

Lessons from Twenty Years of Research Support in the Central Andes

Edward J. Weber and Martín Mujica

Summary of an evaluation report

"Twenty Years of IDRC Project Support in the Central Andes of Peru and Bolivia" prepared for the Evaluation Unit and Minga Program Initiative International Development Research Centre

February 2001

Contents

Foreword

Introduction

Influences after Twenty Years

Farming Systems Thinking

IDRC

Rural Markets

Building on Local Knowledge

Provincial Universities in Southern Peru

Communities

Government

NGOs

Work of Professionals

Regional Sharing of Information

Lessons

Be Realistic

Understand the Local Context

Value Indigenous Knowledge

Encourage Local Researchers

Develop Networks

Balance Participation and Accountability

Introduce Gender Equity

Include Environmental Concerns

Be Persistent

Strive for Institutionalization

Work with NGOs

Future Challenges

Foreword

It is difficult to identify durability in individual IDRC projects because they are time-limited and fundamentally concerned with research in which direct cause-effect relationships are difficult to identify. The output of the research only took on broader applied meaning within communities when it was combined with the efforts of other organizations and by farmers themselves.

Starting in the late 1970s, IDRC supported a number of research projects that were focussed on evolving a more holistic "systems" approach to understanding and improving agricultural production and natural resource management in the high Andean region of Southern Peru and Bolivia. In 1998, the Evaluation Unit, in collaboration with the Minga Program, decided to conduct a retrospective review of more than 30 of these projects to understand their impact and influence, and to determine what could be learned about how to design future development projects. They were looked at as a group precisely for the reason given in the introductory quote ... it is important to look beyond the individual projects to their contributions to research for development in the region as a whole.

Although the Centre no longer maintains a strong focus on agriculture, support for research that builds on local knowledge for natural resources management has in many cases permitted a continued involvement in these activities, notably those that support research on indigenous crops, production systems, and socioeconomic organization within the communities. The projects that were reviewed were important because they got researchers out of research stations and into communities. They were also important because of the roles some project participants came to play in policymaking bodies in Peru and Bolivia. The results of this work are important not only as a substantive contribution to development but as a learning tool for the Centre and its partners in future programming.

The study highlights the labour intensity of the Centre's approach to project development and monitoring, and points out circumstances in which this approach may not be ideally suited. It also notes that many of the projects worked toward building and strengthening connections among researchers through networking, resulting in increased South-South exchanges (as well as North-South exchanges). The study makes the important link between the successes of the projects and their understanding of the environment within which the research was taking place. Further, it highlights the importance of external factors to the success of research for development. In some cases where IDRC could not continue the work, local NGOs came forward and picked up the responsibilities on an ongoing basis.

As an example of the North-South exchanges which were generated, the presence established by Peruvian universities in local communities attracted researchers from various European organizations who, by partnering with local researchers supported by IDRC, were able to expand the teams and contribute to overall learning and results. In terms of South-South exchanges, leaders in the projects in Peru and Bolivia participated actively in various international network meetings and regional exchanges on Andean production systems. Through these exchanges, the project leaders influenced IDRC-supported initiatives in other Andean countries, such as Ecuador and Colombia. This demonstrates not only the relevance of the work to the people of the region, but also the critical importance of factors over which projects have no control -- a reality of much research for development work.

The full study provides considerable depth of data as well as case studies from some of the projects. This summary is intended to give an overview of the key findings and conclusions, but the reader is encouraged to go to the full study for more information, at <http://www.idrc.ca/evaluation/>. For those who cannot obtain access through the Internet, a copy may be obtained from the Evaluation Unit of IDRC.

Fred Carden, PhD
Senior Program Specialist
Evaluation Unit, IDRC

Introduction

Over the last 7000 years, complex systems of natural resource use have evolved in the extremely variable and harsh mountain environments of the high Andes of Southern Peru and Bolivia. The systems were based on local knowledge and production practices and included ecologically sustainable techniques and strategies for producing crops and animals such as potato, bitter potato, quinoa, kañiwa, tarwi, maize, guinea pigs, llamas, and alpacas.

