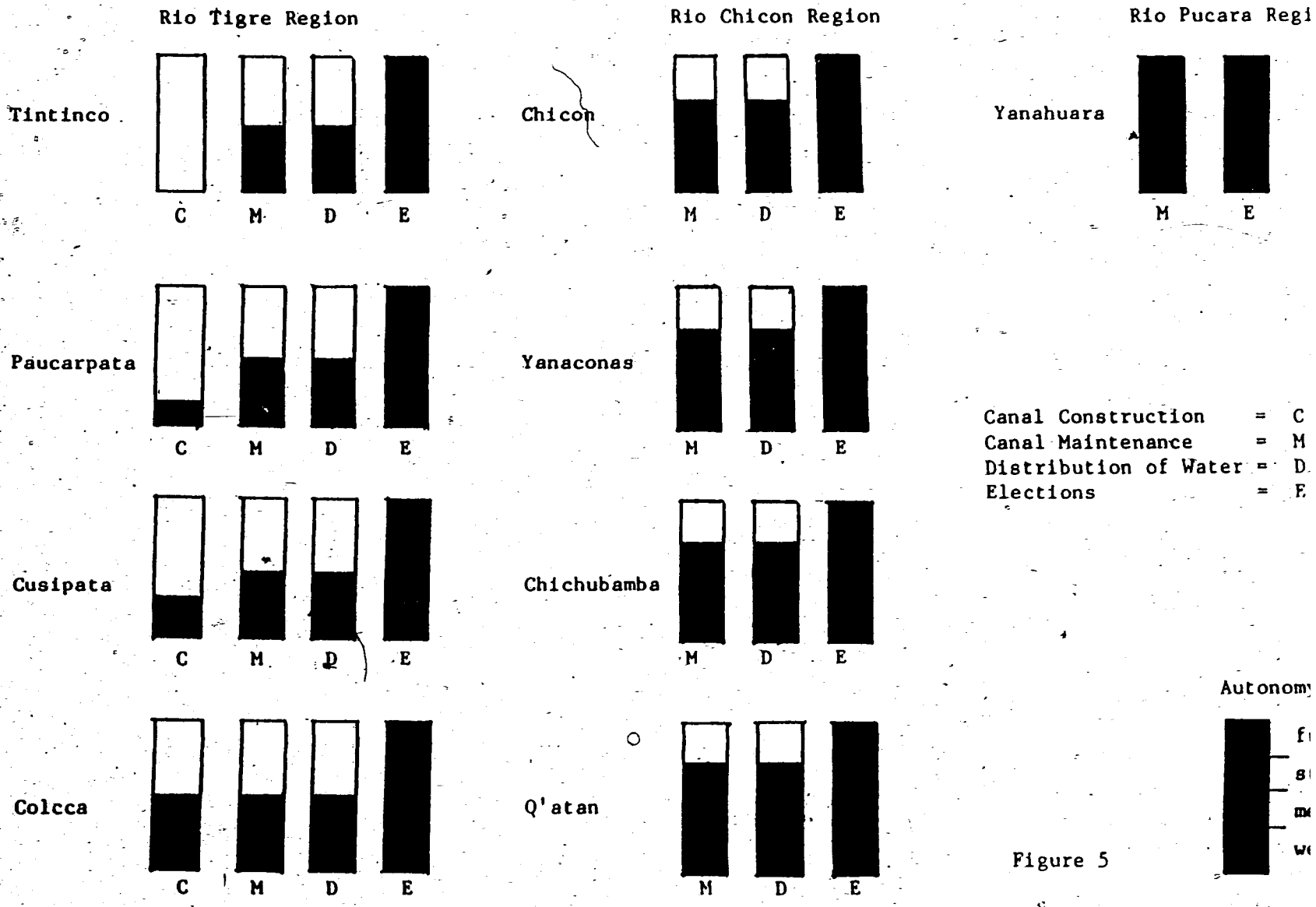
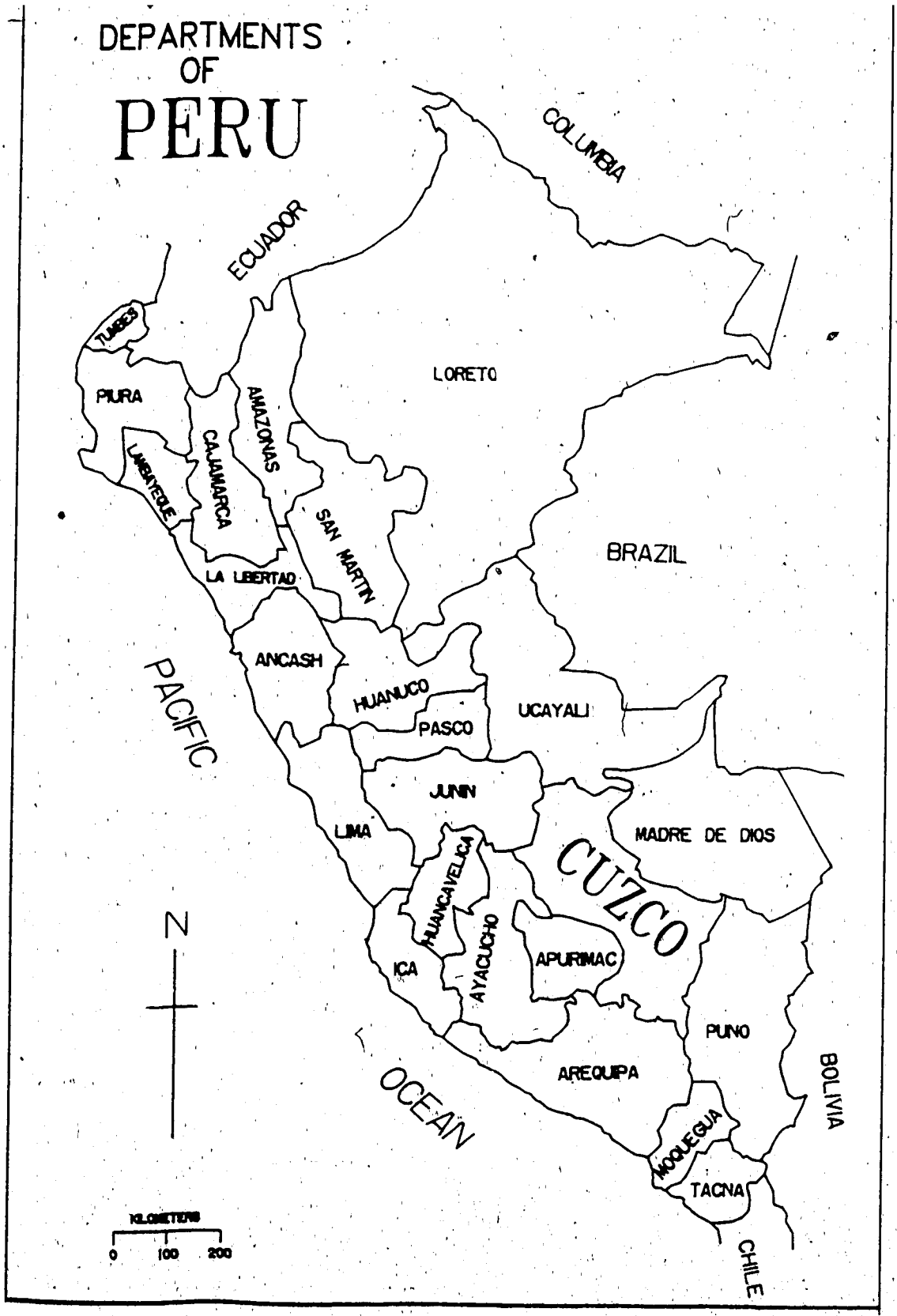
