UNITED NATIONS

ECONOMIC COMMISSION
FOR LATIN AMERICA
AND THE CARIBBEAN - ECLAC

Distr.
GENERAL

LC/G.1433
19 October 1987

ENGLISH
ORIGINAL: SPANISH

STRATEGY FOR THE DEVELOPMENT AND MANAGEMENT OF THE ANDEAN REGION: A PROPOSAL FOR ACTION AT THE RIVER-BASIN LEVEL

86-10-1468

CONTENTS

Summary

The contribution made by high-altitude river basins to the economies of the Andean countries in terms of food, energy, minerals, water resources, tourism and manpower is substantial and widely recognized. It is also generally accepted that the economic returns to these ecoregions in terms of fiscal investment in infrastructure, research, loans, promotion of private investment, etc., are insufficient. The result has been physical and socioeconomic deterioration which is reflected in the poverty in which rural populations of the upper Andes live, and this situation has been aggravated by the fact that national development plans attach only marginal importance to the problems of these people. However, in recent years a persistent attempt has been made by the governments of each of the Andean countries to identify, adapt and formulate strategies which will allow them to further the development and integrated management of these areas, so that they can be integrated with the rest of the country.

In this study an analysis is made of the role which has been played by public policy in the development and integrated management of the river basins of the Andean region. For this purpose, some criteria have been assembled which need to be taken into account in the management systems used for the development of high-altitude river basins, such as the importance of the participation of the inhabitants and users of the basins in the planning and management of the use and preservation of their environment and the role of the State in facilitating and promoting such participation.

The study is based on the assumption that high-altitude river basins are natural spatial units which provide an area of reference for the incorporation of social, economic and environmental aspects. The basic development units in these natural spaces, whose limits may or may not correspond to the limits of the basins, are defined as being areas in which concerted action or transactions may be carried out in conjunction with or among the inhabitants and users, with the aim of raising their standard of living and promoting the conservation of resources.

The document draws attention to some requirements of the process of integrated management of high-altitude river basins, and stress is laid on the need to promote effective co-ordination among the institutions seeking to further the development and management of the basins, in order to avoid duplication of effort and provide the inhabitants and users with systematic assistance.

Emphasis is placed on the decisive role played by finance in the application and medium and long-term continuity of the measures taken to develop the basins, and a description is given of a number of mechanisms and

criteria for guaranteeing the allocation of those resources through different kinds of contributions.

It is reaffirmed that in strategies designed to promote the integrated development of river basins, it is of paramount importance to consider the incorporation of the environmental dimension and socioeconomic components in the various aspects intervening in the development process. Stress is laid on the importance of gathering and taking advantage of the inhabitants' knowledge and co-ordinating it with the technical knowledge possessed by the State, since putting these two kinds of knowledge together will help to choose the most appropriate technology.

Finally, the document presents for the first time an introduction to the methodological system devised by the ECLAC Water Resources Unit as a contribution to the development and integrated management of high-altitude river basins.

The study by no means claims to exhaust the topic, but it does provide a synthesis of some conceptual approaches and strategies aimed at achieving greater consensus among specialized experts, decision-makers and research workers in this field.

1. High-altitude river basins in the Andean region: their heterogeneous features and integral treatment

The development and management of high-altitude river basins, especially in the Andean region, is a complex subject, which must be approached with rigorous accuracy and does not permit of generalizations.

In dealing with the development and management of these steep and isolated areas, it is necessary to take stock of hundreds of different spaces, each of which has its own political, social, cultural, economic and environmental characteristics. Each one of these microregions calls for individual, integral treatment, in terms both of what is written and what is done.

Consequently, in each microregion it is necessary to understand how the users are organized and how they participate in their own development; to preserve and adapt technologies appropriate to the environment; to deal with systems of production which are diversified yet complementary; to take cognizance of the physical environment in terms of space, height and time and, above all, to be able to promote transactions or concerted action among all the participants in the development process in each of the basic areas. In view of the fact that high-altitude river basins form a complex macrosystem made up of numerous systems and subsystems with their own characteristics and with varying degrees of internal and external complementarity, the challenge consists in developing the potential of each of these systems and subsystems whether they be basins or sub-basins, slopes or other basic development spaces or units. The objective is to provide the inhabitants of the high-altitude river basins of Latin America with the elements they need to be self-supporting in their own development, thereby reducing the isolation, stagnation and dependence they now suffer.

This involves finding ways and means of simultaneously assisting hundreds of environments while respecting the individual characteristics of each of them and at the same time establishing links among such environments and between them and the outside world. In other words it is necessary to combine development from within (through systems of assistance and services for promoting self-management) with development from outside, achieved through the intervention of external entities with regional, national or international interests.

At the level of suggesting solutions, the subject makes it necessary to transcend the traditional rhetoric, which is limited to stating the problems and saying what must be done, without worrying about whether the recommendations can or cannot be put into practice. If practical results are to be achieved, the technical experts must share their knowledge with the users and other participants in the development of the river basins, devising mechanisms which are flexible and easy to use and make it possible to compare and exchange experiences and find solutions to each individual problem. This means devising a way of promoting self-management in each river basin or development space.

This task is now becoming less arduous because many positive and accepted experiences in the development and management of high-altitude river basins can be retrieved and systematized and there are information systems (such as, for example, the mere use of a microcomputer) which facilitate access to knowledge in this connection.

The simplest approach is to employ these systems to provide users with a set of alternative solutions from which those best adapted to their needs can be chosen, and also to suggest procedures for combining these solutions and putting them into practice. This approach can help in the development and management of usually marginalized high-altitude areas provided it is made available to its potential users and they have the possibility and will to co-operate with each other. As stated in the introduction to a document issued by the Centro Bartolomé de las Casas in Cuzco, Peru, in which reference is made to the proceedings of the seminar on strategies for the development of the Sierra: "It seems that in recent years there has been a constant increase in the need for co-ordination and co-operation, perhaps because the problems of development and the barriers to it are becoming greater. In addition, in the particular case of the Andes there is a clear perception that the need for working together and co-operating is even greater in the environment of the cordillera, the inter-Andean valleys and the ravines which make up the Sierra". 1/

In view of the foregoing considerations, this document has the following objectives:

a) To assemble and summarize some criteria considered to be of basic importance for tackling the development and management of high-altitude river basins, with special reference to those of the Andes;

b) To draw attention to potential alternatives or to concrete activities and actions needed for the development and management of these basins;

c) To identify the participants or actors involved in the development and management of river basins;

d) To present a system or mechanism which: i) facilitates concerted action among the participants in the process; ii) offers the largest possible number of alternative forms of action, and iii) makes it possible for the activities carried out to be integrated with each other.

2. Criteria for the integral development and management of high-altitude river basins in the Andean region

As already noted, the mountain environment is neither homogeneous nor continuous, and therefore in dealing with it there is no room for readymade formulas or for systems of evaluation designed *a priori*. Nevertheless, there are some criteria on which those who study high areas, especially in the Andes, agree, and these should be taken into consideration in dealing with the development needs of these areas. In doing so, the reader should try to get away from the preconceived approaches of those viewing the problem from outside. If this is not done, factors viewed as propitious and useful by the

inhabitants of a river basin may be considered as obstacles, or the basin itself may be viewed simply as a possible source of certain benefits, with the result that the opportunity to assist in its development is lost.

Among the publications available on the real situation in the high-altitude river basins of the Andes, there are many research papers, one of which 2/ summarizes the special features of these areas as regards quality of life; social, family and communal structure and grassroots organizations; the relationship between the State, users and the private sectors; Andean systems of production; the environmental variables connected with climate, altitude, crop rotation, etc.; the relationship between agricultural and non-agricultural activities in the peasant economy, and local technology and its special characteristics.

With regard to grassroots social organizations, it is important to note the situation in the Peruvian Sierra. As Julio Guerra says: "...over two-thirds of the farmers work on a communal basis, while the remainder are members of co-operative enterprises or owners of small and medium-sized holdings. The weight and importance of the peasant community in agricultural production in the Peruvian Andes is considerable; it is also of prime significance as a socio-cultural group. Its internal structure, as a democratic and centralized institution, means that it can deal with problems of a social as well as a productive nature; these problems are considered at general assemblies, and the decisions taken are executed by organs established within the communal system itself. This type of organization allows for a high degree of co-ordination, participation and planning both within the community and in its relations with the outside world. Institutions representing four levels of integration are to be found in the peasant communities: i) the nuclear family, which represents the most concentrated form of integration; ii) the extended family or, alternatively, the associations of related or neighbouring families, which still regulate access to the land, economic administration and working relations. At this level there may be common ownership of the land, centralized administration of the economy of the component families, an internal division of labour, or merely systems of reciprocity in working relations (ayni, wajiti); iii) the Ayllu or Barrio, the basic level of political integration and is often the true endogamous unit; it represents the first step in the public administration hierarchy (cleaning and construction work) and in ceremonial or ritual integration; and iv) the community proper, which represents the most formalized level of political and administrative organization; in the majority of cases it takes decisions concerning the control of grasslands and drylands, the maintenance of the productive infrastructure (irrigation canals) and the construction of public works, while also performing functions relating to ceremonial, social and other forms of integration."3/

There are also studies dealing with the way in which high mountain areas have developed. These include diagnostic studies of river basins, reports on programmes and projects, papers relating to regional development programmes, reports on the action taken by the State, and other documents explaining what has been done in practice.4/

In these studies, which are primarily devoted to the high Andes, certain criteria are set forth which are outlined below and may be enlarged upon as more becomes known about this field of study:

a) High regions cannot be dealt with as homogeneous, continuous environments. Although situations of poverty and environmental deterioration are to be seen in all of them, in many parts of the high regions poverty occurs unevenly, which may be explained in terms of various indicators relating to standards of living, potential and economic activity. It is necessary to evaluate this unevenness with a view to giving priority to certain activities designed to reduce the differences between these environments or basic units of development, each of which calls for special treatment.

b) Conditions in the high regions must be studied at the level of the basic units of development --river basins, districts, microregions, etc.--, using evaluation techniques adapted to the peculiarities of each region. Broad generalizations and the use of outside patterns are no use for finding the solutions to specific problems which, in the final analysis, are the ones that give results. As noted in Rengifo et al., "...in the Andes, the land under cultivation does not always coincide with the theoretical lines laid down in the classification instruments used".5/ An opposite approach must therefore be taken.

c) The development and management of the basic units of high-altitude regions is not a process which relates exclusively to the agricultural sector or to environmental preservation. As J. Sánchez explains, the high Andes "... is like a complex where agriculture and industry, town and countryside, energy, technology, etc., ...should all be present within the Sierra..."6/ In fact, there is no possibility of developing and managing a high river basin without diversification of action. This diversification begins at the level of the family --whose members simultaneously perform tasks in the areas of agriculture, stock-breeding, handicrafts, trade, harvesting, service activities and the sale of labour-- and then extends to other broader economic units, such as the community, the district, the province and so forth.

d) In practice, the development of basic units takes place in two directions: from within the unit towards the outside world, and from the outside world towards the unit. In the first case, the process may be associated with the classical form of family and community development and the support which may be received for improving living conditions. The second case involves the intervention of actors from outside the unit (basin, district, etc.) in order to extract or exploit certain resources, such as hydroelectric energy or mineral, forestry, fishery and other products. The study of the process of development of high-altitude river basins must cover both of these directional flows. In the case of development from within, the main concern is the desire of the inhabitants of high mountain areas to seek their security, self-reliance or survival by diversifying their action, co-operating with each other, simultaneously managing areas at various altitudes, and using local technology. In the second case, in which the outside world intervenes in the units, private, regional or national interests are uppermost, and this usually leads to sharp conflicts between the river-basin authorities and regional or national centralist interests.

e) The process of developing high-altitude areas at the level of each basic unit can take place only when the participants in the process work together and co-operate. These participants, regardless of whether their role is passive or active, direct their action from within the unit towards the outside world or from the outside world towards the unit and must be clearly identified and brought together in a "concerted action body". This body might consist of representatives of popular organizations, such as peasant communities; representatives of the private sector, such as landowners or merchants; representatives of the technical sector of the State; representatives of political groupings; local authorities; representatives of the armed forces; teachers; and representatives of religious orders, charities, foreign missions, etc.

f) Concerted action 7/ among the participants in the development process of each basic unit will be possible only so long as they know what action to concert, why it is being done, with what resources to carry it out, and how and when to take it. In order to unite their ideas in this connection, the participants in the process should be assisted in i) gaining a true knowledge of the interests, rights and positions of each one of them with regard to the matter under study and ii) studying the largest possible number of possibilities for action and interaction and of procedures and resources necessary for accomplishing what is agreed upon. This assistance calls for the organization and training of technical personnel to act within each basic unit, or group of units, under development.

g) In order to achieve the development of each basic unit, whether it be a river basin or another type of environment, there must be a plan of action for each country and region concerned which allows each basic unit to act and supports and articulates its efforts. This plan of action must be clear and practicable: it must not consist merely of a list of intentions or broad suggestions. In other words, it must be accurately formulated and must specify objectives and assigning priorities to them; it must indicate, how, when and where they are to be achieved and must take account both of existing restrictions and of suitable means for overcoming them.