The localized groups who had evolved these systems over many generations were eventually dominated by the Incas, several centuries before the arrival of the Europeans. The traditional systems of agricultural production have been moulded over time by these external influences and the reorganizations that have occurred within both the political and production systems. The Incas introduced greater social organization and constructed agricultural terraces and irrigation canals, relics of which exist to this day. In the 16th century, the Spaniards replaced traditional systems of rights to use the land and introduced private land ownership, which caused major changes in land distribution, access, and control. Further attempts at agrarian reform in the 1960s and 1970s were accompanied by social unrest.

Although the peasant communities have not always benefited from these interventions, they have shown a great capacity for adaptation to technical, social, and political changes. Farming communities have incorporated barley, wheat, beans, horticultural plants, sheep, cattle, swine, and horses into their product mix. These introductions, and their adaptation to local conditions and uses, substantially changed the agricultural landscape and the systems of natural resource management. During the last half of the 20th century, agricultural mechanization and the use of chemical fertilizers, pesticides, and herbicides have further transformed large parts of these Andean production systems. These new inputs have not been universally accepted or evenly spread. As a result, traditional technology has been maintained alongside commercial agriculture, especially under the conditions encountered in subsistence-oriented Andean peasant communities.

Many early efforts by development agencies to improve rural productivity through new, science-derived, agricultural technologies did not value traditional knowledge and were based on the belief that rural communities were inefficient and backward in their use of resources. Communication and education programs were promoted to disseminate technical information and motivate farmers to adopt "better" technology. That peasants did not have access to the total package of support required to take advantage of the new technologies, particularly institutional support in terms of credit and marketing services, was not perceived.

By the early 1960s, some researchers began to appreciate that peasant farmers, although poor, were efficient in their use of extremely limited resources particularly in the face of substantial risk of disastrous loss. These insights led to the design and implementation of rural development projects that incorporated the organizational change that was needed to capture the potential gains promised by more productive technology. Such projects had a strong focus on understanding and building on existing production systems as managed by resource-poor farm families and communities.

It was into this setting in the 1970s that IDRC sought to support research that could be applied to increase productivity in the traditional, highly complex, and culturally integrated production systems that had evolved in these mountain environments. To improve these subsistence production systems, the projects had to be seen as inputs into a long-term process of change, not discrete activities seeking only to obtain specific objectives and outputs.