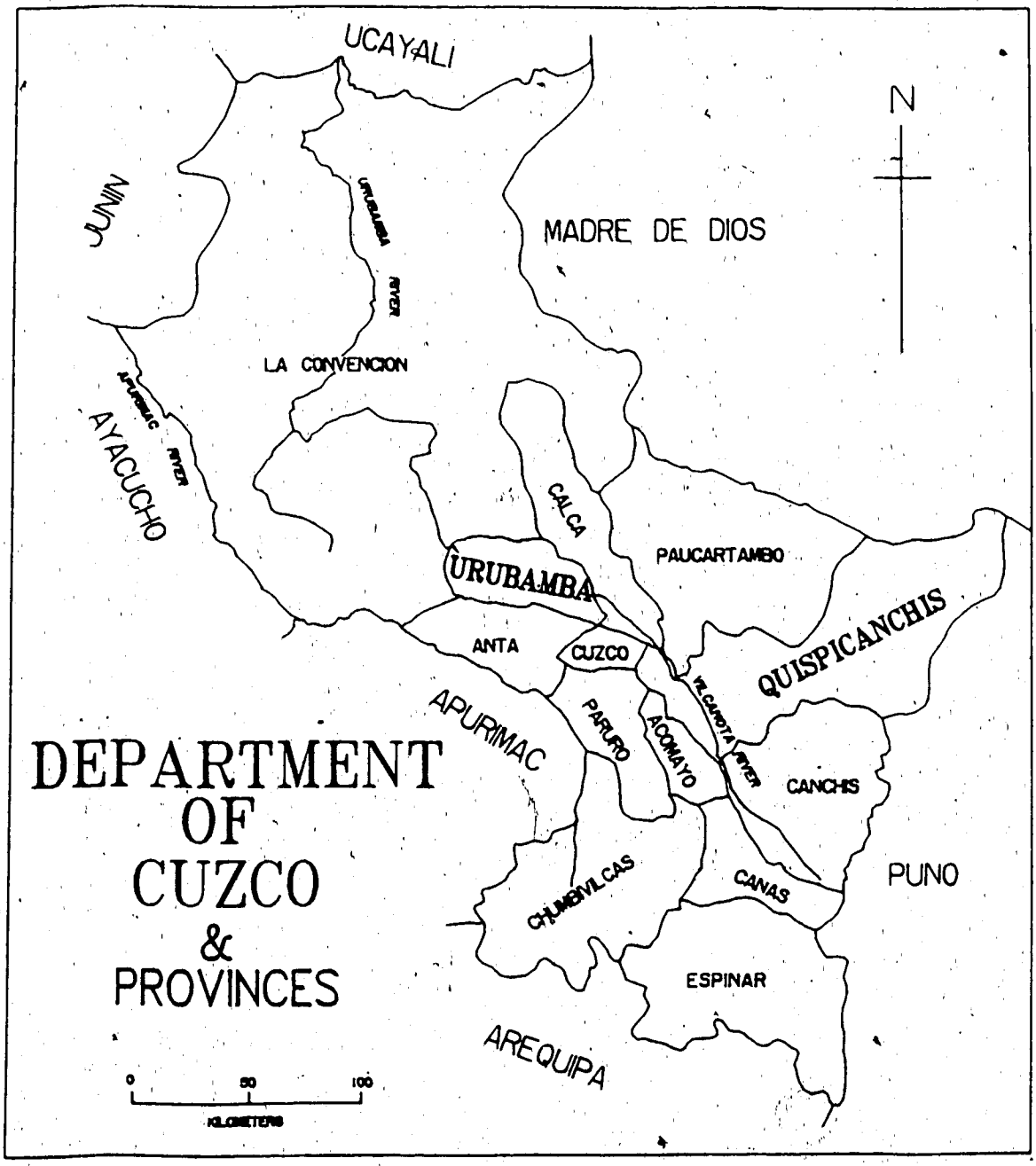