3. Conceptual guidelines for the development and integral management of the Andean region

Observation of the macrosystems in which the Andean people carry out their activities reveals an imbalance between the inflows and outflows of materials, energy and information in the Andean ecoregions.8/ These ecoregions make significant contributions to the national economies in terms of food, energy, minerals, water, tourism and manpower; on the other hand, the economic return to them in terms of State investment in infrastructure, research, credits, promotion of private investment, etc. is notably inadequate.

A retrospective view of the recent history of the Andean countries makes it clear that priority has not been given to the high regions in economic policies.9/ The effects of so many years of neglect are brought out, from a critical perspective, in many studies on Andean poverty.

Policies in which cities are subsidized at the expense of the countryside have set the tone; thus, the difficulties now encountered in urban-rural relations should come as no surprise. The cities absorb some foodstuffs imported at artificial prices, with the result that the profit margins for domestic commodities are very narrow and do not allow the peasant masses enough to meet their needs.

The population groups in high-altitude areas are made up primarily of peasants, most of whom live in conditions of extreme poverty aggravated by the increasing deterioration of the ecosystems they exploit. This deterioration directly affects production (mainly agriculture; forestry and mining), the preservation of renewable natural resources and the socioeconomic structure.10/ Permanent and temporary migration, the marginal living conditions of the peasants and the virtual absence of recognition of the forms of organization and management which are natural to them have also been responsible for the slow rate of development of this ecoregion.11/

Estimates made by ECLAC and the Board of the Cartagena Agreement (JUNAC) both show that in the high Andes around 60% of the rural population live in conditions of poverty, whereas in the towns the figure is some 25%. Available indicators show that neither urban-industrial development, nor the restructuring of the agricultural sector, nor the transfer mechanisms of public and private services have succeeded in reducing the number of rural poor, and their number is probably rising in Bolivia, Peru and Ecuador.

At a time like the present, beyond the effort to find formulas for overcoming the immediate manifestations of a much deeper crisis it is possible to perceive a persistent attempt to redefine the minimum rules of the game and, above all, to bring high-altitude populated areas into the national scenario. In any effort to make high areas --especially those in the Andes-- a central factor in national integration, it is essential that they be developed and integrated from within.

The problem in the case of the Andean region (and in the case of Latin American countries with high-altitude river basins in general) is to find ways of raising the productivity of fragile populated ecosystems while at the same time preserving their environment and renewable, natural resources.

In tackling the challenge of increasing productivity, thought may be given, at a more general level, to policies aimed at redistribution and at democratizing the economy, policies and society with a view to integrating the various levels of productivity (rural productivity, the productivity of regional and local enterprises, the productivity of large enterprises, etc.) to be found in the national context of the Andean countries, and at a more specific level, to a number of concrete technical and operational activities.12/

In approaching the challenge of managing populated ecosystems in high mountain areas, it is necessary to consider how to harness their water, soil and plant resources and their fauna, energy and mineral resources without destroying them and without displacing large population groups. In short, it is necessary to find out how to manage the relationship between man and his environment so that they can both survive.

In this connection it must be reiterated that river basins, especially in high-altitude areas, are natural and basic territorial units which form an appropriate framework for regional and microregional planning, since they integrate man with his environment. In this naturally delimited setting it is easier to co-ordinate and integrate multidisciplinary and inter-agency projects for the integral planning of biophysical, social, economic and administrative resources. The selection of such units does not mean that they cannot be integrated with social and economic aspects at a higher regional or national level. The limits of the river basins make possible a type of regionalization in which political and administrative boundaries are integrated with physical boundaries, thus facilitating the incorporation of the environmental dimension.

Consideration of river basins as a setting for integral planning is based on the fact that in such ecosystems water resources constitute the unifying element, whose management and development is linked to the management and development of other renewable resources (vegetation, soil, fauna, etc.) and to that of human activities, because to a large extent the security of a region and the development of its hydroenergy, agriculture, industry and towns depend on water.

In the process of planning river basins, it is necessary to highlight the importance of studying the spatial characteristics of the main components of the economic infrastructure (road network, transport and communication systems and energy services), both within the basin and in its relation with the outside world, since economic and social development and the structure and evolution of these physical systems are obviously interdependent.

In planning the development and management of a river basin account must be taken both of its component parts (sub-basins and major basins) and of the macrosystem as a whole (the country and its regions). From the overall spatial perspective, a river basin must be studied from two points of view: a) that of its internal flows and b) that of its interrelation with neighbouring basins and other areas. When both aspects are taken into consideration, they highlight the manner and degree in which the basin is linked to a larger area, the regional and national system, and the nature and degree of linkage of the components making up the basin itself. Such exercises in regionalization on the basis of water resources have been carried out in various countries of the region where national water resource plans have been formulated, e.g., Colombia, Ecuador, EL Salvador, Mexico, Peru and Venezuela.13/

4. The development and management of high-altitude river basins in the Andean region: criteria, lines of action, co-ordination of interests and management methods

The most useful background information and experience in the region in respect of the development and management of inhabited high-altitude river basins is to be found in Colombia and to a lesser extent in Venezuela. In general policies based on three kinds of criteria have been used: the conservationist criterion, that aimed at multi-purpose management, and the criterion of development and integral management.

The conservationist criterion prevailed during the 1950s, when reforestation began to be introduced as a tool for conserving soils and the sources and banks of watercourses, complemented by control and surveillance measures and by the adoption of rules and regulations concerning protective wooded areas. Within the framework of this conservationist model, a number of public enterprises and other entities embarked on the reforestation of critical areas of catchment basins with a view to regulating and increasing the flow of water available for urban supply, irrigation, energy, etc.14/ The Cauca Valley Corporation of Colombia used this model in its first projects in the Calima, Anchicaya, Nima and Cali river basins. Subsequently the government of Venezuela through the Ministry of the Environment and Renewable Natural Resources began a nationwide conservation infrastructure programme, which included high-altitude river basins. Its most important contributions have been its basin-by-basin approach, institutionalization measures, and the systematic training of government personnel.15/

Since the mid-1960s, river basins have come to be regarded as multi-purpose bio-geographical units, and a multi-purpose management approach has been applied. This approach, also adopted and supported but the OAS in a number of projects, was extensively applied in Colombia, where more detailed studies were initiated by the Ministry of Agriculture, the former Regional Association for the Development of the Magdalena Valleys (CVM), the National Institute for Renewable Natural Resources and the Environment (INDERENA), the Cauca Valley Corporation (CVC), the Autonomous Regional Corporation for the Development of the Bogotá Savanna and the Ubaté and Chiquinquirá Valleys (CAR), and the Corporation for the Protection of the Bucaramanga Plateau (CDMB). These studies provided the basis for the formulation of what may be regarded as the first plans for the development and management of selected basins. The plans concentrated on analysing the economic conditions and biophysical characteristics of the basins; some social aspects were touched upon, but only in passing. At the same time, conservation continued to be promoted.16/

These experiences demonstrated, especially in Colombia, that the management of a river basin is a complex task influenced by a series of factors --not just biophysical factors but also those relating to the social, economic and administrative structure of the basin--, and all closely interrelated and with different degrees of internal and external complementation. Thus, a third criterion was emerging: that of the development and integral management of river basins.

The CVC, especially, has undertaken a thorough reorganization in this area since 1978. In this, it has concentrated on some 28 basins of the Upper Cauca, Upper Anchicaya, Upper Daga and Upper Calima, working in three successive stages: i) a stage of drawing closer to the community and checking and surveying the basins' renewable natural resources; ii) a stage of diagnosis and formulation of the plan for development and integral management, and iii) a stage of execution of the plan, with the participation of the community and the technical and financial support of public and private sector entities. In addition, since 1978 CAR has been executing integral management plans in the basins of Lake Tota, the Neusa dam and the river Checua. INDERENA, with the participation of other entities involved in regional and national development is also executing the Upper Magdalena basin project

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(PROCAM).17/ Thus, as may be appreciated, progress has been made towards the consideration of man's place within this territorial space, his social relationships and his activities, as elements of fundamental importance in the concept of river basins.

Good management of these basins helps to generate a better standard of living, better health and education for the population, good services, the best possible use of the natural resources, and optimum production. All these results depend to a greater or lesser extent on other factors, such as the availability of the biophysical resources (soil, water, vegetation, minerals, etc.) in a given basin, exogenous elements that cannot be managed at the microregional and regional levels (national policies, legislation, the national budget, the climate, etc.), the way in which the public sector is administered, and intra-regional, regional, national or international marketing production and marketing activities, etc. All of this points to the need to treat each basin as a series of dynamically interacting elements, that is to say, as a system. It is in fact a complex open system whose biophysical, social and economic elements are closely intertwined. It is a system open to currents, influences and lines of action which cross its frontiers: it is both a giver and a receiver.18/

5. Forms of management and administration of high-altitude river basins in Latin America

In dealing with the question of the management of inhabited high-altitude river basins in Latin America, it has been necessary to combine two classical approaches used in English-speaking countries: i) river-basin-development, which is aimed at the integral development of the resources of relatively large basins but is also useful in the high-altitude basins of Latin America because they are inhabited and exploited on a large scale, and ii) watershed management, which is intended for use in catchment basins and involves the management of their natural resources in such a way as to conserve and control the quality, volume and time of occurrence of the water produced in them.

In terms of development, the approach taken is based on the concept of regional development applied to microregions, and heavy emphasis is placed on the conservation or management of natural resources, especially water. The application of the techniques of regional development to the development and management of river basins is hence primarily characterized by a) delimitation of the area of application (high-altitude river basins in this case) and b) depending on the area of application, the special treatment accorded to the aspects of the conservation and management of natural resources, especially water.

A definition which sums up the process of development and management of these river basins reads as follows: "...the management by man of this entire area in and away as to make full use of and protect the natural resources available to him in it, with a view to achieving sustained optimum production (in the short, medium and long term)".19/

The physical area of work --the high-altitude river basin-- also needs to be defined. From a hydrological point of view, a basin is the area drained by a river, or, as stated in the Colombian Law on Basin Management, "a duly delimited physical-geographical area in which the surface and underground waters flow into a natural drainage network through one or more continuous or intermittent watercourses coming together into a larger watercourse which enters or may enter a major river, a natural accumulation of water, a swamp or directly into the sea" (see appendix 1).20/ This definition may be applied to systems which influence a relatively small zone (microbasins), to sub-basins (larger systems, which are themselves tributaries of other systems), and to the large hydrological networks known as river basins.

The three types of hydrographical systems or units described above are closely interrelated, and the terms used to denote them depend on their position with respect to each other and on the way in which they interrelate. Thus there is no absolute definition in respect of size (although there may be relative definitions) for drawing a distinction between one type of high-altitude river basin and another or between "large" and "small" basins.

With regard to the history of the management of such high-altitude basins in Latin America, there are as yet no comprehensive records or much background data. It is known that the institutions of and environments have normally controlled and managed them by instinct in order to further their development.21/ At the family or community level, for example, the inhabitants of the Andes usually manage several altitude levels and their water resources simultaneously in a way which approximates to the modern activities proposed for the development and integral management of basins.

In some cases where high-altitude river basins have been subjected to outside intervention, this process of development and integral management has been changed considerably in that it was either strengthened or partially or totally destroyed.

The kinds of intervention that have come closest to the concept of development and management of inhabited high-altitude basins are those which have combined outside interests (such as multi-purpose water projects, especially for electricity generation) with internal interests such as increasing productivity (especially of agriculture) through technical assistance projects, the granting of loans, etc.

