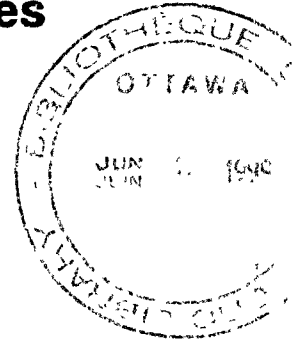


CONDESAN: An Ecoregional Approach to the Sustainable Management of Natural Resources in the High Andes

by

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Introduction

Since the publication of the Brundtland Commission report in 1987, natural resource use sustainability has become a common objective for resource managers. Frequently it is understood to mean the sustainability of a specific resource such as agriculture or fisheries. Many definitions of sustainable agriculture exist (Ruttan 1991). The Consultative Group on International Agricultural Research (CGIAR) accepted the following definition:

The successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources (TAC/CGIAR 1987).

This definition has the advantage that it does not specify a process for using natural resources. Indeed, the sustainability of natural resources utilization is best defined in terms of identifying the options most applicable to the ecoregion under consideration and then applying them. In this way the well-being of the planet and its inhabitants will be enhanced (Zandstra 1993).

Recent emphasis on sustainability followed or sought to replace productivity as the dominant natural resources management objective. To many observers, the productivity (i.e., the survival) objective contradicted objectives geared at sustainability. This, however, fails to protect unique, often unproductive, habitats that harbour valuable plant and animal diversity. It can be argued, therefore, that the overall objective of sustainability should be subject to having secured the unique ecological niches required for the preservation of biological diversity. In effect, there are multiple objectives for natural resources management. More recently a reconciliation has taken place (U. of F. 1993), although there remains an uneasy disharmony of views among environmentalists and survivalists. Neither view, however, is sufficiently broad. Natural resources management objectives must seek to improve the resource base while simultaneously increasing the benefits that people can derive from responsible resources utilization. This means that in addition to sustainability, productivity and the maintenance of biodiversity, the objectives must also include equity.

A more rational strategy for natural resources management is to maintain or to improve the natural resource base and the balance between its components. In a well functioning land use system this often implies the replacement of utilized natural resources with new resources by natural regeneration at a rate that must equal or exceed that removed by human utilization plus that used by the natural resource use system in maintaining itself. An important exception is the removal of toxic elements from the system to correct fertility imbalances.

The importance of improving the natural resource base becomes evident when we consider the relationship between resource quality and the carrying or production capacity of the land. A high quality resource base provides greater returns in response to additional labour and material inputs (de Wit 1992). When high extraction rates lead to the erosion of natural resources, however, incomes are reduced and the maintenance of the resource base is frequently neglected. This, in turn, frequently leads to a reverse downward spiral in human welfare and the type of resource base degradation that is common in poorer countries (Murqueito 1992). This is amplified by the link between poverty and high birth rates that leads

to production demands well beyond that which can be sustained by an ever weaker resource base. The effects of this phenomenon on the natural resource base is well documented (Lipton 1991, 1985).

This paper describes CIP's Andean ecoregional activities for sustainable management of natural resources. The procedures followed to develop the Andean consortium strategy (CONDESAN) are highlighted. Organizational as well as conceptual aspects are also described. Ideas to promote the horizontal transfer of applicable technologies from the Andes to the highlands of Eastern Africa are discussed.

The Andean ecoregion

At the end of the decade of the 1980s, it was evident that the world economy had undergone a prolonged period of sustained growth. At the same time, it was evident that this growth was inequitable and was characterized by increased poverty in certain areas. This is particularly true for the Andean ecoregion, which was once the home of the world's most dynamic cultures having the ability to produce significant food surpluses and which is the current home of more than 135 million people whose main source of sustenance is agriculture. The Andes are the source of several highly productive river basins providing life-support systems for rural and urban populations located in the lowlands. The whole Amazon basin, which supports life in its vast tropical rainforests, originates and depends upon water sources located in the Andean ecoregion. Hence, degradation of natural resources in the high Andes can have dramatic effects downstream.