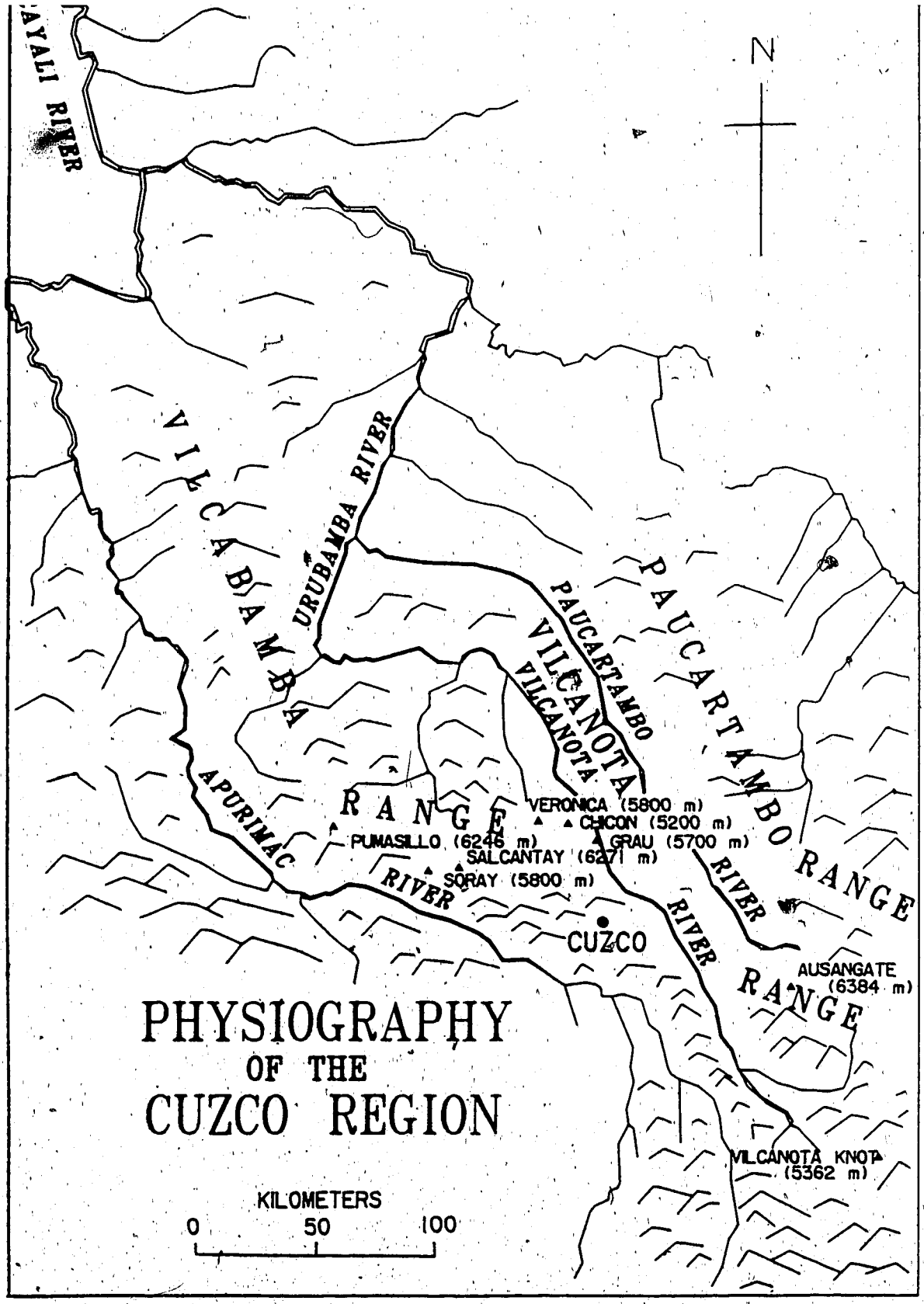
Figure 5


DEPARTMENTS
OF
PERU
COLUMBIA
ECUADOR
TUMBES
PIURA
LAMBAYEQUE
CAJAMARCA
AMAZONAS
LORETO
SAN MARTIN
BRAZIL
LA LIBERTAD
ANCASH
HUANUCO
PASCO
UCAYALI
PACIFIC
JUNIN
LIMA
MADRE DE DIOS
HUANCAVELICA
CUZCO
ICA
AYACUCHO
APURIMAC
PUNO
AREQUIPA
BOLIVIA
OCEAN
MOQUEGUA
TACNA
CHILE
N
KILOMETERS
0
100
200