In contrast, intervention actions which are characterized by a sub-sectoral approach to the use of renewable and non-renewable natural resources far removed from approaches aimed at the development and integral management of the basins concerned are those which have failed to combine external and internal interests. The best example of such intervention might be that of the installation of a mining company which pollutes a basin's air and water resources, leads to deforestation for energy generation, and alters the community's patterns of organization.

Between these two extremes there is a great variety of situations usually deriving from different ways of seeking to reconcile the interests of the various participants in the process of the development and management of the basins. These participants may be formal or informal, passively or actively,

internal or external, and they may represent senior government experts, the private sector, users or political, religious, technical, academic, military and other groups. The conflicts of interest or differences of opinion which arise may vary just as much as the participants in the process.

By way of illustration, the following could be considered as participants: the technical advisory group, the political power group, the organized private sector group, the organized group representing the public, the social and religious group and the scientific research group. Each of these groups of participants has its own particular view of development, which also depends on whether its approach is from the inside, looking outwards, or from the outside, looking in. For example, in a given basin, a politician, an expert and a user would have three different views of the basin's development and management; moreover, the view of the technical expert would differ depending on whether he lived in the area of the river basin or was simply passing through to build some project and then leave. In addition to these differences of approach and the conflicts of interest to which they give rise, there are the different viewpoints of the national, regional and local levels. The initial co-ordination task consists in determining points which are of common interest to all those concerned (for example the improvement of roads), in order, on this basis, to secure mutual co-operation.22/

The forms of management used in high-altitude areas have been grouped as follows:

a) the development and management of basins without State involvement;
b) the development and management of basins with State involvement.

Consideration has also been given to the following possible variants of each of these situations;

i) multisectoral or sectoral scope;
ii) action taken from within the basin or from outside of it;
iii) passive or active approach.

The alternative involving the least degree of management would be that of a passive nature without State participation; i.e., without organization of the users inside or outside the basin.

The alternative involving the greatest amount of management, in contrast, would be that carried out with the joint and active participation of the organized users and the organized State, using a multisectoral approach and seeking to combine inside and outside interests.

Table 1 illustrates the various possibilities for high-altitude river basins.

Table 1

MANAGEMENT FOR THE DEVELOPMENT OF HIGH-ALTITUDE RIVER BASINS

A. Without State participation

Source of management	Sectors involved in management	Degree of participation of those involved	
		Passive	Active
1. From inside the basin	1. All sectors 2. Only some sectors	No organized management at the basin level, nor any awareness of its need for such management	With organized management at the basin level and recognition of the need for multisectoral, or at least sectoral, management
2. From outside the basin	3. Only one sector, for example, irrigation channel associations	Example: Groups of landowners, community groups and unorganized inhabitants	Example: Private autonomous development corporation established at the basin level

B. With State participation

Source of management	Sectors involved in management	Degree of participation of those involved	
		Passive	Active
1. From inside the basin 2. From outside the basin 3. Jointly	1. All sectors 2. Some sectors only 3. Only one sector, as the water management expert	Example: Basin commissions at national-level or individual basin-level commissions with no executive powers in terms of sectoral or multisectoral action within the basin	Example: State, private or mixed basin development corporations with executive powers within the basin at both sectoral and multi-sectoral levels

Source: Axel Dourojeanni and Mario Lenzi.

6. Intentions and achievements of the State: How to produce tangible results

It is interesting to compare the intentions and achievements of the State as they relate to the development and management of basins, microregions, districts or other areas, especially in so far as the impact on their inhabitants is concerned.

For the inhabitants of a high-altitude basin, the words "development" or "management", so often used in official reports, only have significance when they lead to something tangible: greater food security; improvements in housing, health, clothing, roads or transport; higher prices for the goods they produce or greater educational opportunities. That is to say, these concepts are meaningful to them only when their quality of life improves and they enjoy greater stability, greater self-sufficiency, more equitable marketing conditions and higher productivity.

It is of no practical or tangible value to them that the government analyses their problems; that a plan is drawn up; that studies are carried out on their physical, social or economic environment; that laws, regulations or decrees are enacted or adopted for their benefit; that some institution is established on paper, that seminars or workshops dealing with their problems are held; that scientific articles are written; etc.

From this standpoint, when analysing what has been done to develop and manage high-altitude areas, a distinction can be drawn between what is tangible or not for their population and between what does or does not affect their resources, and a link can then be sought between the tangible and the intangible so that action can be taken in this particular case.

Among national, regional or local actions which are not tangible for the inhabitants and do not have an impact on their resources mention may be made of the following:

a) Statement of the problems encountered in the inhabited parts of high-altitude areas, such as inherent drawbacks, the colonial legacy, the impracticability of a given administrative or political system, shortage of foreign exchange, the external debt, dependence, backwardness, poverty, social unjustice, low productivity, etc. These intangible and generalized statements do not change the situation in an area. The statement of more specific and precise problems encountered in each basin, while undoubtedly of greater practical value, still has no tangible significance for the inhabitants. Some basin studies, for example, contain quantified lists of biophysical problems such as erosion, floods, sedimentation, or misuse of renewable natural resources or lists of socioeconomic problems such as rates of illiteracy, levels of malnutrition, unemployment and migration, and similar indicators but these too do not necessarily result in concrete solutions.

b) Statement of objectives to be reached in order to overcome the problems (economic development, environmental protection, autonomy, decentralization, setting of priorities, regionalization, integration into the nation, improvement of living conditions, raising of precarious living standards, combatting hunger, etc.). In terms of a specific environment, such

as the Saldaña river basin in Colombia,23/ these same objectives might become: basin planning; basin protection; development and protection of the water potential; raising training and employment levels; promoting economic, agricultural, livestock, forestry, fishery, agroindustrial, handicraft and tourism activities; strengthening the trade balance, contributing to the gross domestic product, raising employment levels, integrating the population more effectively and fostering institutional co-ordination mechanisms. This type of identification of objectives may be carried out at the national, regional or local level; it may be effected with or without the participation of users; the times and places for accomplishing the objectives may be set, the forms of solution may be indicated, and yet all this may still seem an intangible achievement to the inhabitants of the basin concerned.

c) Statement of action policies in support of objectives, such as the 15 policies referred to in the APRA plan for the Peruvian Sierra. These policies relate to taxes, exchange rates, differential treatment, credit and finance, agricultural support prices, promotion of agricultural production, marketing without middlemen, import programming, State investments, business management and training, use of technology adapted to the Sierra, concerted State action, forecasting natural phenomena, agroindustry and consumption.

d) Statement of global development strategies which may also be outlined on various planes, such as establishing priority among areas, moving gradually from the periphery towards the centre, differentiating using different levels of concertation according to the different territorial, technical-operational (microregions) and organizational environments, planning by river basins, creating autonomous corporations, etc. The strategies may also be at the national, regional and local levels, and they may be more or less detailed depending on the level of work. In the case of the Saldaña river basin in Colombia,24/ the specific strategies are divided into three groups: i) those connected with the provision of social services (such as the construction of aqueducts, sewerage systems, water treatment, extension of natural resource management and community participation) and the co-ordination of health, education and housing services; ii) those oriented towards the rural areas: water management, soil conservation, reforestation, ecological surveys, forest inventories, etc.; and iii) those oriented towards economic development: the development of integrated production units, promotion of improved technology, encouragement of mechanization, crop diversification, crop rotation, annual crops in association with forest plantations, etc.

e) The enactment of laws, decrees or regulations which support or permit the execution of previously announced policies and strategies. In all the Andean countries there are many laws bearing on the conservation, development and management of water, soil, fauna, forestry and other resources in the upper Andean basins. However, in the majority of cases, the sectoral or subsectoral approach predominates, with the notable exception of decree 2857 of 13 October 1981 of the Ministry of Agriculture of Colombia, which regulates part of decree-law 2811 of 1974 on river basins (see annex 1). This decree defines the concept of a basin, its boundaries and conditions of development, and refers in detail to the purposes and priorities of its regulation; to the management plan in its diverse aspects and phases, including those of diagnosis, formulation, implementation and control; to the execution of the

plan; to the management of basins; to the financing of the plans; to expropriations and servitudes, and to prohibitions and punishments.

f) The statement and formulation of action programmes and projects remains intangible for the inhabitants as long as such programmes and projects are not implemented. A full list of possible projects and programmes will not be specified in this paper, but it is being compiled and will be included in the ECLAC Manual on the Development and Management of River Basins in the Andean Region, to be published shortly with the aim of making available to users the hundreds of programmes and projects that have been successfully carried out in high-altitude areas, both at the level of basins and of other spaces. Table 2 gives examples of some of the projects and programmes that have been included.

What is crucial in analysing the relationship between the intentions and the actual achievements of the State, from the point of view of what is tangible or intangible for the inhabitants of the basin or other high-altitude area, is the establishment of what the government decides and what it actually does to put its intentions into effect. The conversion of the intangible into the tangible can be achieved inside or outside the area to be developed or managed, and it can be done by the users themselves, by private groups or by the State, jointly or individually.

The State can work to help the inhabitants of the basin, through an established bureaucratic system (ministries, national corporations, regional bureaus, etc.); through the creation of an autonomous corporation or special agency; or with the support of sectoral or multisectoral project or programme offices. The more it promotes their self-sufficiency, the more positive it will be for the inhabitants: this can be done, for example, through training programmes, co-operation, organization and loans and, at a lower level, through transfers of funds, free construction of public service facilities, exemptions from payments or similar measures. The State action can be negative for the inhabitants of the basin, when it permits intervention or directly intervenes in the area without regard for local needs, condoning the deterioration, exploitation or extraction of mineral, energy, forest or other resources without attempting to improve the living conditions of the inhabitants of the area or taking conservation measures.

Generally speaking, the success of autonomous corporations or of any decentralized or semi-decentralized entities is due to the fact that they permit direct interaction between the users and the State. They also make possible the allocation of funds and other resources to initiate action plans (see annex 2). Unfortunately, these autonomous or semi-autonomous systems have not become widespread throughout the region for reasons such as: the failure to give proper value to the basins through greater investment; the lack of legislation; the existence of centralized systems (such as regional bureaus) or provincial or district boundaries which conflict with basin boundaries; the failure to reinvest specific funds in each basin; the isolation of the basins; the lack of trained personnel; conflicts between the interests of national enterprises and those of the inhabitants of the basin; the custom of using the resources of a basin, especially the water, without contributing to its development, etc.

Table 2

COLLECTION OF MANAGEMENT, INVESTMENT AND ADMINISTRATION PROGRAMMES AND PROJECTS FOR HIGH-ALTITUDE ANDEAN RIVER BASINS

AGRICULTURAL AND FORESTRY SERVICE (SESA) OF THE TECHNICAL UNIVERSITY OF CAJAMARCA, PERU	AMBANA: LAND AND MEN, FRENCH INSTITUTE OF ANDEAN STUDIES (IFEA), LIMA, PERU
1. Soil use and conservation	1. Erosion control (reforestation, intercepting channels, restoration of terraces, etc.)
2. Andean crops	2. Improvement of farm soils (to prevent soil degradation by improving structure, humidity, fertilization, organic material, etc.)
3. Establishment of pastures	3. Improvement of the feeding and breeding of animals (so that in turn the animals can contribute by producing organic matter) through vaccinations, reproduction control, fattening, construction of sheds, etc.
4. Establishment of forestry nurseries	4. Improvement of natural pastures by mixing grasses and legumes
5. Establishment of forestry plantations	5. Improving cattle management using fences and through the choice of plots of land for the cultivation of fodder, with ensilage or haymaking
6. Establishment and management of vegetable gardens	6. Introduction or improvement of native species, such as tarwi and quinua
7. Seed banks	7. Improvement of seeds, disinfection, chemical fertilizers (technological package)
8. Establishment and management of fruit orchards	8. Control of water run-off and erosion
9. Establishment of flower nurseries and plantations	9. Improvement of irrigation infrastructure and techniques
10. Farms of small animals	10. Improvement of agricultural production through improvement of fertility
11. Fish breeding	11. Improvement of vegetable production on smallholdings
12. Beekeeping	
13. Production and use of mycorrhizal fungi	The following are also planned:
14. Production and inoculation of nitrifying bacteria	
15. Cultivation of vegetable tissue	12. Changing the social attitude of the inhabitants of the valley or riven basin in order to increase participation
16. Bioagriculture	
17. Comprehensive water use (run-off)	13. Training and assistance of various kinds for the organized inhabitants (extension services, credits, etc.)
18. Integrated production systems	
19. Integrated economic cycle	
20. Construction of biodigestors and use of biogas and fertilizer	
21. Construction and use of solar dryers	
22. Construction and use of solar heaters	
23. Construction and use of storehouses for seeds of tubers	
24. Other infrastructure for production	
25. Pottery handicrafts	
26. Wicker workshop	
27. Carpentry workshop	
28. Natural dyes for sheep's wool, textiles and ready-made clothing	
29. Jewellery workshops	
30. Workshops for hides and skins and leather tanning	
31. Basic health services	
32. Schools and workshops	
33. Basic rural housing	
34. Drinking water, latrines	
35. Community premises	
36. Granaries or storehouses	
37. Diversion channels	
38. Irrigation ditches	
39. Sewerage	
40. Terraces	
41. Water drop in canals	
42. Gully control	

Source: Universidad Nacional de Cajamarca (UNC)/UNEP/ECLAC, "Manual silvoagropecuario. Experiencias del Servicio Silvo-Agropecuario de Cajamarca (SESA)", Ed. Pablo Sánchez and Jorge Yáñez, Peru, April 1985. French Institute of Andean Studies (IFEA), Comité Nacional de Bolivia del Programa MAB, Ambaná: Tierras y hombres, La Paz/Lima, June 1982.