Over 80 percent of the currently available agricultural land in the Andean highlands is steeply sloping with a broad range of soils and variable patterns of climate and water supply. Production systems vary significantly by country, altitude and latitude. In general, locations closer to the equator are more humid than those further South. Altitude has a profound effect due to the high incidence of frost in drier areas. In the valleys and mid-altitude areas crop production, namely potatoes, maize, beans, ulluco, faba beans and others, is important and is combined with different types of livestock production. In the most marginal areas such as the Altiplano, which supports the world's largest high-altitude population, livestock production (South American camelids) is more important because the range of crops is restricted to bitter potatoes and pastures. In Peru and Bolivia peasant communities are widespread, while in other countries private farming is more common.

Economic conditions have deteriorated seriously in the Andean ecoregion generating increased poverty in the majority of the population. Land degradation (erosion) is the most serious environmental issue affecting the region. In Peru, 21 million ha are endangered by erosion, infant mortality rates have reached as high as 289 per thousand while in Bolivia the per capita income is lower than three hundred dollars per annum in certain areas of the Altiplano. Such conditions have encourage massive rural-urban migration (4.6 percent in the case of Colombia) with resulting social conflicts and migration to the Amazonian ecoregion where non-sustainable slash and burn practices have lead to deforestation and loss of biodiversity.

Development of the Ecoregional Initiative: CONDESAN

As a result of the situation described above, CIP's management responded directly to Agenda 21 and recognized the need for an increased emphasis on Andean natural resources management. The goal of the programme developed is to overcome the deterioration of land and water resources, prevent the loss of genetic diversity and to alleviate extreme poverty. Since 1992, CIP developed an innovative strategy for partnership through collaborative research to promote development for the ecoregion. The following are the steps that have helped evolved CIP's ecoregional initiative:

Early commitment

Full involvement of NARS, NGO, universities and other partners and to develop a sense of ownership

among stakeholders has been the starting point of the initiative. CIP hosted an International Andean Agroecosystem Workshop in March 1992, at which time it was proposed that the centre, with the support of IDRC, help coordinate research on the sustainable management of natural resources. The approach chosen was to organize a research consortium.

Broad involvement

A programme that would coordinate and catalyze efforts and make more effective use of scarce funds and existing scientific talents will require the participation of all those institutions with the capability to collaborate. Currently, a wide range of institutions are participating in this initiative. Activities will therefore be implemented through collaboration with national, regional and international institutions. It is important to point out that in the Andean ecoregion, considerable work of high quality, in research and development, has been done in the past by competent institutions.

Participatory programme development

The Andean ecoregional initiative uses participatory programme planning by objectives (PPPO) as a mechanism to guarantee full participation of stakeholders for joint planning and shared monitoring of projects. This has led to the identification of well-defined outputs, setting of the research agenda and the division of tasks for each of the components of biodiversity. These components include land and water management, communications, INFOANDINA, policy, livestock, pastures and agroforestry.

Scientific rigor

Scientific rigor is required to address the research priorities identified during the PPPO process, to provide support to the research disciplines involved and to support the systems approach. This ecoregional initiative is currently supported by a critical mass of scientists in certain disciplines such as biodiversity, pastures and livestock, modelling, and natural resource economics. It will be expanded to cover such areas as land use systems and GIS. These researchers are strategically located in Colombia, Ecuador and Peru.

Shared responsibilities

The PPPO process has raised questions about the assignment of tasks within the Andean consortium. The process also created a participatory decision making structure in the implementation process. This has led to a division of assignments according to the comparative advantages held by the participating institutions.

Communication links

The communication and information sharing links between researchers, that will be used to consolidate information on genetic and biophysical resources and on research planning, will be enhanced through INFOANDINA. This is an information system developed by CIP in close collaboration with national communication systems.

Monitoring and accountability

Shared monitoring mechanisms created for the project will improve sustainable land use and the maintenance of biodiversity. Supervision will be based on realistic indicators against which performance can be evaluated. This will increase the credibility of the projects within the donor community and enhance confidence in the initiative among stakeholders.