Map 1

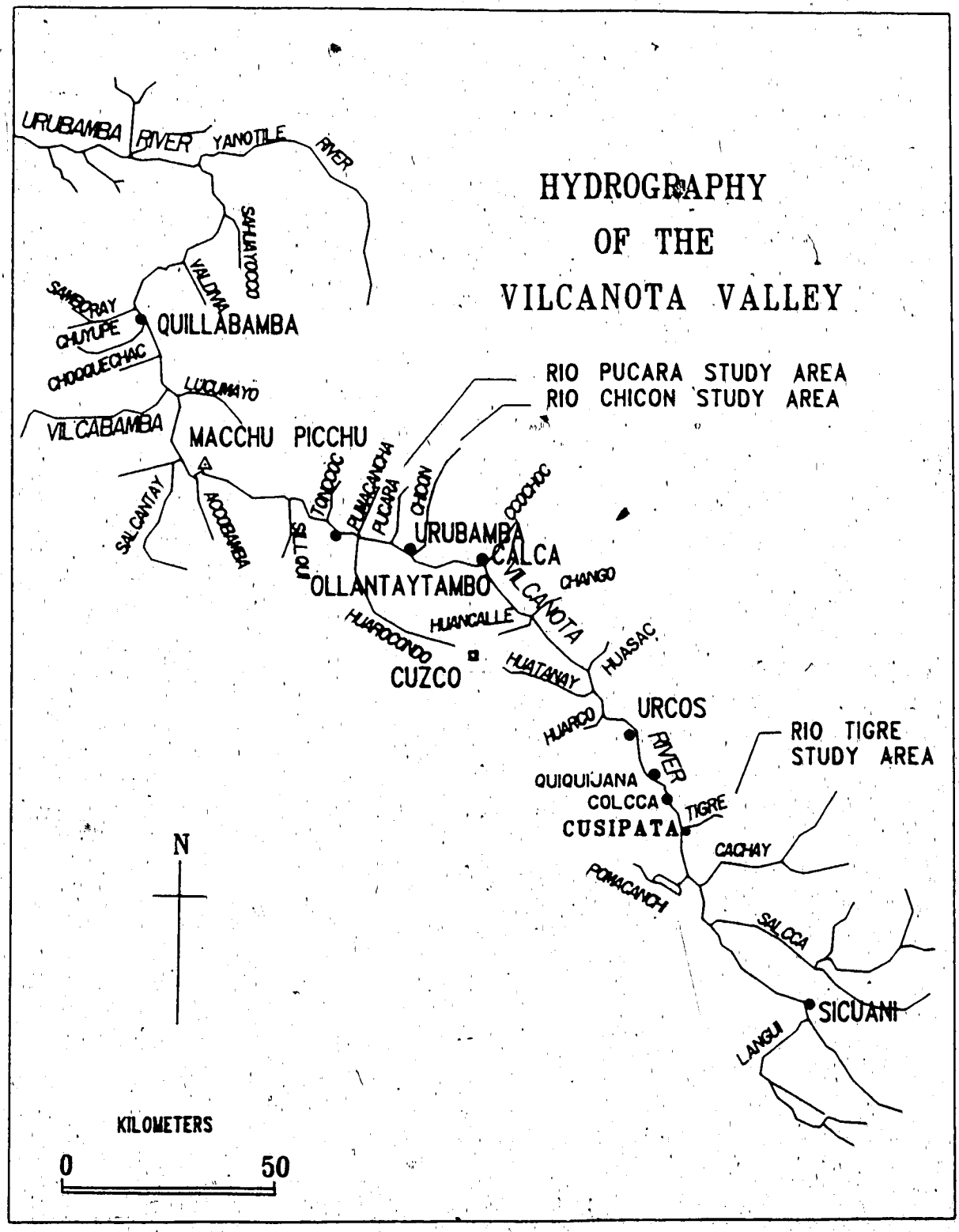

UCAYALI
JUNIN
MADRE DE DIOS
N
URUBAMBA RIVER
LA CONVENCION
APURIMAC RIVER
AYACUCHO
CALCA
PAUCARTAMBO
URUBAMBA
ANTA
CUZCO
QUISPICANCHIS
APURIMAC
PARURO
ACOMAYO
VILCANOTA RIVER
CANCHIS
CHUMBIVILCAS
CANAS
PUNO
ESPINAR
AREQUIPA
DEPARTMENT OF CUZCO & PROVINCES
0
50
100
KILOMETERS

Map 2



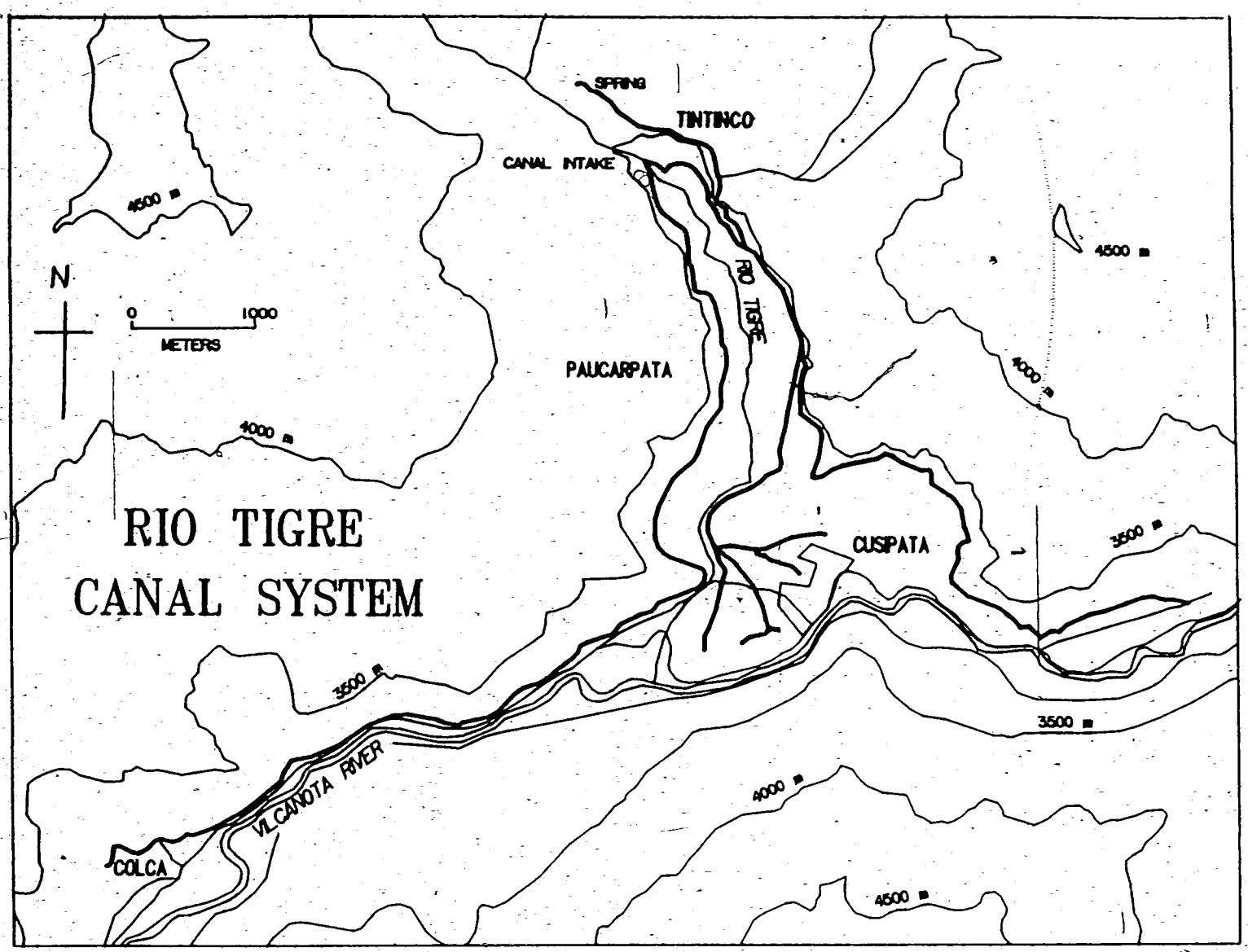
Adapted from Gade (1975)