Table 2 (cont.)

PLAN FOR THE MANAGEMENT AND DEVELOPMENT OF THE RIVER AGUACATAL BASIN	NATIONAL INSTITUTE FOR THE DEVELOPMENT OF MICROREGIONAL PROJECTS IN THE SIERRA
1. Reorganization of soil use	1. Establishment of wire fences and enclosure of fields
2. Soil conservation and erosion control, conservation of zones of instability, of torrents and of water quality	2. Improvement and recuperation of natural pastures
3. Natural regeneration of vegetation	3. Establishment of pastures with dry-zone leguminous plants
4. Reafforestation for protection purposes	4. Establishment of pastures with grasses and tubers
5. Commercial reafforestation	5. Promotion of haymaking and ensilage
6. Controlled cattle rearing	6. Animal health and prevention programmes
7. Controlled farming	7. Dissemination of animal fattening and reproduction techniques (camelidae)
8. Control and supervision of natural resources	8. Definition of crop patterns (crop rotation, native crops, forestry plantations, etc.)
9. Control of mining and quarrying	9. Establishment of network of cottage industries for food processing and conservation
10. Regulation and control of population settlements on hillsides	10. Dissemination of primary industrial food processing techniques
11. Improvement of homes and social development	11. Dissemination of technology for the design, production and operation of energy production units
12. Basic services (such as drinking water supply, education, social, community, commercial, institutional and other services. The first in order of priority are drinking water supply, excreta and waste water disposal and educational services, followed by electrification, health centres, community centres, sports facilities, and trade co-operatives)	12. Activities related to the management of fauna for for human consumption
13. Open air recreation	13. Activities related to the management of fauna for production
14. Reorganization of economic structures	14. Activities for the management of fauna for tourism
15. Special studies (all types of studies on the stability of potential landslide areas close to cities, studies on coal mining in the basin, etc.)	15. Cutting new roads and highway maintenance
16. Training and technical assistance	16. Design of alternative transport methods
	17. Medium and long-term credit programmes with preferential interest rates
	18. Selective extension programme for the management of various resources (forage plots, cattle, crops, soil conservation, product processing, etc.)
	19. Programme for the distribution of strategic and and other inputs

PROJECT FOR THE MANAGEMENT OF WATER AND SOIL RESOURCES IN THE RIO MALA BASIN
1. Forestry plan (production of plants, establishment of plantations)
2. Agricultural plan (improvement of alfalfa fields, natural pastures, fencing of gulches, establishment of dairy farms, installation of a semi-industrial cheese-making plant)
3. Agricultural plan. Definition of crop patterns, seed improvement, technological package (fertilizers, techniques, etc.), rehabilitation of terraces. Complementary plans
4. Plan for the management of drinking water supplies, irrigation, catchment, piping, etc.
5. Plan for the maintenance of soil fertility
6. Extension and training plan
7. Incentives plan

Source: Corporación Autónoma Regional del Cauca (CVC), "Plan de ordenación y desarrollo de la cuenca del río Aguacatal", Informe CVC, No. 79-17, November 1979, Cali, Colombia. Dirección General de Aguas, Suelos e Irrigaciones, "Proyecto de ordenamiento de los recursos aguas y suelo en la cuenca hidrográfica del río Mala, subcuenca del río Ayaviri-Sector de Tratamiento pampa Cullpa", Lima, Peru, 1984. Instituto Nacional de Desarrollo, Proyectos Microrregionales en Sierra, "Estrategia de desarrollo en sierra", document PCM-PMS-SDI/No. 3, Lima, Peru, 1983.

Table 2 (concl.)

REHABILITATION PROJECT FOR DEPRESSED AREAS OF THE SOUTH-CENTRAL SIERRA REGION AND REFORMULATION, PERU

1. Development of irrigation works to consolidate the productive structure of the microregions
2. Development of the basic infrastructure to support production (feeder roads, etc.)
3. Establishment of nurseries to further the production of genetic and certified seeds, especially of native crops
4. Development of handicrafts, fish breeding, farms for rearing small animals (rabbit breeding, poultry keeping, beekeeping, etc.) and small agroindustries
5. Development of the social and community infrastructure (health, sanitation, education, community services)
6. Design and execution of an integrated system to give support to rural producers (research, technical assistance, credit, marketing)
7. Modernization of the tools and equipment currently used in farming and promotion in suitable areas, of the use of machinery and appropriate mechanized equipment
8. Retrieval and dissemination of the economic and social technology of the Andean region (food and medicinal plants, irrigation systems, local forms of leadership, etc.)
9. Development of a comprehensive training programme for agricultural producers and for the population in general.
10. Social research to assess: i) the possibility of designing a system of storehouses to facilitate vertical exchange among producers and communities at different altitudes, ii) the potential of work exchange or mutual aid (Ayni groups) to become mini-associative enterprises and suitable subjects for collective credit, and iii) the potential of these Ayni groups to solve minifundia problems
11. Formulation of a plan to utilize the Andean system of weekly markets to reform and improve rural-urban marketing and producer prices, as well as to improve the supply of inputs and provide support for production
12. Design and execution of reafforestation programmes, especially for communities lacking comparative advantages for agricultural development, by reintroducing native varieties and species (Kishuar, Q'euna, Lloque, etc.)
13. Regularization, ordering, zoning, issue of title deeds and entry in the public registers of the land-tenure systems of the peasant communities.

Source: Instituto Nacional de Desarrollo, Proyecto Especial Sierra-Centro-Sur, "Proyecto de Rehabilitación de Zonas Deprimidas de la Sierra Centro Sur y su Reformulación", report by the consultant Julio Guerra, Lima, January 1986.

From what has been observed in Latin America, the bureaucratic form of the State's presence in high-altitude basins, through the provision of services such as health, education, social organization, etc., is less effective than action carried out through projects. Intervention to extract minerals, water for irrigation or hydro-electric power does not mean either, in several Andean countries, that anything is left for the inhabitants of the place, since there are no laws making it mandatory to allocate a percentage of the benefits gained to the development and management of the basin. This is the problem facing the inhabitants of the Upper Colca basin in Arequipa, Peru. There, as Manrique says, "the Majes Project aims at using the waters of the Colca to irrigate the Majes lowlands. However, after a short period during which the project created work for the inhabitants, the works came to an end, leaving as their legacy 166 hectares of arable land in the valley expropriated to build highways, sharp inflation due to the presence of workers earning high wages in the area, and damage to resources such as the terraces destroyed in Yanque and the problems of Maca, which is sinking. The hopes that the peasants had entertained of having access to irrigation water from the canal or of obtaining irrigated plots of land in Majes have once again been dashed; they were not permitted access to the water even during the drought which hit the region at the beginning of the 1980s, and the quota of beneficiaries of the Colca sector was set in 1982 at 120 peasants. With the price that has been fixed for the parcels of land (25 000 dollars payable over 20 years) the chance of access to the Majes land has been denied the peasantry forever. The waters of the Colca will thus create new wealth in the irrigated lands and in the two hydro-electric plants now planned. But for the peasantry of Colca there will be yet another postponement of their interests and they will have to keep on struggling to assert the claims which, as already seen, will not be satisfied through concessions but only through fighting for their historically denied rights".25/ State intervention was apparently more positive in those investment projects carried out at the national level, such as the Irrigation Development Plan for the Sierra, the Meris Plan, (Peru) and others at the sectoral level. Regrettably, however, this type of isolated and intermittent programme does not have the same effect as the global management of a basin and the promotion of organized and concerted participation by its inhabitants.

The foregoing points to the need to strengthen the management systems at the level of basins and other basic development units, the scale of which makes it possible to achieve concerted action with and among their inhabitants and users. It is also necessary to facilitate concerted decisions among those persons not only with regard to their own support but also with regard to the export of resources outside the basin. If these resources are to be exploited by or for others (for example, in order to provide water or generate energy for distant cities), the inhabitants of the basin must be given legal mechanisms which will permit them to share in at least a percentage of the profits from the use of their environment. These and other similar measures will gradually narrow the gap between the intentions and actual achievements of the State and between the inhabitants of high-altitude basins and the rest of the nation.

7. Concertation of the actions of participants in the development and integral management of Andean high-altitude river basins

Almost all the literature on the management of high-altitude basins repeats and confirms the enormous need for the users and inhabitants of these and other basic units to participate in their development. It would seem, however, that in only one Andean country, Colombia, has a formal mechanism been provided to organize and facilitate the integral, equitable and institutionalized participation of the inhabitants of basins all over the nation. This mechanism consists of the enforcement of the decree-law on river basin management to which reference has already been made (see annex 1) and the establishment of autonomous development corporations.

In the other countries there are many works concerning particular basins, in some cases with an integral and in others with a sectoral approach. However, they deal above all, with the implementation of a given programme or project and not with institutionalized ongoing action to promote participation. The existence of these programmes does not always signify that the inhabitants of a basin participate in decisions concerning their implementation.

In other cases, the existing systems of participation are more apparent than real. This is the case with several community assistance programmes, where the idea of formulating and executing the projects does not arise from face-to-face discussion and agreement among users, technicians and politicians, but from a memorandum or request from the organized users submitted to the government authorities to request or demand support. It frequently occurs, too, that the projects are the result of the sudden arrival of a technical group which has decided to incorporate the basin into its "national programme" and to carry out particular works without any substantial prior dialogue as to whether or not those works are of priority importance to the inhabitants or will bring them any benefit.

Usually, also, there are problems of State co-ordination in drawing up integral development plans for basins: repetition of surveys, formulation of projects from a sectoral viewpoint, or simply a lack of co-ordination of the work connected with integral water development and management in the basin. In Brazil, in order to avoid this kind of situation, the Special Committee for Integrated Surveys of River Basins (CEEIBH) was set up under Interministerial Decree No. 90 of 29 March 1978, with specific committees for the main basins (San Francisco, Paranápanema, Guaiba, Iguazú, Jarí, Paraíba del Sur, etc.).

If State action in a basin is not co-ordinated it certainly becomes difficult to agree on concerted action with the inhabitants of the basin, and a series of conflicts are created between the viewpoints and desires of the politicians, technicians and the different users.

In order to establish an institutionalized body for deciding on concerted action, it is necessary to consider inter alia the following points:

a) The type of representatives who can and should participate in such concertation bodies: representatives of peasant communities, residents of the basin, merchants, businessmen and craftsmen; representatives of the State, the

church, projects, universities, etc.; and representatives of the major users of the basin, chiefly mining companies and hydro-electric enterprises.

b) The organization, functions and powers of a permanent technical secretariat which will assist the concertation body by presenting surveys and alternatives for action, executing decisions, drafting agreements, placing actions in order of priority, monitoring and checking the decisions adopted, and performing other related duties.

c) The sources of permanent financing, for the technical secretariat of the concertation body and for the implementation of decisions (see annex 2).

d) The legal basis for operating as a concertation body.

e) Preparation of a manual of procedures for carrying out concertation in different situations, in order to facilitate agreement among the different parties involved.

The probable composition of the concertation body is presented in figure 1, and the steps for reaching possible agreements among participants are given in table 3.