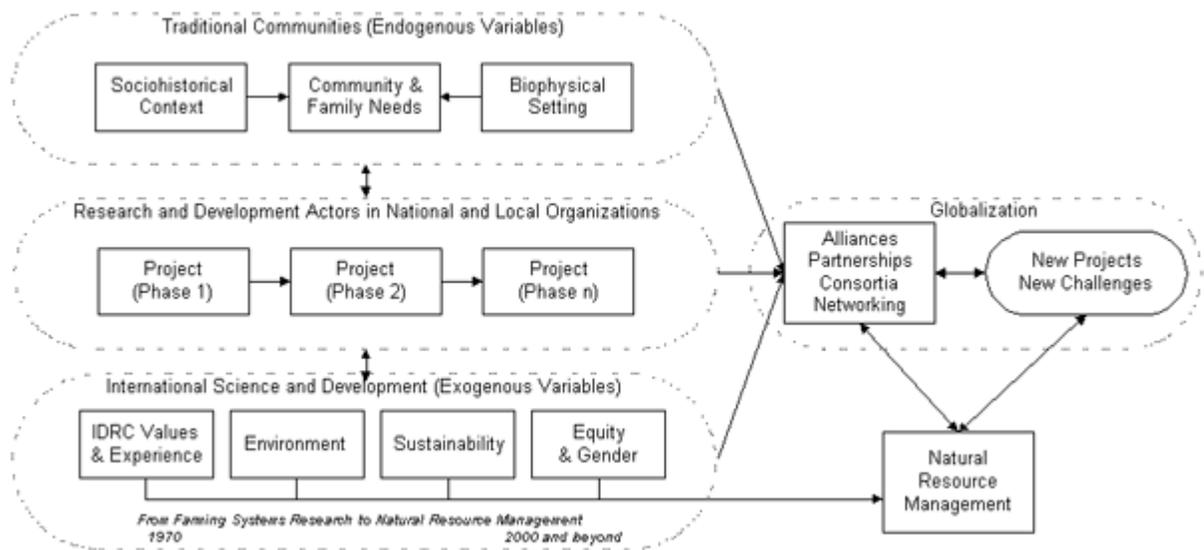


Figure 1. The range of endogenous and exogenous variables that influence projects conducted by local researchers. These variables have changed over time and resulted in new partnerships and alliances as well as changes in thinking at the international level. The partnerships now face new challenges that will be influenced by globalization and current thinking about natural resource management.

The researchers that IDRC chose to support had been strongly influenced by social movements that had their origin in the 1920s. These movements evolved as a series of intellectual, political, and social actions that sought to better understand and empower indigenous societies and validate their knowledge and practice. This change in thinking was in sharp contrast to the thinking of previous European interests, both the church and business interests, who had sought to subjugate and eliminate cultures and people who they considered inferior and impediments to obtaining wealth. By the late 1970s, researchers became interested in taking a more holistic approach to research on local production systems. The conceptual, cultural, and political roots of these scientists strongly influenced the results of IDRC-supported projects. At the same time, IDRC supported collaboration in its projects with the rapidly growing NGO sector, which sought to be relevant to surroundings societies, and explored ways to collaborate on service delivery.

IDRC's goal at the time was to develop projects that would benefit poor indigenous people who were living in communities that were only marginally linked to the market economies. Therefore, in Peru and Bolivia, the Centre sought like-minded researchers interested in working directly with farmers. IDRC found a few potential partners in the regional universities of Southern Peru and the National Agricultural Research Institute of Bolivia, which were beginning to establish closer contact with the societies that surrounded them. This institutional environment presented opportunities for IDRC-funded project personnel to eventually link university research activities in rural areas with the NGOs that were beginning to work in the same localities.

Figure 1 shows the range of factors that influenced the perspectives and thinking of the partners involved in the research IDRC funded. The primary concerns of the intended beneficiaries, the indigenous rural communities in the mountains of Peru and Bolivia, were their community and family needs, which were influenced by both the social and historical context and the local environment. Local researchers and national organizations were influenced by international research agendas and by social and political ideologies and movements that were on-going in the region. Over time and with experience, the practices and knowledge derived from these research projects has been absorbed into the thinking and practices of both the national and international research and development organizations and the rural communities. IDRC, a research for development organization, used its own experiences to help identify opportunities for change within the rural communities. However, IDRC was also influenced by external changes in developing thinking. The Centre's perspective has evolved from a concern for cropping systems and animal production systems, to integrated farming systems research, to concepts of natural resource management.

As these three groups have worked together over the last 20 years, they have shaped and influenced each others thinking and perspectives. Today, views are more international in scope, and problems of rural and agricultural development are considered more broadly in the context of natural resource management (NRM). The experiences and knowledge that have been accumulated suggest important issues for development practitioners to consider during project and program development.

Influences after Twenty Years

This review of projects in Peru and Bolivia focussed on IDRC-supported activities in agriculture, food systems, and natural resource management. The objectives were to understand the changes that had occurred since the end of project support and to determine what difference these projects had made. In some cases, changes could be linked to IDRC support. However, in many cases, cause and effect relationships were not clear.