Broad-based funding

Since support for the consortium is based on sharing both the costs and the benefits, stakeholders are expected to fund the activities that are undertaken. This support can be complemented with funding from other sources, if necessary. Donor countries, such as Canada, Switzerland, Germany and Holland have expressed their firm support to the Andean initiative. Multidonor support, longer term funding and funding sources related to Agenda 21 are included in this flexible funding scheme.

Successful strategy

Such a strategy has resulted in the establishment of the Andean consortium: CONDESAN (Consortio para el Desarrollo Sostenible de la Ecoregion Andina), which is operational with the kind support of IDRC. CONDESAN emphasizes partnership through collaborative and complementary work. Through the consortium, research on resource management will be integrated with research on crop/tree improvement and livestock husbandry by adopting a systems approach and by linking policy formulation to technology development and adoption.

The Andean consortium is open and participatory to compensate for imbalances in resources and to allow for membership to be extended to all stakeholders willing to share costs and benefits. This can include networks operating one or more components of the Andean agroecosystem as this would assure that rapid progress is made. The make up of the government of the consortium complements that of the participating institutions. It has an Advisory Council that will include outstanding scientists and representatives of major donors, regional research administrators and IARCs. The Council operates at the senior management level of the consortium and is tasked with oversight on content, approval procedures, monitoring and accountability.

An Executive Committee, which represents all participating groups and the Consortium Coordinator, is provided by CIP and will establish effective mechanisms to link institutions, hold major responsibility for the day-to-day research programming monitoring and the coordination of consortium activities. The consortium will also be the means to transfer results to other similar institutions.

Thematic research areas of CONDESAN

CONDESAN's proposed approach to conduct activities in the Andean ecoregion will be organized under the following main thematic research areas:

- I-Biodiversity of Andean Crops, Pastures and Animals
- II-Land and Water Management
- III-Agricultural Policy and Rural Development
- IV-Commodity Systems

Another important complementary area of work includes the gathering of relevant gender information to support the development of technologies that contribute to the sustainability of the system. Information activities (INFOANDINA) and human resource development will provide support to research themes.

The study of natural resources to address the research areas of CONDESAN requires consideration of multiple levels of resource interactions as these can be governed at many levels (plant, crop, farm, communities, watershed, national or regional). The performance of different systems for using natural resources must be understood in terms of their long-term effects on the resource base and the productivity of the resources used. This analysis should be at the level of the natural resource unit (agroecology or land type) and should allow extrapolation to homologous environments.

Much of the field work will be conducted in benchmark sites, such as heritage sites representative of the Andean ecoregion. These will facilitate long-term evaluation of alternative development initiatives. In the short term these are defined in Colombia, Ecuador, Peru and Bolivia. At these sites, research will be of a participatory nature, involving local communities, executing institutions (NGO, universities,

National Agricultural Research Systems (NARS), CGIAR, United Nations and others), including the private sector. The research will focus on measurement of the dynamic characteristics of systems, modelling to establish priorities for monitoring, evaluating the impact of land use systems, maintenance of biodiversity, and in the design and implementation of policies. The work will investigate intervention points at the commodity level to maintain productivity gains and achieve sustainable production. The benchmark sites will also help in extrapolation of component technologies to similar agroecologies.

One example of the functioning of the Andean consortium is the component of Andean Root and tuber crops. This is done within the area of Biodiversity, and developed through the financial support of the Swiss Development Cooperation (SDC) and Germany's GTZ. A PPPO held in August 1992 gave well developed outputs. A total of 52 projects are being developed by 24 institutions in Ecuador, Colombia, Bolivia and Peru. Work areas for the lesser known Andean root and tuber crops include in-situ and ex-situ conservation, crop protection, production of planting materials, and commodity systems. Experience in management of small grants, capacity building as an integral part of project implementation, and shared governance gained by participating institutions are recent "byproducts" of this biodiversity component.