8. Bases for establishing a support system for promoting concerted action to develop and manage high-altitude Andean river basins

One of the obstacles facing technicians and users in the implementation of action to develop and manage basins is the fact that the existing information on the subject is not systematized. As already noted, this problem can be overcome to a large extent by facilitating the exchange of information on successful experiments in Latin America or other parts of the world. In order to do so, it is necessary in the first place to determine what kind of information will be useful to users of the system, bearing in mind that they will be meeting in concertation bodies at the level of each basin and that therefore what they need are not general recipes but action alternatives which cover the aspects of integration, organization, investment and management of production systems.

In the second place, it is important to design a computer system to provide access to the information, so that of the hundreds of alternatives available, a choice can quickly be made as to which is most suited to the situation raised in the concertation body. This means that information coming from very different sources and places will have to be quickly and efficiently systematized in order to indicate what to do and how to do it and, furthermore, to establish the connection between the different action alternatives. The system must operate in three dimensions. The first dimension is that it must be able to provide the user with a number of alternatives (for example, of investment programmes and projects such as those presented in table 2) and then receive some specific data on the problem (for example, ranges of altitude above sea level, relative complexity of the project, amount of labour required by the project, particular sector to be developed), so that the computer can pre-select the alternatives most suited to that particular environment. In its second dimension, the system must describe the project and

Figure 1

CONCERTATION BODIES FOR RIVER BASINS: POSSIBLE PARTICIPANTS AND PRODUCTS

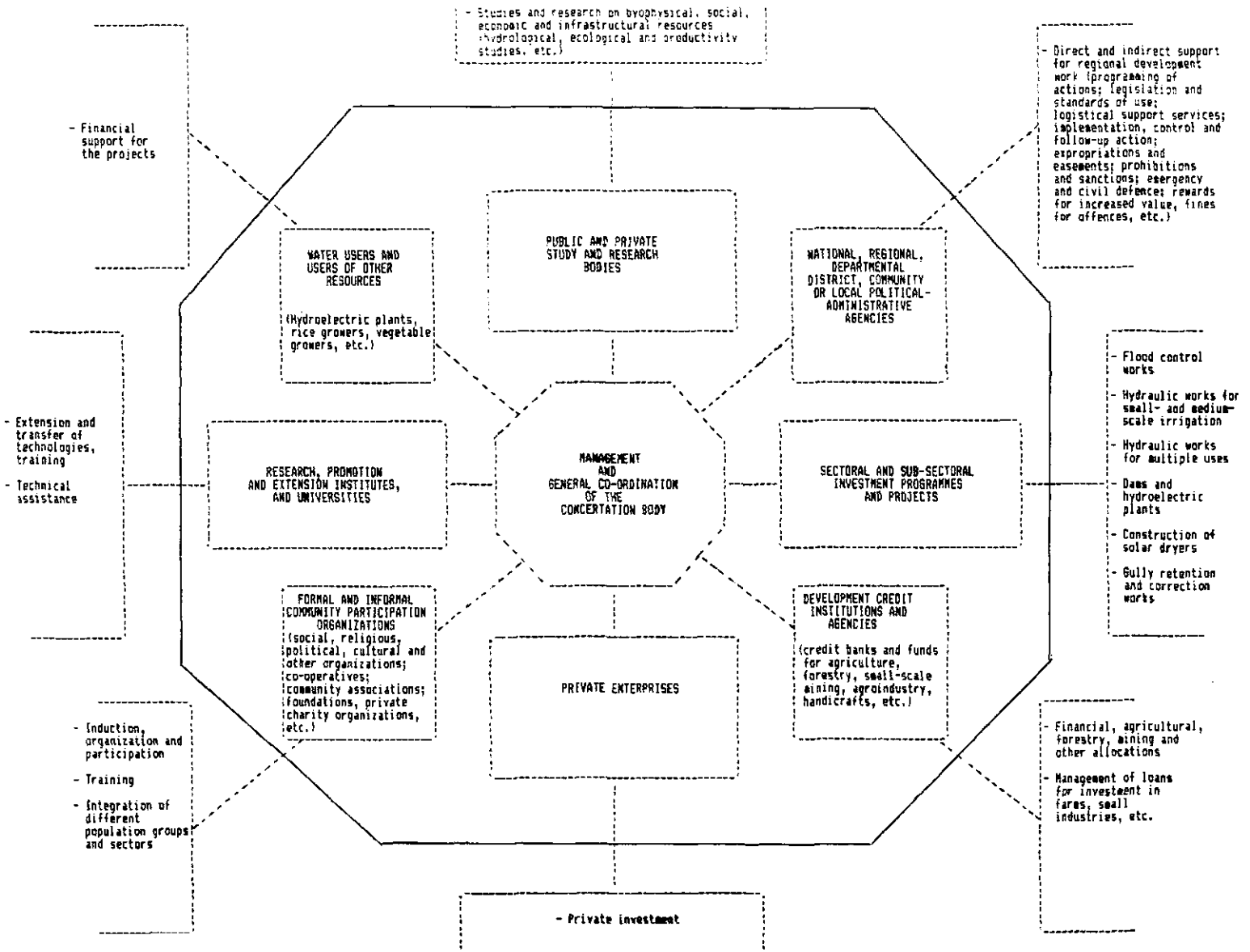

Table 3

MEASURES FOR PUTTING INTO EFFECT POSSIBLE TRANSACTIONS AT THE LEVEL OF A PARTICULAR RIVER BASIN

Step 1: To identify the agents who participate in the development, use and management of the river basin and whose actions change the environment (planning from below).

Step 2: To ensure that the interests of mutually interdependent agents or groups of agents are duly represented.

Step 3: To compare the items of discrepancy or coincidence between agents so as to identify possible areas of agreement.

Step 4: To generate technical and operational options or alternatives by which to appraise and assess the possible areas of agreement among the existing agents.

Step 5: To demarcate the area of geographical or physical influence and the institutional or administrative scope of the alternatives or areas of agreement in order to identify the agents involved in such options.

Step 6: To predict the effect over time of the adoption of the alternatives proposed in order to determine the level of commitments of the agents.

Step 7: To assess the alternatives proposed, as far as possible in quantitative terms, by determining the direct and indirect costs and benefits of each. To tentatively assign the costs and benefits thus identified to the agents.

Step 8: To identify possible compensatory measures by the State or by collective agencies for overcoming any differences which may exist in the allocation of costs to the agents when their agreement would be of benefit to society.

Step 9: To conduct the negotiations with a full understanding by those signing the agreement of the commitments that they have undertaken as well as of any compensatory commitments, where applicable.

Step 10: To ensure through legal means, supervision and technical assistance, where necessary, that the different agents respect the commitments made. To maintain a surveillance system.

Based on: Stanley A. West, "Planning, environmental analysis and conflict management".
Published in: "Dams and their effects on health".

state with what other projects it is associated and where experience of its execution exists. Finally, in its third dimension, the system must explain the procedure for executing the project step by step and in summary form, and indicate where further information can be obtained.

In the third place, it is necessary to sort out the information and present it in a handbook or guide using common codes, classifiers and descriptors so that the information will be quickly received, classified and integrated into the system. This codification is necessary, furthermore, to facilitate the exchange of information between the users and participants of each basin and between different basins and countries.

Lastly, the handbook or guide must be presented and distributed to its potential users, who must be instructed in its use and trained to form a co-operation network to increase and update the information contained in the system. In the process of designing the handbook, which is currently being prepared by ECLAC, four groups of information were considered necessary: a first group which explains how to design plans for the integral development and management of river basins and how to select alternatives; a second group which sets forth the methods of organization and administration of basins, including the political, legal, financial, educational, participatory and other aspects; a third group which presents the largest number of investment alternatives in the form of programmes and projects, describing them and explaining how to carry them out; and finally a fourth group which classifies and explains systems of production and conservation. Each of the four groups consists of four modules. The first module covers the aspects of the perception of the situations (inventories, assessments, diagnoses or studies); the second classifies and describes the alternatives for action; the third sets out the general procedures or methods for carrying out the alternatives, and the fourth classifies and describes the specific practices or tasks which are common to several procedures.26/

Measures to implement this system are being co-ordinated by ECLAC and the Board of the Cartagena Agreement (JUNAC). The ECLAC Water Resources Unit has been made responsible for drafting and editing the system to begin with, while JUNAC will provide information. Through their public and private entities, the countries in the Andean region are actively co-operating in this process and will finally assume the responsibility of making the work a viable reality by putting the system into effect and contributing their own experiences. The entities which have expressed their desire to participate include the following:

Argentina:

- National Institute of Water Science and Technology

Bolivia:

- Institute of Hydraulics and Hydrology
- Cochabamba Regional Development Corporation

Chile:

- National Forestry Corporation

Colombia:

- National Planning Bureau
- National Institute for Renewable Natural Resources and the Environment
- Colombian Agricultural Institute
- Colombian Institute of Hydrology, Meteorology and Land Development

Ecuador:

- Ecuadorian Institute of Water Resources
- Ministry of Agriculture

Peru:

- National Development Institute
- National Council for Science and Technology
- "La Molina" National Agricultural University
- Ministry of Agriculture

Venezuela:

- Ministry of the Environment and Renewable Natural Resources
- Inter-American Centre for Land and Water Resources Development

It is hoped that this joint effort will make it possible to provide a system which will co-ordinate the different kinds of progress achieved both regionally and nationally. Of these, mention should be made of the FAO's Latin American Watershed Network (directed primarily towards protection and conservation), the different proposals for establishing organizations to assist high-altitude areas (such as the creation of an international association of specialists in hillside agriculture, Turrialba, Costa Rica, 1980),27/ and other similar proposals. Much progress has also been made at the country level, as for example the establishment of river basin management bureaus, the organization of courses on the subject, and the holding of congresses, seminars and workshops, which could benefit from the support of a system such as that proposed.

What is needed today is to organize and order these efforts by systematizing the work of river basin management and development in Latin America. It is hoped that the suggestions made in this document will contribute to this end. Finally, it may be noted that from 24 to 28 November 1986 a meeting was convened by ECLAC and JUNAC in Lima, Peru, on the development and integral management of river basins in the Andean region. Among other documents, specific studies undertaken in the Andean countries to evaluate the strategies that these countries are using to promote high-altitude river basin development and management were presented at that meeting. Annex 3 gives the frame of reference used for preparing the study on Colombia.

Notes

1/ Universidad Nacional Agraria (National Agricultural University) "La Molina" and Centro de Estudios Rurales Andinos (Centre for Andean Rural Studies) "Bartolomé de Las Casas", Estrategias para el desarrollo de la sierra, Cuzco, April 1986, p. 11.

2/ Grimaldo Rengifo et al., "La agricultura andina-Perú", mimeo, restricted distribution, Lima, 1984.

3/ National Development Institute, Special Project on the Centre-South Sierra, "El Proyecto de Rehabilitación de Zonas Deprimidas de la Región Sierra-Centro-Sur y su Reformulación", report prepared by Julio C. Guerra Tovar, Lima, January 1986, pp. 12-13.

4/ Ministry of Agriculture and Food, Diagnóstico de la cuenca alta del río Vilcanota, Technical Co-operation Agreement with the Federal Republic of Germany, Irrigation Improvement Plan in the Sierra (MERIS Plan), 2nd stage, Lima, Peru, 1979; Corporación Autónoma Regional del Cauca, "Plan de ordenación y desarrollo de la cuenca del río Aguatacal", Informe CVC No. 79-17, Cali, Colombia, November 1979; Ministry of Agriculture, Department of Water, Soil and Irrigation, Proyecto de ordenamiento de los recursos agua y suelo en la cuenca hidrográfica del río Mala: Subcuenca del río Ayaviri-sector de tratamiento pampa Cullpa, Vol. I, Lima, Peru, 1984.

5/ Grimaldo Rengifo et al., op. cit.

6/ Universidad Nacional Agraria (National Agricultural University) "La Molina" and Centro de Estudios Rurales Andinos (Centre for Andean Rural Studies), "Bartolomé de Las Casas", op. cit.

7/ ECLAC, Transacciones ambientales en el campo de los recursos hídricos, LC/L.364, 13 December 1985.

8/ Alejandro Colomés, Producción pecuaria, de fauna y desarrollo de la ganadería de vicuña en la ecorregión andina, E/CEPAL/PROY.6/R.40, Regional seminar on agrarian policies and peasant survival in high-altitude ecosystems, Quito, Ecuador, 23-26 March 1982.