Research methods for the study included five field visits that were designed to uncover traces and influences of work carried out 20 years ago. The information was collected from various sources: file review and document analysis; interviews with individuals who had been directly involved with the original projects; focus groups involving people who were participants in the original projects and subsequent activities; interviews with recent graduates of faculties of agronomy and animal husbandry; and visits to peasant communities. Data collection took place over a period of 10 months.

The study suggests that Centre-supported projects, and the thinking they encouraged, have expressed their influence in local communities, universities, governments, and NGOs. Influences can also be seen in the work of professionals and in the mechanisms that are now used to encourage sharing of information and improved collaboration within the region.

Farming Systems Thinking

Over the past two decades, thinking within IDRC about farming systems and natural resource management has changed and evolved. The Centre's original emphasis on production systems, while novel and innovative, tended to consider projects in a relatively contained way, almost as closed systems that assumed solutions to problems of income could be resolved mainly through improved productivity. This approach was characteristic of most Centre programs dealing with technology and technical change in the 1970s.

By the 1980s, IDRC staff began to challenge researchers to think more broadly about local communities and their production activities. Largely through IDRC support and influence, "systems" approaches and concepts were introduced to many of the region's research centres. Systems thinking was promoted as a better way to comprehend and approximate the production systems practised by peasant communities. This change in thinking brought with it a need to better understand local realities.

Researchers in the Andes began to recognize that research activities focussed solely on increased productivity, or even on increased total income, were ineffective in addressing the needs of local communities if they were based only on a single commodity and were limited in scope. In response, researchers in Southern Peru and Bolivia were supported by IDRC to develop educational, research, and promotion work that was carried out by interdisciplinary and interinstitutional teams. These teams worked in pilot communities on a variety of real problems that were faced by the farming communities. In this way, ongoing communication was established between the producers, extension workers, and researchers. This enhanced dialogue meant that farmers were presented with technologies adapted to their production systems and based on a clearer understanding of their changing needs and regional and national priorities.

Today, the notion of a "production system" has expanded beyond a combination of crops and animal husbandry used to achieve greater productivity. Crops and animals are a starting point in the chain of decisions taken by farmers and their communities, but they are only a single element in the expanded chain of market influences. Traditional production decisions that dealt with resources, weather, and inputs now must encompass what can effectively be produced beyond the necessities required by the rural family. The traditional rationale that considered only some elements in the process of making decisions and which was, in essence, a strategy of survival in a local environment, has evolved into a systems approach that must encompass many more factors. Therefore, not only has the notion of what constitutes a production system changed, but the scope of the components considered in such systems has had to be expanded.

IDRC

New values and concerns continue to evolve. For IDRC, they involved an evolution of thinking with respect to production systems along a continuum from cropping systems and animal production systems to the more integrated farming systems research (FSR) approaches, which included insights from the social as well as the biological sciences.

Most of the projects examined had quite specific technical objectives, but their overall goal was always stated in development-impact terms. Usually there was no indication of the linkages or pathways leading from the specific research outputs to the anticipated impact. Thus, the projects often ignored other essential actors and relationships. These connections were assumed to be implicit and, within IDRC, projects tended to be viewed as independent entities to be evaluated in development-impact terms rather than on the basis of their research findings contributing to the solution of development problems.

With the advent of new global perspectives and development challenges, IDRC sought creative ways to deal with the even broader issues of the environment,⁽¹⁾ natural resource management (NRM), and a focus on equity, in particular gender equity. This expanded horizon led to a greater understanding of the dynamics of the entire process of change, including technologies, and promoted a higher level of conceptual thinking in the form of NRM.

New challenges emerged in the projects as a result of this growing awareness of the complexities of NRM. As efforts increased to integrate new actors (in alliances, partnerships, consortia, and networking) into the scope of projects, they brought with them their own biophysical, sociohistorical, and community influences. With time, the range of interactions among partners increased. New IDRC-supported projects were also influenced by existing projects as actions and ideas shared and learned from past projects were applied to the experimentation in new ones.