Map 3



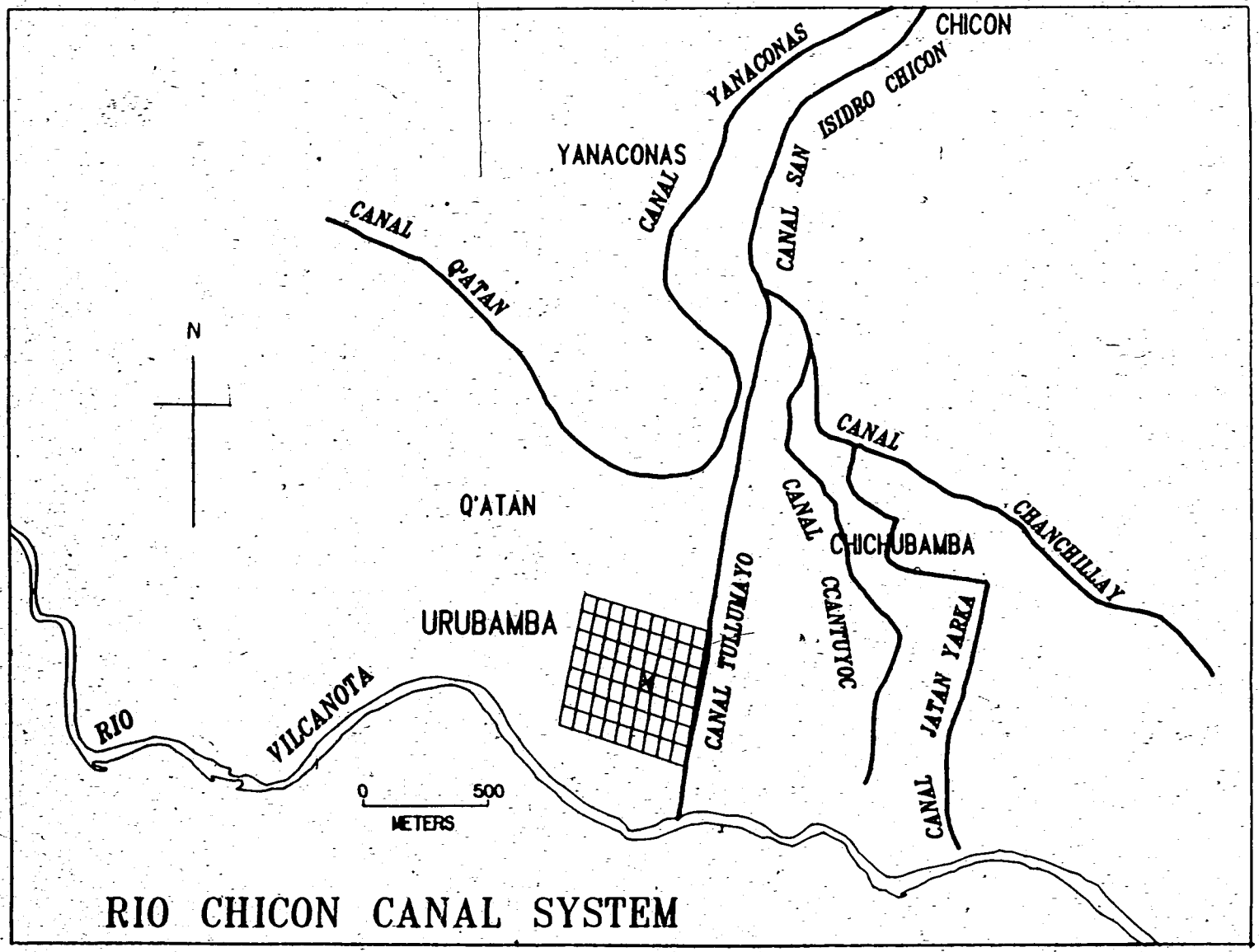
Adapted from Gade (1975)