9/ ECLAC, El poblador rural, el manejo del agua en las cuencas alto andinas y el rol del Estado, E/CEPAL/PROY.6/R.41, Regional seminar on agrarian policies and peasant survival in high-altitude ecosystems, Quito, Ecuador, 23-26 March 1982.

10/ Ibid.

11/ Universidad Nacional Agraria (National Agricultural University) "La Molina" and Centro de Estudios Rurales Andinos (Centre for Andean Rural Studies) "Bartolomé de Las Casas", op. cit; ECLAC/UNEP, Sobrevivencia campesina en ecosistemas de altura, Vol. I and II, United Nations Publication, Sales No.:S.83.II.G.31, Santiago, Chile, 1983.

12/ Comments by Juan Sánchez at Universidad Nacional Agrarira (National Agricultural University) "La Molina" and Centro de Estudios Rurales Andinos (Centre for Andean Rural Studies) "Bartolomé de Las Casas", op. cit., pp. 265-267.

13/ ECLAC, Formulation of plans for water resource management in Latin America and the Caribbean, LC/G.1391, 22 January 1986.

14/ COLCIENCIAS/CVC/DNP/OPSA, "Red nacional de cooperación tecnológica para el ordenamiento de cuencas hidrográficas", working document, Bogotá, Colombia, May 1986.

15/ Ministerio del Ambiente y de los Recursos Naturales Renovables, Dirección de Manejo de Cuencas, "Conservación de cuencas - Programa básico", Sociedad Venezolana de Ingenieros Forestales, Jornadas Técnicas Forestales, Caracas, Venezuela, 1978.

16/ COLCIENCIAS/CVC/DNP/OPSA, op. cit.

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18/ Ibid.

19/ Ministry of Agriculture and Food, Water Department, "Principios para elaborar un plan de protección de cuencas", prepared by Axel Dourojeanni and Luis Oberti, Boletín Técnico No. 11, Lima, Peru, August 1978.

20/ Ministry of Agriculture, Bogotá, Colombia, 13 October 1981, Decree No. 2857, regulating Part XII, Title 2, Chapter III of Decree-Law 2811 of 1974 on river basins, together with other provisions.

21/ Nelson Manrique, Colonialismo y pobreza campesina: Caylloma y el valle del Colca, siglos XVI-XX, DESCO Centro de Estudios y Promoción del Desarrollo, Lima, May 1983.

22/ ECLAC, Transacciones ambientales ..., op. cit.

23/ Departamento Nacional de Planeación/Corporación Autónoma Regional de Tolima (CARTOLIMA), "La planificación de cuencas: Bases para el desarrollo de la cuenca del río Saldaña", Informe resumen, Colombia.

24/ Ibid.

25/ Nelson Manrique, op. cit., p. 223.

26/ The terms of reference for the elaboration of the manual for the planning and management of integrated systems for the development and management of river basins are being drafted by the Water Resources Unit of the Natural Resources and Energy Division of ECLAC and will be published shortly.

27/ Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Rockefeller Foundation, Memoria, Seminario Internacional sobre Producción Agropecuaria y Forestal en Zonas de Ladera de América Tropical, Ed. Andrés R. Novoa y Joshua L. Posner, Turrialba, Costa Rica, 1-5 December 1980.

Annex 1

MINISTRY OF AGRICULTURE

DECREE NUMBER 2857 OF 13 OCTOBER 1981.

"Which regulates part XIII, Title 2o., Chapter III of Decree-Law 2811 of 1974 relating to drainage basins and establishes other provisions"

THE PRESIDENT OF THE REPUBLIC OF COLOMBIA

by virtue of the powers vested in him by the constitution and particularly those conferred by section 3 of article 120 of the Charter,

DECREES :

CHAPTER I :

GENERAL PROVISIONS

ARTICLE 1. Definition of a river basin. For the purposes of article 312 of the National Code on Renewable Natural Resources and Environmental Protection, a river basin or watershed designates a duly defined physical and geographical area, wherein the surface and underground waters flow into a natural network through one or several continuous or intermittent flows which in turn join together into a greater course which enters or may enter a main river, a natural accumulation of water, a lake or directly into the sea.

ARTICLE 2. The boundary of the river basin. A river basin is bounded by the water divide. The divide designates the maximum altitude or elevation separating two adjacent rivers.

When the boundaries of the underground water in a river do not coincide with those of the surface water divide, the boundary will be extended

underground so as to include the aquifers which flow towards the river bordered by the surface waters.

ARTICLE 3. Conditions for exploitation. Exploitation of natural resources and other environmental elements will be carried out subject to the general principles established by Decree-Law 2811 of 1974 and, particularly, to the criteria and provisions made by article 9 of the law.

Any activity which by its nature may cause serious damage to the renewable natural resources in the river, whether or not the latter is covered by a management plan, must be authorized by the Administrative Body Responsible for Renewable Natural Resources, by means of the preparation and submission of the relevant environmental impact study.

The above relates in particular to the construction of carriageways, canals, removal of water from river channels or lakes, mining operations, the construction of reservoirs or other similar works.

CHAPTER II

REGULATION

ARTICLE 4. Purpose of the Decree. The main purpose of regulating a river basin is to plan the use and management of its resources and to direct and control the activities of users, so as to maintain or restore a suitable balance between the economic exploitation of the resources and the protection of the physical and biotical structure of the basin and in particular its water resources.

Thus conceived, regulation establishes the framework for planning the integral development of the river basin and programming the execution of specific projects for exploiting hydraulic resources.

ARTICLE 5. Priorities under the Decree. By virtue of the powers granted by Decree 133 of 1976, the Ministry of Agriculture, after having obtained the opinion of the National Department of Planning, is responsible for defining policies with regard to priorities in the regulation of river basins, bearing in mind the physical problems affecting them and in particular, those which lead to deterioration of the renewable natural resources, particularly water resources, used to satisfy the needs of the human population and of agricultural production, or uses for energy, industry and mining.

ARTICLE 6. Protective Measures. Once a regulatory plan has been approved, the Administrative Body Responsible for Renewable Natural Resources must take the conservational and protective measures for the natural resources of the zone, provided for in the plan, and in pursuit of this it may restrict or define the uses made of the river basin and establish controls or limits to the activities of rural, urban, industrial or mining development.

ARTICLE 7. Subjection of Activities to the Plan. In those river basins subject to a management plan, it will only be possible to carry out agricultural or forestry activities or activities affecting the physical infrastructure in the manner and subject to the conditions laid down by the plan and in every case making use of techniques and procedure which ensure preservation of the soils, of the vegetable coverage and of the water resources in the area.

ARTICLE 8. Authorization of Settlements. In those river basins subject to a management plan, no activities or infrastructure works in pursuit of official programmes and projects for colonization or human settlements will be allowed without prior approval by the Administrative Body Responsible for Renewable Natural Resources.

CHAPTER III

THE MANAGEMENT PLAN

ARTICLE 9. The Administrative Units Responsible for Renewable Natural Resources may declare a river basin subject to regulation either on its own initiative or at the request of a party, subject to the provisions of article 5 of this Decree. In accordance with Extraordinary Decree 133 of 1976 and Law 2a. of 1978, authority to do so is vested in the National Institute for Renewable Natural Resources and the Environment, INDERENA and the Regional Development Corporations, in the territory of their respective jurisdictions.

ARTICLE 10. Adoption and Approval of the Plan. Management plans for a river basin will be adopted by the Board or Governing Council of the relevant Administrative Body Responsible for Renewable Natural Resources, in full compliance with the statutory requirements for the approval of administrative acts in view of their nature or size.

Whenever the management plan requires economic participation by several public bodies, and whenever its execution involves funds provided by external credit, it will be submitted by the National Department of Planning for prior examination and approval by the National Council for Economic and Social Policy, CONPES. If the plan constitutes part of the National Plan for Economic and Social Development, its adoption will be subject to the approval of the relevant law by the National Congress.

ARTICLE 11. Official Participation. Any national or regional central or decentralized public body may participate in the preparation of the regulatory plan for a river basin through the signing of an agreement with the relevant Administrative Body Responsible for Renewable Natural Resources. The agreement will specify the amount of technical and economic resources committed, the administrative and operational mechanisms for promoting the relevant tasks, together with the terms and other provisions considered necessary for successfully achieving the proposed objectives.

ARTICLE 12. Grounds for the Ordinance. The Administrative Units Responsible for Renewable Natural Resources are under the obligation to plan the regulation of river basins as a means of preventing damage to them or of restoring them, whenever any one of the following situations occur.

1. When it is necessary to provide protection for or to construct infrastructure works designed to control, protect or benefit from water resources or any other works of particular economic and social importance.

2. When the exploitation of a basin's natural resources may upset the physical, chemical or ecological balance of the natural environment, thereby jeopardizing the integrity of the basin or any of its resources in particular, or its productive potential in the future.

3. When the ecological environment is affected by a widespread disturbance causing or likely to cause deterioration of the water or soil, in terms of quality and quantity, rendering or capable of rendering them unsuitable for satisfying the development requirements and basic needs of the community.

4. When the implementation of officially approved plans or programmes requires that the waters be used for human consumption, to increase agricultural production, to develop hydraulic energy, industry, navigation and river transport or for other purposes of equal impact and importance.

The administrative decision to regulate a basin will be adopted by the competent body, following the preparation of the preliminary diagnosis, on the basis of which the reason or reasons justifying the preparation and formulation of the relevant plan will be determined.

ARTICLE 13. Contents. Any plan for regulation and management must involve the following stages: a) diagnosis; b) formulation; c) implementation and d) supervision.

ARTICLE 14. Diagnostic Stage. This is essentially intended to identify the present state of the river basin in order to assess the potential and limits of its natural resources and the economic circumstances of the human communities living in the area.

Prior to the diagnosis, the studies, plans, programmes and projects relating to the use and management of the basin's natural resources will be compiled and analysed.

ARTICLE 15. Terms of Reference. The bodies responsible for drawing up the plan will be required to prepare detailed terms of reference for the diagnoses and for submitting them to their respective Boards for examination in order for them to be revised and to receive the necessary approval.

ARTICLE 16. Elements of the Diagnosis. It will be necessary for the diagnosis to identify existing and potential problems together with their causes. To this end, the relevant study will define:

1. The physical, climatic and topographical conditions in the area.

2. The inventory and state of the renewable natural resources.

3. The whereabouts, equipments, state of operation and maintenance of public services.

4. The population's social, economic and cultural circumstances.

5. The purpose of and technology adopted for exploiting the natural resources of the basin together with their impact upon the renewable natural resources.

6. The location and present state of the existing physical infrastructure works in the area of the basin used to ensure water supply, generation of electrical energy, irrigation, drainage, etc.

7. The identity of the public and private bodies active in the basin, either in the field of agricultural or forestry production, in the social structure or in any service designed to improve the population's living conditions.

8. The number of beneficiaries of legally granted water rights as well as of agricultural or forestry operations in the area.

ARTICLE 17. Formulation Stage. On the basis of the results of the diagnosis, the management plan for the river will be formulated, containing a synthesis of government policy with regard to the management of these special areas, and specifying the deadline within which the plan in question is to be implemented.

ARTICLE 18. Contents of the Formulation. In its formulation, the plan must include:

1. A clear and precise definition of the general and specific aims specifying which characteristics it is intended to imprint onto the river basin.

2. A definition of the strategy adopted to achieve these aims together with a description of its main elements.

3. Formulation of the programmes and projects.

4. Definition of policy alternatives in the areas of credit, taxation, rates, improvement and technical assistance.

5. Alternative investment proposals for programmes and projects to exploit the renewable natural resources in the drainage basin.

6. Definition and proposal of alternative sources of funds for the programmes and projects which are chosen and approved.

7. Definition of the administrative structure responsible for co-ordinating, supervising and managing the basin in pursuit of the plan.

8. Zoning of the basin providing for its use and management in respect of areas which have been set up as reserves or set aside for forestry, agriculture or urban use, etc.

ARTICLE 19. Implementation Stage. It is during this stage that the policies, programmes and projects defined by the plan will begin to be implemented, and that the operational plans will be prepared, defining as precisely as possible the human, technical and financial resources required and specifying the goals it is hoped to achieve during each period.

ARTICLE 20. Control Stage. In formulating operational plans it is necessary to include short-term objectives and goals making it possible to follow up the programmes and projects under way. Follow-up and supervision must be carried out by the Ministry of Agriculture or the National Department of Planning, depending on whether the area falls within the competence of INDERENA or of an Autonomous Regional Corporation.