Rural Markets

Rural communities have recently gained greater access to a range of development organizations and representatives of commercial companies. Access to outside markets, ideas, and supplies is no longer limited to a few middlemen, and the communities themselves have become increasingly monetized markets. Farmers traditionally save and plant their own seed; however, today seed may be purchased from a supplier by those who have adequate land and are less dependent on a subsistence livelihood. The poorest community members are still the least able to take the risks and make the investments needed to move into the world of commercial production. These changes mean that the decision-making challenge faced by the Andean peasant has become exceedingly more complex as has the challenge to organizations like IDRC that seek to devise and test viable and sustainable options.

Building on Local Knowledge

In the process of transforming production conditions, technological innovation represents a means rather than an end in itself. The projects supported by IDRC developed a broad dialogue between the knowledge acquired from experimentation and experience in other countries, the experiences of researchers in the Andes, and the knowledge and experiences indigenous to the high Andes.

Traditional communities continue to evolve, to adapt technologies, and to react to organizational opportunities and change. Any agency that wants to influence that process must be aware of, and participate in, a complex set of relationships and be around for a substantial time to understand how these relationships function. They must build on community values and interests if new ideas and values are to be developed, introduced, and adopted.

Many projects that introduced better technologies, plant varieties, and Andean livestock improvements would not have been possible without an appreciation of the local historical context. When IDRC supported its first projects in the region, social actors, development agents, and researchers had been influenced by the growing recognition of the value of indigenous knowledge. These individuals became the main partners of IDRC (as project leaders and participants) and in several cases also became IDRC program officers.

The value of understanding and appreciating local knowledge can be seen in the IDRC supported PISCA project (Proyecto de Investigación de Sistemas de Cultivos Andinos) in Peru. Before the start of this project, anthropology and ethnology studies had been carried out in the rural areas of the Andes. The same researchers worked in the diagnostic stages of PISCA and participated in multidisciplinary teams that identified a number of representative agricultural communities in which farming practices and community-related activities could be studied.

The rationality of traditional Andean agriculture, based on the management of diverse ecological zones, a wide dispersion of crop plots, and an ample diversity of species and plant varieties cultivated in each plot began to be recognized. Researchers saw that the goal of these traditional practices was to confront the elevated risk implied by agriculture in arid lands, on hillsides, and under generally adverse climatic conditions with risk of drought, frost, and hail. Researchers thus obtained a much better appreciation of the complexity of the problems faced by farmers. Just as important, they began to appreciate the problems that they would have to address when attempting to design and test potential technical improvements.

This insight into these complexities of indigenous production systems led the PISCA project leader Mario Tapia to propose a system of agroecological zones that reflected the special conditions that characterized the highly diverse mountain environments of the Andes. The foundations for the concept of agroecological zones, a combination of ecological and agricultural indigenous knowledge, were developed and initially tested during PISCA. These zones were based on climatic characteristics, altitude, and physiography as related to the plants and crop varieties grown by farmers. The system recognized farmers' perceptions and how they adapted to their environment and was based on terminology and concepts that were used by the farming communities. In 1995, Mario Tapia was awarded the Premio Nacional a la Creatividad (a prestigious national creativity award) for his IDRC-supported work on the agroecological zoning system and for his research on native Andean crops.

Provincial Universities in Southern Peru

As universities partnered with IDRC and other regional organizations, changes began to occur within some of the universities themselves. The focus of student theses and professional research papers was altered and changes took place in course orientation and content. The changes that took place usually responded to one or more of the following goals: to introduce a vision of an integrated system that included a more complete understanding of existing production systems; to integrate technical production aspects with socioeconomic considerations; to expand the curriculum of the agricultural sciences to encourage greater interaction and complementary programming in research and education; to achieve greater integration among university trained professionals, their research results, farming communities, the public agricultural sector, and regional authorities; and to expose university researchers and students to FSR research methodologies and provide training opportunities for young professionals and students.