The Andes and Eastern African highlands: potential links

CIP has recently been assigned (by CGIAR) the role of convener to globally implement Chapter 13 of Agenda 21 dealing with Sustainable Mountain Development. CONDESAN will therefore collaborate with institutions in the highlands of East Africa and in the Himalayas to promote the two-way horizontal transfer of applicable component technologies and to help maintain the options for human welfare worldwide.

One example of technology transfer would be in the area of water management. Indigenous Andean technologies for water management could help increase sustainability of agricultural productivity in selected ecologies of the highlands of Eastern Africa. For example, in Burundi agricultural production in the "marais" or swamps is increasingly important in an area where food is at a premium. The dry season lasting from April to September allows for cultivation in the swamps. Nevertheless, due to flood waters from rains in upstream areas, crops such as potatoes are not planted in April at the onset of the dry season but late in June or July when the water level decreases. In many instances rainfall in the upland areas results in fields becoming waterlogged in September before harvest is possible thus reducing the chances for food security.

An Andean technique "waru-waru" might be a suitable solution to the problem created by these seasonal floods. It consists of a system of water management structures that combine raised beds and with intervening canals. This system was developed by ancient Andean societies for cropping in areas requiring control of the water table. The use of waru-waru in the marais of Burundi, and elsewhere in Eastern Africa, could allow for flexible planting dates that farmers could adjust at will for optimum productivity. Additional benefits furnished by the waru-waru system include a better production and recycling of nutrients, favourable microenvironment for food production (frost protection), maintenance of fish, native plants, birds and beneficial insects. In addition the system can play an important role in providing more land for agricultural production. Another example could be the testing of Andean root and tuber crops in the highlands of East Africa, to explore their potential to complement existing vitamin deficiencies and to help alleviate hunger.

Constraints

There is yet much to do to accommodate diverse research agendas of the participating institutions. In terms of methodology, participatory research methods must be refined to achieve an active role in the life of the communities and in evaluating outcomes. An emphasis must be placed upon the policy area to allow for conflict resolution between urban and rural areas. Further, farming systems research methods need to have an adequate time dimension to measure the long term effects of resources management.

Conclusions

Objectives for natural resources management are multiple and must reconcile a number of interests. Among these are the sustainability of resource use, the ability to provide food, the protection of biodiversity and unique ecological niches and also the provision of equitable access to benefits. These objectives are not incompatible but the importance of each will come into play in different orders of dominance for different ecologies or regions. In this respect, enhancement of natural mechanisms that are favourable for the long term productivity of natural resources in the Andean ecoregion, and similar ecologies, merit the increased attention of researchers.

The institutional consequences of natural resources management research have translated into changes in collaboration. Opportunities have increased for collaboration with a wider range of partners (NARS, NGO, universities, networks and the private sector) to assure that rapid progress is made and to capitalize on previous experiences within the Andean ecoregion. The CONDESAN strategy, favoured by CIP and its partners for natural resource management, allows for better implementation of a multidisciplinary research within a systems approach and also addresses constraints to increasing sustainable production while maintaining the options for future generations. Only in this way can the needs of the inhabitants be addressed in a holistic, sustainable manner. While this is so, CONDESAN provides unique opportunities for spill-over effects to similar agroecologies in other areas thus contributing to human welfare worldwide.

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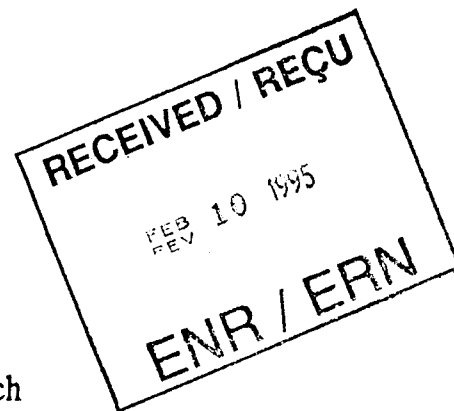
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