ARTICLE 21. Precedence of Standards. The standards relating to the management and exploitation of renewable natural resources laid down by a management plan for a river basin have precedence over the general arrangements provided for by any other administrative regulation or laid down in the permits and concessions granted before the plan came into force.

ARTICLE 22. Consultation of Users. The users of a watershed are entitled to be informed about and to make recommendations concerning the management of a watershed.

Similarly, once a river basin has been declared subject to regulation, the users of the basin in question must be informed of the fact. In order to do so, the Administrative Body Responsible for Renewable Natural Resources will decide upon and take the necessary steps, so as to ensure that the persons concerned may express their views and put forward such recommendations as they consider necessary.

CHAPTER IV

IMPLEMENTATION OF THE PLAN

ARTICLE 23. Responsibility for Implementation. The Administrative Body Responsible for Renewable Natural Resources will be responsible for implementing the river basin management plan. Nevertheless, responsibility for implementation may be delegated to another official body provided that the body in question demonstrates that it possesses a direct interest in the area and sufficient technical, economic and administrative capability to carry out the operational plans and achieve the aims set by the plan.

ARTICLE 24. Follow-up and Assessment. The Administrative Body Responsible for Renewable Natural Resources will design and lay down the technical and administrative means necessary to ensure follow-up of the activities pursued by the institutions responsible for implementing the management plans and to assess their results.

The Administrative Body Responsible for Renewable Natural Resources may, at any time, reassume the functions it has delegated if, on the basis of the relevant reports, it is proved that the obligations laid down by the delegation agreement have not been fulfilled.

ARTICLE 25. Power to intervene. The preparation or implementation of a management plan does not prevent the Administrative Bodies Responsible for Renewable Natural Resources from intervening in the activities of users by means of the necessary protective and conservation measures to avoid or halt damage to the renewable natural resources in a river basin.

CHAPTER V

THE ADMINISTRATION OF RIVER BASINS

ARTICLE 26. Administration of Watersheds. Responsibility for the administration of river basins is borne by INDERENA or by the Regional Development Corporations. In accordance with the law, once authorization has been granted by the National Government these organisms may delegate administrative responsibility to other official bodies with a direct interest in the zone in question or to Users' Associations possessing legal status, provided that in the view of the body delegating responsibility, such organisms or associations are able to provide satisfactory technical and administrative guarantees to assume this responsibility.

Users' Associations may only administer a specific area of the watershed in which they possess a particular interest and provided that this coincides with their corporate purpose as laid down in their statutes.

ARTICLE 27. Co-operation to ensure the Protection of River Basins. The public or private bodies responsible for administering aqueducts, irrigated areas, hydroelectric installations, enterprises for processing natural resources, and in general which either directly or indirectly make use of the resources of a river basin, are under the obligation to collaborate in its development and to contribute technical and economic resources to defending the renewable natural resources and to safeguarding the environment.

ARTICLE 28. Users' Association. For the purposes of the previous article, Users' Associations may be organized in each river basin, with non-profit-making legal status, and whose main aims will be to:

a. Carry out specific programmes to protect the renewable natural resources in the river basin;

b. Promote the execution of studies relating to the regulation and management of the river basins;

c. Participate in financing management plans for the river basins;

d. Act as a consultory organ for the bodies responsible for implementing the management plans, if these bodies so decide;

e. Carry out the functions provided for by article 26 of this Decree.

ARTICLE 29. Organization of the Associations. All those persons who either directly or indirectly make use of the natural resources in a river basin may belong to the Associations, and the Association's Governing Board will be composed of representatives of each of the municipal councils in the basin, of the Land Management Districts, of the official or private bodies which own or manage installations for generating energy and regulating rivers and channels, industries established in the area as well as of the Administrative Body Responsible for Renewable Natural Resources. In keeping with the purpose of this decree and the laws governing these types of organization, the Ministry of Agriculture will lay down the regulations which the watershed Users' Associations must comply with.

CHAPTER VI

FUNDING FOR THE MANAGEMENT PLANS

ARTICLE 30. Funding for Plans. The management plans for river basins will be financed by the following funds:

1. By the revenue from the compensatory taxes for expenditure on the maintenance of the renewability of renewable natural resources, in accordance with the terms of articles 18, section 2 and 159 of Decree-Law 2811 of 1974.

2. By the revenue from the retributory taxes paid for services involved in eliminating or controlling the damaging impact on the environment of profit-making activities, in accordance with the provisions of section 1 of article 18 of Decree-Law 2811 of 1974.

3. With the revenue from ad valorem contributions, collected by the Administrative Body Responsible for Renewable Natural Resources in pursuit of articles 46, 126, 152 and 322 of Decree-Law 2811 of 1974 and in accordance with the terms of that law.

4. By funds from the national budget as well as the funds which the administrative bodies themselves have set aside for that purpose.

5. By the proceeds of domestic or external loans taken out by the Government or by the Administrative Body Responsible for Renewable Natural Resources.

6. By income provided by the contributions made by the official bodies making use of the basin.

7. By donations and gifts made to the Administrative Body Responsible for Natural Resources by individuals or legal entities, be they national or foreign.

8. With the revenue from fines imposed on users of the watershed for failing to observe the prohibitions established by this Decree.

ARTICLE 31. Calculation of the Amount of the Taxes. Except where otherwise stipulated by law, the Administrative Bodies Responsible for Renewable Natural Resources are authorized to establish the amount of the taxes referred to in sections 1 and 2 of the previous article, by means of agreements or Resolutions of a general nature and depending on either the nature of and benefits derived from the resources used or on the amount and degree of physical, chemical or biological environmental pollution, without thereby relieving those responsible of all their other obligations with regard to the control of environmental damage.

CHAPTER VII

EXPROPRIATIONS AND SERVITUDES

ARTICLE 32. Declaration of Public and Social Interest. In accordance with the provisions of subsection c) of article 69 and article 71 of Decree-Law 2811 of 1974, the purchase of private real estate or developments or of those owned by public corporations is hereby declared to be in the public interest whenever it is necessary in order to carry out works for the development of the programmes provided for by the relevant river basins management plans.

Should the owners of the real estate or developments affected by the purchase order be unwilling to sell them voluntarily or be prevented by law from selling them, the Administrative Body Responsible for Renewable Natural Resources in the basin may have them expropriated and take the necessary legal steps, in accordance with the effect or disposition of the Code of Civil Procedure.

ARTICLE 33. Appeals. Only appeals against the administrative measure submitted through the governmental channel and under full jurisdiction for suits under administrative law, presented within the terms and in the manner established by the relevant Code will be accepted.

ARTICLE 34. Assessment of Compensation. In accordance with the terms of Decree-Law 150 of 1976, the maximum purchase price of real estate or developments for the purposes of implementing a management plan will be that of the valuation established for the purpose by the Instituto Geográfico Agustín Codazzi.

ARTICLE 35. Process of Expropriation. Once the final Expropriation Order has been obtained, the body concerned will request the Civil Circuit Judge within whose jurisdiction the property is situated to carry out the expropriation in application of the special process provided for by Title 24 of the Third Book of the Code of Civil Procedure.

ARTICLE 36. Public Servitudes. In order to execute the civil works provided for by the management plan or in pursuit of the administrative activities of the watershed, the Administrative Body Responsible for Renewable Natural Resources or its delegated authority is empowered to occupy such land or to impose such restrictions to the right private ownership as is required for the execution of the civil works or implementation of the watershed preservation activities.

In accordance with article 69 of Decree-Law 2811 of 1974, the establishment of servitude or of ownership restrictions affecting private real estate or that owned by public corporations, is declared to be in the public interest for the purposes laid down in the above paragraph.

ARTICLE 37. Administrative Application of Servitude. The Administrative Body Responsible for Renewable Natural Resources or its delegated authority will establish servitude or ownership restrictions over private real estate or that owned by public corporations, by a founded resolution specifying the area required or the relevant restrictions, the manner in which it will be applied and the amount of the compensation paid for the servitude, which will be established on the basis of a valuation by the Instituto Geográfico Agustín Codazzi.

The only means of appeal against the administrative decision is through a motion to set aside once governmental channels have been exhausted.

ARTICLE 38. Validation of the Servitude. Once the servitude has been established, either because the owner of the real estate concerned has given his agreement or because the administrative decree has become final, the lien will be registered as a public document, and entered in the registry of the competent Office within whose area the property is situated.

The amount of compensation will be paid to the owner of the real estate affected by the lien by the body responsible, following presentation of the account and subject to fulfilment of all the relevant administrative and fiscal requirements.

ARTICLE 39. Process of Servitude. Should opposition be made, the Administrative Body Responsible for Renewable Natural Resources or its delegated authority will initiate the relevant abbreviated process of servitude, in accordance with the provisions of the Code of Civil Procedure.

CHAPTER VIII

PROHIBITIONS AND SANCTIONS

ARTICLE 40. Prohibitions. The following acts are prohibited as they constitute violations of the integrity of managed river basins:

1. The execution of physical infrastructure works designed to alter the means for making use of natural resources, if these fail to comply with the technical requirements of the relevant management plan.

2. The exploitation of any of the renewable natural resources existing in the basin without prior authorization from the Administrative Body Responsible for Renewable Natural Resources in accordance with the law or with regulations; the adoption of methods or procedure which are technically inadequate to ensure the preservation of the integrity of resources; failure to comply with the legal requirements explicitly laid down by law or by the relevant administrative acts whereby the exploitation is authorized.

3. Infringing, either directly or indirectly, the prohibitions laid down by the special norms regulating the exploitation of each specific renewable natural resource.

ARTICLE 41. Sanctions. In accordance with the provisions of Law 23 of 1973, violation of any of the prohibitions established by the above article will incur the following sanctions for those responsible for the infringement. These will be applied on the basis of the seriousness of the acts and of the damage they may cause:

a. Written warning.

b. Interruption of the work or of the exploitation, until such time as the user carries out the recommendations made by the Administrative Body Responsible for Renewable Natural Resources on the basis of the management plan or in the relevant concession or permit.

c. Destruction of the works or suspension of the act authorizing the exploitation, when the works or acts fail to comply with the management plans or norms laid down by the law and by the regulations protecting renewable natural resources or the environment.

d. Successive fines up to 500 000 pesos graduated in accordance with the nature of the violation, its harmful consequences on the resource or resources affected, on whether the violation constitutes a repetition, on the means or elements used to commit the offense and on the interests affected, depending on whether these are the general interests of the community or the rights of a third party.

PARAGRAPH. In addition to the fine, the violator will be obliged to remove the works constructed or demolish them, as the case may be, and return things to their previous state, replacing natural or artificial defenses and paying the cost of such replacement, without prejudicing any compensation due for the damage caused.

ARTICLE 42. Competence for policing. The competent officials for enforcing the sanctions provided for herein will be the officials of INDERENA and those of the Regional Corporations empowered with police authority by Decree 133 of 1976 and Law 2a. of 1978 together with the mayors and other police authorities, as provided for by the relevant National Code.

ARTICLE 43. Procedure. Application of sanctions for administrative infringements will be carried out by INDERENA officials and by those of the Autonomous Regional Corporations in accordance with the procedure laid down by Decree 2733 of 1959.

Application of sanctions for infringements which fall under police jurisdiction will be carried out in accordance with the procedure established by Decrees 1608 of 1978, Title VII, Chapter III and 1681 of 1978, Title XII. In those cases where no special procedure applies, the procedure followed will be that established by the National Police Code.

ARTICLE 44. This Decree takes effect on the day of its issue and any dispositions to the contrary are hereby annulled.