The work in IDRC-supported projects to systematically document and understand the production practices of individual farmers and their communities was synthesized by university staff in the courses they taught in various disciplines. Eventually, courses were designed from a systems perspective and introduced into the curriculum of the faculties of agriculture at a number of universities. Several of the professors who developed such courses were invited to other universities to present their courses, and the outlines and content of several courses were published.

IDRC's contribution to expanding university research, course content, and training materials included: professional training of students in systems approaches and the support of field work carried out under the on-farm conditions in agricultural communities; support for professors in their research into the conditions of agricultural communities and provision of opportunities for visiting and exchanging experiences between Andean universities; and changes in the curricula of the faculties of Agronomy and Livestock.

Changes in curricula were addressed principally at the postgraduate level because the integration of ideas and a systems understanding assumes a base of knowledge and techniques normally presented in more basic training. The initiatives to modify the agricultural sciences curriculum toward an integrative systems approach tacitly corresponds with the objectives of the IDRC-supported projects. These changes provide substantial evidence of IDRC influence.

In other faculties, especially in the social sciences (Administration, Anthropology, Economics, and Sociology), the influence, rather than flowing from the projects to the universities, was from the universities to the project activities. Initially, problems of crops and livestock were viewed from the perspective of the faculties of agricultural and biological sciences. Once concerns broadened to production systems and peasant livelihoods, agronomists and other agriculture professionals increased their contact with social scientists and engaged the rural population in helping to define their research objectives. The researchers also gained a greater appreciation of the complex management decisions farmers must take in assessing whether the recommendations of the specialists from the universities would serve their interests.

Changing the universities was not a direct objective of the projects supported by IDRC, although aspects of university teaching related to production systems were expected to be strongly influenced. IDRC believed that university researchers and students could be encouraged and developed through support to applied research projects. As faculties of agriculture and social sciences finally began to work together in research and promotional work, contributions were made by various disciplines as they sought solutions to real-life problems faced in the pilot communities.

In most of the university courses, changes in curricula, focus, and structure took place gradually. However, at the Colegio Andino del Cusco, an autonomous graduate school, a holistic approach to various postgraduate courses was promoted from the beginning, particularly in the sustainable environmental management program. This program evolved from previous courses on Andean rural development and was developed by Annette Salis, a former researcher in the IDRC/CIDA supported PISA project (Proyecto de Investigación de los Sistemas Agropecuarios Andinos), and current Director of the Colegio. The courses that are now taught reflect the influence of the systems analysis approach promoted under the umbrella of IDRC-support in the region. The IDRC-related influence also reaches many organizations, local governments, and NGOs that hire graduates of the Colegio Andino to fill professional staff positions.

Communities

Specific impact and benefits to identifiable groups or communities is difficult and challenging to identify. Had the focus of the study been on one or two specific projects and been an in-depth look at the many linkages and pathways such impact entails, no doubt a variety of positive localized relationships would have been discovered. Specific measurement of development results arising from a research project and their attribution to an individual donor agency or development organization, however, is at best tenuous. Impact at the level of a family or community, to say nothing of a whole region, is normally the result of many influences drawn together by the target population within an historical background and ecological, cultural, and economic context. IDRC projects, even those purporting to take a systems or holistic approach, only dealt with a few such relationships at a time. Applied results depend on the interaction of many actors and influences working at various levels.

An important contribution of the projects was getting researchers out of the experimental stations and universities to become acquainted with the reality of the countryside and agricultural communities. This took the form of joint efforts organized between professors, students, and the families in communities, many of whom remember and value the experience of learning in the field about peasant agricultural production systems.