Map 4

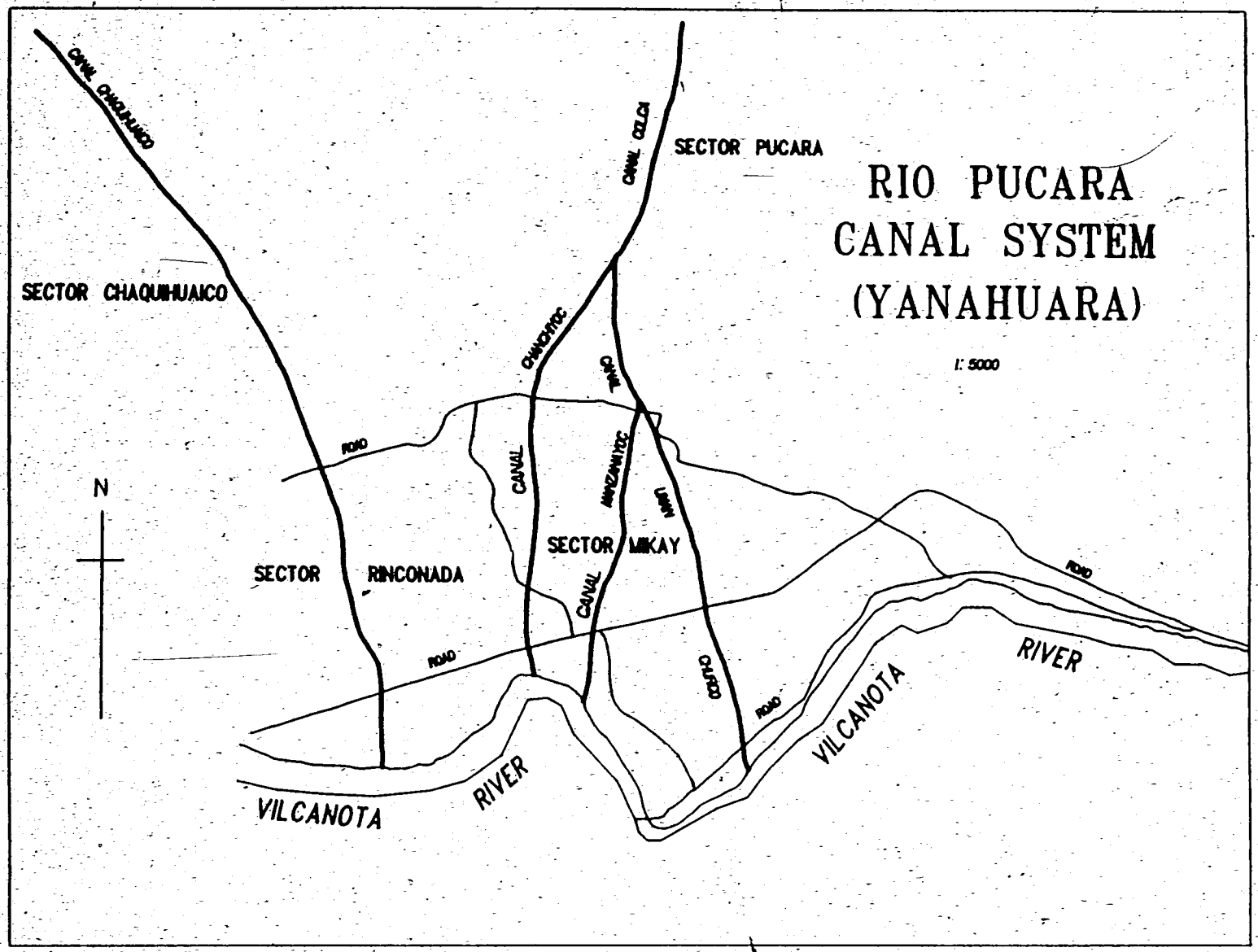


Adapted from: Ministerio de Agricultura -Proyecto Cusipata

Map 5


CHICON
YANACONAS
CANAL YANACONAS
CANAL SAN ISIDRO CHICON
YANACONAS
CANAL
CANAL Q'ATAN
N
CANAL
CHANCHILLAY
Q'ATAN
CANAL CHICHUBAMBA
CANAL TULLUMAYO
CANAL CCANTUYOC
URUBAMBA
CANAL JATAN YARKA
RIO
VILCANOTA
0
500
METERS
RIO CHICON CANAL SYSTEM

Map 6


CANAL CHAQUIHUACO
SECTOR CHAQUIHUAICO
CANAL COLCA
SECTOR PUCARA
RIO PUCARA
CANAL SYSTEM
(YANAHUARA)
1: 5000
CHANCAYOC
CANAL
ROAD
N
CANAL
MANZANAYOC
CANAL
SECTOR
RINCONADA
SECTOR
MIKAY
CANAL
ROAD
CANAL
ROAD
ROAD
VILCANOTA
RIVER
VILCANOTA
RIVER

Map 7

1. Peru is divided into 23 departments and the province of Callao. Each department is divided into several provinces, each of which includes a number of districts. Districts are made up of communities which may or may not be officially recognized.

2. Inca informants explained the organization of Cuzco to the Spanish investigators by means of the ceque system. This is an abstract system of imaginary lines (ceques) which irradiate from the center of the city of Cuzco (Temple of the Sun) into the four suyus (quarters) of the Inca Empire, uniting huacas (sacred sites) such as temples, springs and rocks. Zuidema (1964) found that one third of the huacas were related to water (see also Villanueva y Sherbondy 1970:xv and Zuidema 1978).

3. There is no full consensus among investigators regarding the definition of the Quechua term ayllu. Some of the better definitions are as follows: Orlove and Custred (1980:229) define ayllu as 1. a pre-Columbian form of social organization based on kinship and residence; 2. an Indian community; and 3. a kinship group that may vary in size and lineality.

Sherbondy (1982a:18, 20) considers an ayllu to be the basic unit of Andean social organization, which can be defined "as a kinship group and a local group but for purposes of studying irrigation, the most important aspect of the ayllu is that of a local group".

According to Isbell (1978:249), ayllu is a "generic term signifying a corporate group with a head".