TO BE MADE KNOWN, PUBLISHED AND COMPLIED WITH
Issued in Bogotá, D.E., 13 October 1981

THE MINISTER OF AGRICULTURE

LUIS FERNANDO LONDOÑO CAPURRO

THE HEAD OF THE NATIONAL DEPARTMENT OF PLANNING

FEDERICO NIETO TAFUR

Annex 2

MECHANISMS FOR ALLOCATING FINANCIAL RESOURCES FOR THE INTEGRAL DEVELOPMENT AND MANAGEMENT OF HIGH MOUNTAIN RIVER BASINS IN THE ANDEAN REGION

There are various means of financing plans to develop and manage watersheds. Some of the possible means of harnessing funds are set out in Colombian Decree-Law 2811 of 1974, given in annex 1. Here below a summary is provided of some of the alternative sources of financing included in the above law together with other alternatives.

a) The revenue from compensatory taxes for expenditure on maintenance of the renewability of renewable natural resources.

b) The revenue from taxes on the services of elimination or control of the consequences of environmental deterioration. (The amount is calculated by the administrative bodies responsible for renewable natural resources in accordance with the law.)

c) A percentage of the income from the sale of hydroelectric energy.

d) The revenue from ad valorem contributions collected by the administrative bodies responsible for renewable natural resources in accordance with the law.

e) Funds from the national budget and from the budget of the administrative bodies responsible for renewable natural resources.

f) Revenue generated by water rates and by contributions from the various organized users of the natural resources in the watershed.

g) The proceeds of loans taken out by official bodies using the watersheds and by those councils of users with legal status.

h) The proceeds of gifts which may be encouraged within the country by tax reductions.

i) The proceeds of fines imposed on users of the river basin for polluting the waters, eroding the soil, modifying the vegetation or guilty of other infringements of the law.

Within this brief outline it is important to stress the overwhelming importance of c), which in the case of Colombia and with regard to the commitments which the owners of hydroelectric power stations must meet, leads, in the first instance, to the application of law 56 of 1 September 1981. Article 12 of this law obliges these firms to devote an annual sum equivalent to 4% of total energy sales during the previous year, assessed at the rate of block sales. Article 30 of decree 2024 of 12 July 1982, which regulates law 56, establishes that priorities for the investment of 2% of energy sold by hydroelectric power stations will be made on the basis of the studies and recommendations relating to the "regulation and management of river basins", provided for by decree 2857 of 1981.

In addition, article 11 of Law 60 of 1983, adopted on 28 December the same year, obliges firms owning hydroelectric power stations to transfer funds equivalent to 4% of gross energy sales, mentioned above, to a specific Corporation, known as the Autonomous Regional Corporation Rionegro-Nare (CORNARE), while the Corporation is, in turn, under the obligation to invest them in the manner laid down by article 12 of law 56 of 1981.1/ This clearly puts the Corporation in a privileged position, as it is thereby able to act as a bridge allowing the municipal councils located in the micro-river basins and sub-basins under its jurisdiction to become participants and to reap, in concrete and specific form, the economic benefits deriving from the exploitation of their natural wealth, and to direct the investment of these funds in a framework of economic and social planning and of territorial management within the geographical area of the river basins.

The criterion set out in point g) seems to indicate that the beneficiaries of the water resource in particular as well as those of other natural resources should take part in financing activities for the use, development and conservation of such resources by signing agreements with the river basins administrative bodies.

1/ Autonomous Regional Corporation Rionegro-Nare (CORNARE), Compendio de las normas legales y disposiciones básicas, Bogotá.

Annex 3

ASSESSMENT AND DIAGNOSIS OF STRATEGIES, PROGRAMMES AND PROJECTS USED IN OR FORMULATED FOR THE DEVELOPMENT AND MANAGEMENT OF HIGH MOUNTAIN RIVER BASINS IN THE ANDEAN REGION OF COLOMBIA DURING 1980-1985 WITH PROJECTIONS UP TO 1990

REFERENCE FRAMEWORK

I. FRAMEWORK OF THE STUDY AND APPROACH

The study falls within the framework of the activities which are being pursued as part of the project on Planning and Management of Water Resources in Mountain River Basins in Latin America, under the co-ordination and direction of the Water Resources Unit, depending on the Natural Resources and Energy Division of ECLAC.

The aim of the project, which is financed by the Government of Italy, is to foster technical co-operation between countries in the Andean region so as to improve the mechanisms for planning and management in high mountain river basins designed to make use and manage the renewable natural resources, particularly water, soil and vegetation with the aim of improving the level or quality of life of marginal populations, bearing in mind the social, economic and environmental aspects, in a manner coherent with national, regional and micro-regional development policies.

At this stage, the project has assigned priority to the countries of the Andean region, in particular Colombia, Ecuador, Peru and Venezuela. One of its targets is the preparation of a document containing the results of a comparative assessment of the strategies, plans, programmes and projects used by the countries in the region in the development and management of high Andean river basins.

Within this framework, the study on Colombia aims to identify the strategies, plans, programmes and projects carried out or under way for the development and management of high mountain river basins in Colombia, for the purpose of assessing their impact. It is hoped that it will be possible to identify their possible achievements as well as the influence exerted by the formulation of strategies for the development of high mountain river basins at the national level in Colombia.

The recommendations put forward by the study should provide the government with guidelines for choosing priorities and selecting the best alternatives among programmes and projects for the development of mountain regions. The study has been systematically designed and organized so as to provide closely-argued and exhaustive support for the recommendations, based on studies into large river basins.

In this respect, it will be necessary for the study to endeavour to assess the political and technical instruments available to the country in order to tackle the development and management of these areas, rather than drawing up an exhaustive inventory of natural resources, which are widely known thanks to a variety of intra and interregional studies.

The main hypotheses which the study will need to consider are the following: a) there is insufficient articulation between the country's economic development and the role played therein by high mountain watersheds and the formulation of plans and strategies for national development (inconsistency between the declared importance and the importance actually given); b) the policies derived from plans and strategies for the high mountain region are inconsistent with the objectives established within the different levels of the planning system (inconsistency between national, regional and micro-regional objectives); c) the importance given both by the State and by the private sector to development of high mountain river basins is not fully reflected in practice in the basins.

Examination of these hypotheses should make it possible to draw conclusions and gain a deeper knowledge of the degree of articulation of the planning system, as well as of the real importance assigned to the development of high mountain river basins by the State and productive sectors; the coherence and quality of the political and technical instruments; areas in which there is an overlapping of functions, a lack of institutional co-ordination and inconsistency within the formulations, should there be any; together with the relationship between strategies and the actual potential for action. The aim of the above is to clearly identify which of these have constituted and continue to constitute real obstacles and restrictions, as well as the most advisable and promising means of overcoming them.

II. METHODOLOGICAL PROPOSAL

1. Identification of the high mountain river basins in Colombia

A description will be provided of the country's biophysical environment through a brief outline of its main regions with their most pronounced features and major river basins.

The study will then concern itself with the Andean region. The area's natural and economic resources will be described together with its social and political environment, and a comparison will be made between this data and that relating to the rest of the country. In this paragraph a hierarchy of the river basins in the Andean region will be established on the basis of a number of indicators, such as resources, production, population and water, and those

watersheds which will constitute the main object of the study will be selected.

2. The real and nominal importance which the public sector has assigned to the development and management of high mountain river basins during the period 1980-1985

The aim of this paragraph is to compare the public sector plans, policies, programmes and projects concerning the Andean region and its river basins and to assess the actual results achieved by these in terms of degree of execution, amount of investment, institutional development undertaken, together with the specialized regional and sectoral centres set up by the public and private sector.

It is both necessary and vital to endeavour to identify the direction taken by the development strategy for the Andean region and its river basins. In this respect, it will be possible to examine whether priority is given to satisfaction of the needs of the population living in the river basins, i.e., protection against those effects which are considered harmful, such as erosion or migrations, conflicts originating in the use made of the water, or to other needs. It will thereby be possible to verify and appraise the results which have been achieved or which are to be achieved by the implementation of policies, programmes and projects.

3. Present, possible and maximum potential production capacity of the high mountain river basins (with and without irrigation)

A diagnosis of the production of the river basins studied will be made under this heading, with the aim of defining the degree of compatibility between the declared public objectives and their actual viability.

The diagnosis will be based on a comparison between the present state of production and the ideal level of production obtained in experimental areas. First of all, an examination will be made of the real and present production capacity together with all the physical, economic, technological and infrastructure restrictions displayed by the river basins in the study; an assessment will then be made of the production possible if all of the most significant restrictions were eliminated or reduced; finally, the theoretical potential maximum production of the river basins will be measured, i.e., the picture they would present following a growth process in which all restrictions were eliminated.

The indicators adopted will be, for example, the volumes of production obtained on experimental stations, compared with those achieved on the plots; the yields (kg/ha or head/ha) with and without improved seeds, the production obtained with intensive use of peasant labour and without it; and perhaps also that achieved with peasants trained by extension programmes compared to that of untrained peasants, for example.

Comparisons of agricultural production will be based upon the principal products of the river basins thereby requiring prior definition of the relative agricultural production structure in each river basin in 1980.

Moreover, a qualitative comparison will be made of the production of high mountain river basins with those situated in other regions of the country, as well as of the development of non-agricultural activities within river basins as compared with other regions.

These first three points constitute the stage of physical, institutional and productive diagnosis of the high mountain river basins in Colombia. This diagnosis establishes the empirical basis for the stage of assessment of the most important programmes and projects which the public sector has undertaken in order to develop and manage high mountain river basins.

4. Identification of the programmes and projects drawn up for the development and management of high mountain river basins

This section will identify the programmes and projects drawn up as well as those used with the aim of weighing up application of the development strategy. Subsequently, only those programmes and projects which were actually adopted will be examined and an assessment will be made of the extent to which they have been fulfilled. This assessment will be based upon comparison of specific indicators (relative investment, surface involved, number of beneficiaries, institutions responsible, and others) and on programmes which are theoretically viable from the technical and administrative points of view, such as, for example, integral development programmes at the level of river basins, programmes for the improvement of irrigation, for reafforestation, livestock, crop improvement, revival of technologies, training, and others.

On the one hand, this exercise will make it possible to establish the degree of articulation of programmes and projects at the level of each river basin, and on the other to define the type or types of programmes and projects on which efforts at development have concentrated.

5. Achievements of the programmes and projects adopted for the development and management of high mountain river basins

The purpose of this paragraph is to weigh up the results of the strategies in terms of the degree to which they have met their main objective, which is to reduce the discrepancy existing between actual and potential production as well as between the latter and the maximum potential production achieved in the 1980-1985 period.

This assessment will be carried out by establishing the nature of the goals and the percentage of them which have been achieved, on the basis of the contents of the programmes and projects carried out. The targets and indicators taken as a basis for comparison will cover the productive sphere as well as the institutional, physical, technical, social, economic and financial, administrative and legal ones.

6. Obstacles and restrictions hampering fulfilment of the declared public-sector objectives for the development and management of high mountain river basins in the Andean region

This section endeavours to identify the main difficulties which have in the past affected and continue to affect development strategies in high mountain river basins in Colombia. It will be possible to tackle the issue once the main programmes and projects carried out have been identified and their impact measured.

Assessment of the obstacles pinpointed is possible on the basis of official declarations concerning physical restrictions, such as access to the watershed; technical ones, such as frost; financial restrictions, such as those affecting credit; or cultural ones, such as the absence of organization and training.

With these declarations in hand, the actual obstacles will be assessed by means of direct observation of the production and living conditions of the population living in the high mountain river basins. These obstacles may take the form of a lack of knowledge of technology, the absence of technicians, unawareness of the actual conditions facing peasants, or the absence of political will to apply the strategies.

Paragraphs 4, 5 and 6 will make it possible to draw up a matrix for assessing the phenomenon, in which it will be described, together with the obstacles and restrictions affecting each of the principal programmes and projects adopted for the development and management of high mountain river basins. This will be the prerequisite for drawing up the matrix setting out solutions and recommendations.

7. A set or file of desirable programmes and projects for the formulation of a development and management strategy for high mountain river basins in Colombia

This section will present the results of the assessment of each programme and project implemented, together with an overall assessment, in order to promote the harmonious development of the high mountain river basins, which is the purpose of the study.

First of all, a summary table will be provided of the programmes and projects which achieved high, medium and low results in terms of the degree to which they fulfil their principal aims and have reduced or eliminated the most significant real restrictions and obstacles.

Where necessary a description will then be provided of the case studies on programmes and projects whose assessment needs to be deepened in order to restore their viability.

Finally, the set of programmes and projects which in the view of the researchers should be completed, strengthened and developed will be decided, i.e., that set of programmes and/or projects which have been formulated and not implemented.

The set of recommended programmes and projects will require integrating and linking elements, in order to develop a harmonious and viable strategic proposal incorporating productive, technological, socioeconomic and hydraulic considerations.

In order to achieve the above it is necessary that the reference indicators used in drawing up the set of recommendations tackle a variety of features, such as, for example, the results achieved, the targets set and met, the difficulties which have been overcome or which remain, and the priority of needs which must be met at the present time.