The influence of these projects is evident in recollections among community members. Peasants were encountered who remembered the names of PISCA personnel and located successful operations as well as abandoned constructions. Some of these community members work today with a local NGO, Centro para el Desarrollo de los Pueblos - Ayllu (CEDEP Ayllu) near Cusco, Peru, among whose members are previous participants of PISCA. Examples of lingering effects of projects in the nearby Sacred Valley of Vilcanota included the planting and use of eucalyptus, a nontraditional crop-production activity that was introduced by PISCA. In other communities, some of the older community members and

leaders remembered the names and participation of professionals, professors, and students from the IDRC-supported projects. The youngest members drew attention to terrace recuperation works and erosion-control ridges on neighbouring hillsides and to crop rotations. They indicated they had participated with their fathers in the construction of these land-forming activities. The director of a local NGO in Peru noted that the experiences with terraces, ridges, and crop association and rotation, as well as the assessment of Andean grains that had been carried out in the pilot communities, had spread to other communities in different micro-regions.

Another example of community change can be found on the Bolivian shoreline of Lake Titicaca. Here IBTA (Instituto Boliviano de Tecnología Agropecuaria) used IDRC support to evaluate and promote the introduction of greenhouses for family and community production of vegetables to improve the local diet and produce vegetables for sale in urban markets. CIRNMA (Centro de Investigación en Recursos Naturales y Medio Ambiente), an NGO in Puno received IDRC assistance to introduce lessons from the Bolivian experience to greenhouses in Puno and to continue support for the Bolivian work after the demise of IBTA. The Bolivia and Peru initiatives adapted this technology to local conditions and used construction materials that were easily available to small farmers.

The construction and organization of agricultural community service centres was an initiative that originated from the PISCA and PISA projects and was repeated in the different regions. At the time, the idea was to create a multipurpose infrastructure for seed storage, meeting rooms, and other services. The infrastructure that was built has served not only as a warehouse and focus for the organization of services in the communities, but in many cases has allowed the communities to access various types of support from the government and other institutions. In Puno, first aid, carpentry, a communal store, and a meeting hall are available in the facilities constructed under the projects. This is in sharp contrast to Quello Quello (in Cusco), where similar project-created facilities were abandoned. One interpretation of the reason for this difference is that in Cusco the facilities were intercommunal and perceived as part of the project, not as a shared responsibility between the communities. In the case of Puno, because the facilities were constructed by individual communities, a greater sense of ownership arose, both then and now, which links community members to the value of using the facilities communally.

Government

IDRC's influence is evident in public-sector agricultural extension and rural infrastructure construction activities. Previous IDRC-supported projects staff are now working in key positions in government programs that deal with watersheds and integrated rural development. These programs have developed collaborative relations with university faculties of agronomy and share a concern for natural resource management (NRM) and the environment themes promoted by IDRC.

One government program that reflects IDRC-promoted thinking is the Programa Nacional de Manejo de Cuencas Hidrográficas y Conservación de Suelos (PRONAMACHCS), which began in 1981 as a soil conservation program and was later given responsibility for the management of water and soil resources in inter-Andean valleys. A second example is the program for Natural Resource Management in the Sierra and Rainforest (MARENASS) that was begun in 1997 in the communities in Ayacucho, Apurímac, Cusco, and Madre de Dios. The program allowed communities to establish direct contact with the personnel of their

choice for technical assistance and for crop and livestock management training. MARENASS employs personnel that worked and were trained in projects supported by IDRC. Both of these government-supported projects have adopted an integrated approach to NRM that was fostered during earlier work supported by IDRC.

NGOs

During the internal unrest in Peru (1980-1995), NGOs proliferated in response to the difficulties in the countryside, which affected the research and teaching projects of the regional universities as well as the extension and technology transfer work of the public agricultural sector. The NGOs, despite working constantly in the crossfire of subversion and repression, were able to act with greater flexibility in this situation and received substantial external financial support.