4. Chosen Women (acclas in Quechua) are frequently referred to as "Virgins of the Sun" in the literature. Inca imperial officials (apopanacas) visited villages periodically to select girls at about the age of ten for outstanding beauty and physical perfection (Rowe 1963:269). They were educated in convents (acclahuasis) by mothers (mamakonas) in spinning, weaving, cooking and the brewing of maize beer (chicha). Some of the girls became mamaconas themselves, others were married to Inca nobles and some entered the service of the Sun and the sacred shrines (huacas). The Chosen Women played important roles in festivals and sacrifices (Rowe 1963:269).

5. Varayoc derives from the Spanish term vara (staff) and the Quechua term yoc (with), meaning with staff. A varayoc is an individual who has a cargo, which is a political or religious office in the political-religious hierarchy, the varayoc system of a community. All men of an Indian community are expected to take part in the varayoc

system. In their youth they must assume menial cargos (burdens) such as carrying messages or cleaning offices and the church. Later they must volunteer for a major cargo. This involves organizing and sponsoring a fiesta in honor of a significant village saint. "As a man moves up through this hierarchy of religious obligations, he is rewarded with increasing amounts of prestige... Satisfaction of religious burdens leads to or is accompanied by parallel progress up a ladder of political offices such as sheriff, councilman, mayor, etc" (Harris 1964:24).

For an in-depth description of the varayoc system, see Mitchell 1972:174-203).

6. The Quechua term topo is a basic unit of measurement that has been used since Inca times. Rowe (2963:266) states that according to Garcilaso (1723) and Sarmiento (1906) one topo was granted for the support of a taxpayer and his wife, while additional grants were made to their children.

The precise dimensions of a topo vary between regions. In the communities studied in this research one topo is equivalent to one third of a hectare while in other parts of Peru it equals only one forth of a hectare.

7. Compadrazgo (ritual coparenthood) is a system that originated in Medieval Europe and is now a widespread phenomenon throughout Latin America. Ties of ritual kinship are established between the parents and godparents of a child, between a couple and their sponsors at the time of their wedding or between parties in a variety of other rituals.

8. The difference between Indian and Mestizo is conceived largely on the basis of cultural characteristics and has little to do with physical features. Language, manners, dress, education, occupation, and wealth are the main characteristics which distinguish the two groups. Indians speak primarily Quechua, chew coca, wear homespun clothes, have little or no education, subsist mainly on agriculture and the raising of livestock. Mestizos speak mainly Spanish and orient themselves toward the city. When engaged in agricultural activities, they normally produce surplus which is sold for cash.

There exists a category between the Indians and Mestizos, called Cholos. These are people who are upwardly mobile but who have not yet attained the status of Mestizo. For a detailed discussion, see Mitchell 1972:75-112).

9. Ayni is a form of reciprocal exchange of goods and services. In this form of reciprocity, persons who respond to a call for aid expect repayment of the same type of service at a different time.

10. Indigenismo is a pro-Indian intellectual movement which started in the early twentieth century. It is "a form

of critique of old forms of society which were perceived as capable of only slow and inadequate response to the disruptive intrusion of capitalism and foreign entrepreneurs" (Yambert 1980:69). Pro-Indian spokesmen such as Gonzalez Prada, José Carlos Mariategui (1928), and Castro Pozo (1924) emphasized the importance of the peasant community in maintaining important organizational principles and in providing a locus for economic action. Primov (1980:153) considers the development of the concept of peasant community, formerly comunidad indígena, now referred to as comunidad campesina, as the most important consequence of the indigenismo movement.

Indigenismo, however, did not only focus on the social reality of the Indian peasant but took on political dimensions as well. It was accepted by the political party APRA and during the administration of president Leguia in 1920 provisions were made to legally recognize peasant communities (Yambert 1980).

11. John V. Murra (1967, 1972) devised the concept of 'Vertical Ecology', also referred to in the context of 'Vertical Economy', 'Vertical Control' and 'Verticality'. Murra claims that the Andean peoples conceive of their world in 'vertical' terms. Using documents about visitas (visits) of the pre-Incaic chiefdoms of Chupachu and Lupaqa, he developed an important and frequently used model of 'verticality' in the Andes. Murra argues that economic success was achieved by these kingdoms through the control of production and distribution from diverse ecological zones. Murra's model has been frequently used by investigators to explain the exploitation of various microecological zones in modern communites.

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APPENDIX ONE

The Harvest of Maize in Cusipata

-told by Anibal Duran, one of the elders of Cusipata-

(translation mine)

The harvest of maize is a festive occasion in Cusipata and is awaited with great anticipation by everyone.

According to an ancient custom, at harvest time each cultivator of maize calls together a group of peasants of up to forty people, depending on the economic capacity and social status of the person who is organizing the work party. Most of the participants help in ayni (reciprocal aid), while some may be paid for the work they contribute.

The peasants start by cutting maize stalks at ground level, tying them into large bundles with twisted ropes made of cow hide. In a competitive demonstration of physical strength, these bundles are carried on the backs of the participants. The strongest and most athletic young man who carries the greatest weight, is chosen to lead the march of maize carriers. In spite of the physical strain involved in this activity, the peasants sing songs in chorus during the entire march across several kilometers. The songs express both sadness for the plants which were cut and happiness for being able to provide food for the family.

Upon arrival at the home of the peasant who arranged the work party, the sweating men take a rest and drink chicha.

At noon the wives of the participants prepare a meal out of maize with guinea pig meat. At the end of the day the participants continue to drink chicha. For days to come the people work together in this way until all maize is harvested.

The Appearance of Water in Yanahuara

An ancient legend told by Solon Corazao, one of the Elders of Yanahuara

(translation mine)

In ancient times Yanahuara suffered from extreme water scarcity. The fields lay waste, the animals were thirsty, and the streams were dry. The villagers consulted oracles. Magicians and fortune tellers made innumerable offers and sacrifices to the Apus, the Mountain Deities who, however, showed no compassion.

One day, Irin Puclla, the most powerful chief of the region, had a dream in which a Mountain God appeared in his royal garments surrounded by an aura of splendor and brilliance. Blinded by the appearance of this deity, Irin cast down his eyes and listened to the imperial voice which was accompanied by the sounds of a blizzard.

Putting his royal hand on Irin's shoulder, the God spoke:

"Son, I heard the crying of my children of Yanahuara who are in desperate need of water. I have selected you to carry out my plan to bring water from my lagoon Yurac K'ocha to Yanahuara. You have three graceful daughters, whose beauty is famous beyond the limits of this principality. One of them is as pure as a diadem, her soul is as transpar-

ent as the sky, as iridescent in its purity as the humming-bird, and her body is without blemish. It is this immaculate daughter of yours who must bring the water to Yanahuara. Awaken your wife and dress your daughter. I will give her royal clothes and jewels more beautiful than those worn by queens. Bring her to the lagoon Yurac K'ocha high above Yanahuara. She must enter the lagoon as far as she can and then descent to Yanahuara. On the way down, Mother Nature will oppose her with all her might. The terrible noise of the water that will be rushing after her may not scare her and under no circumstance may she turn around or she will be severely punished. And so it will be."

Frightened by this vision, Irin Puclla awakens his wife to tell her about the terrible dream. They look at their daughters sleeping calmly. With terror they realize that the youngest and most beloved daughter is the purest of all and it is her who must endure the trial. "No, no, this cannot be possible" cries the mother in desperation, imploring mercy from the divinities for her youngest one. Suddenly she conceives of a plan which she whispers in Irin's ear who is still unable to move. They both decide to send the oldest daughter, who is very beautiful as well, to fulfill the mission.

In the morning they find the most splendid clothes and jewels in the room of the daughters. The mother brushes the long hair of her first-born and dresses her in the exquisite attire, fit for a princely wedding. To the sound of the

flute (pincuillo) played by Irin, he guides his daughter toward Yunac K'ocha, instructing her of the mission she was to undertake. At the lagoon he leaves her.

The girl puts her delicate feet into the cold water and with determination she breaks the calm, pristine surface of the lagoon which reflects the shining brilliance of the rising sun. Then she starts her descent toward Yanahuara. Behind her the waters rise gently without haste. But as she continues on her way downhill, they begin to roar in a threatening way like caged lions. The sky resounds, the earth trembles, and the noise becomes insupportable. The girl cannot endure the torment any longer and turns around, only to be converted into stone. And the waters disappear ....

The following night the Mountain God appears again in the dream of Irin Puclla, angry and disgusted about Irin's action. Irin, afraid of the punishment, promises to faithfully fulfill the divine demand.

Appeased in his anger, the God Tutelar again provides the most beautiful clothes for the daughter and many gifts for Irin and his wife. But the following morning in the presence of their most beloved youngest child, they cannot bring themselves to dress her for the sacrifice and decide that the child in the middle will take her place. The outstanding beauty of this girl was even more enhanced through the loving hands of her mother who dressed and adorned her. With tears in her eyes the mother instructs

her daughter about the difficult mission she was to undertake and she makes her promise not to turn her face under any circumstance. In the belief that, dazzled by the girl's beauty, the Mountain God would not notice the exchange, Irin Puclla leads his second daughter to the spot where her sister turned into stone and where the water disappeared with a horrifying gurgling sound.

Alone the girl starts on her cautious descent to Yanahuara. At first only a slight murmur can be heard from inside the earth. As she advances downhill, the noise gets louder and suddenly the enraged waters appear with a frightening explosion. A cruel race begins. The girl is closely pursued by the enormous avalanche of water which is ready to overtake and to crush her beneath. Nature in all her might conspires against her. The sky breaks loose in a wild rage, lightning and thunder strike, and a tremor causes large rocks to tumble downhill, tearing off pieces of rock in their paths. The horrifying noise sounds like a symphony conducted by a crazy God. As the waters are close enough to bury her, the girl turns her face in terror. Immediately she turns into stone, and the waters disappear....

Irin Puclla does not dare to sleep for fear of the oracular dream, but soon he finds himself in the arms of Morpheus and again the Mountain God appears in even greater magnificence and splendor. Irin jumps to his feet expecting the lightning to strike him and to convert him into stone. With resignation he awaits his punishment. But the God

only speaks two words - "Son, fulfil!".

The following morning the parents again find exquisite clothes and jewels with which they must adorn their youngest child. Instructing her of her difficult mission, they take her to the spot where her sister was converted into stone the night before and where the waters disappeared. Alone the girl begins her descent through the densely forested canyon, comforted only by the brief appearance of a deer and the flight of a bird which was startled by her sudden appearance.

She had not traveled far when the earth was opening up, gushing out a torrent of water ready to devour her. But the frightened girl hastens her steps and water and child rush downhill each one struggling to overtake the other. The courage which the girl shows in closing her ears to the roaring sound, allows her to pass beyond Atoc Saik'o, Lluska Rumiyoc, Atun Huaiko and arriving at Samana Moko (Chaulla-kocha), she decides to rest for a short moment. The water, exhausted from trying to overtake the girl, also decides to take a rest, and slows down on its course.

But soon, without warning, the waters dash forward and again the girl flings herself downhill. At Uno Chekerec, in a last attempt to win, the waters divide into four arms trying to encircle her. But the girl does not fall into this trap and hurrying on she reaches Q'olka, the final destination, where a cheering crowd has assembled to witness the miracle.

APPENDIX THREE

Appendix three has been removed due to poor print quality. It consists of the proceedings of an irrigator's meeting in Cusipata.