This rapid growth of the NGO sector later led to the formation of thematic or regional consortiums through which many of these organizations were able to integrate activities and link with universities, public sector institutions, and businesses. The influence of IDRC projects and personnel involved with them is evident. For example, in Puno, collaboration and synergy exists between the Universidad Nacional del Altiplano (UNA) and Instituto Nacional de Investigación Agraria (INIA), and between CIRNMA (heir of the PISCA and PISA projects), the Centro Privado para el Desarrollo del Campesinado y del Poblador Urbano Marginal (CEDECUM), the Centro de Investigación Educación y Desarrollo (CIED), and the Cooperativa Americana de Remesa al Exterior (CARE). The learning and training behind this interinstitutional coordination dates from the experience gained in the projects supported by IDRC.

Work of Professionals

Professionals who participated in IDRC-supported projects in positions of responsibility continue, in one way or another, to work with concepts, models, and methods that were applied in the projects or acquired through associated training. Scientists who participated in the PISCA and PISA projects and are currently employed in the regional universities believe that the most important effect or influence of their involvement with IDRC is that faculty members now teach more appropriate material on the technologies that students are likely to encounter in the Andes. These scientists are using a systems approach in their work: in some cases in the classroom, in others in their continued contact with Andean communities, and still others in research. The systems approach is also applied to research not directly dealing with production, but related to planning, regional development, and anthropological studies.

In NGOs, universities, and private companies, traces are to be found of the professionals who worked in IDRC-supported projects. Adolfo Achata, who is now in CIED and worked in PISA, credits his involvement in the PISA project with his appreciation of the value of integration between research and development. Guillermo Zvietcovich worked in the postproduction projects of PISCA in Puno and assumed the overall coordination of the project in 1985. Together with his wife, Gloria Cornejo, who was also a project participant, Zvietcovich has created and developed an accredited quality control laboratory for agricultural and agroindustrial products in Arequipa. In addition, he has established an NGO, the Institute for the Defense of the Natural Environment (IDEMA), which promotes family gardens in periurban zones and organic or ecological agriculture in rural areas. Also in

Arequipa, Ignacio Garaycochea, who worked with the PISA team in the mid-1980s, now directs a company dedicated to alpaca fibre, meat, and skins production. In Puno, Arturo Vásquez, who joined PISA in 1987, is behind a number of organizations answering grassroots demands or requirements from CEDECUM. These are small companies that produce Andean or imported foodstuffs (e.g., milling, bakery, and leaf concentrates factory). Key researchers in the PISA project, Miguel Holle, Roberto Quiroz, and Carlos Leon Velarde continue their research at the Centro Internacional de la Papa (CIP) in the context of CONDESAN. Jorge Reinoso and Roberto Valdivia continue to play a leading role in development activities in the Puno region through CIRNMA, an NGO they created with a few other colleagues to continue the work initiated through IDRC and CIDA support. Many others could be mentioned, but these provide a sample of how project influence has spread.

Regional Sharing of Information

A key objective in most IDRC projects was to expose university researchers to FSR research methodologies by providing support to attend courses and publish undergraduate research theses. Information exchange was encouraged and supported by IDRC among researchers, students, and farmers.

To encourage sharing of information among farmers, the PISCA project collaborated with the Instituto Indigenista Interamericano to hold workshops for farmers from Peru and Bolivia in Puno and Cusco in 1983, and workshops for Peruvian and Ecuadorian farmers in Cajamarca in 1984. In addition, a meeting of the farmers participating in the PISCA project was held in Cusco in 1982. At the local level, many meetings, field days, and trips were organized during the PISCA and PISA projects.

IDRC also supported international conferences in the region. The first meeting on genetics and plant-improvement of quinoa was held in Puno in 1980 and attended by specialists from Chile, Bolivia, Canada, and Peru. An Andean regional meeting on genetic resources, held in 1981 under the auspices of FAO and IICA, also received partial support from IDRC-funded projects. Another significant IDRC contribution came through its support, in conjunction with other agencies interested in Andean Traditional agriculture, for the series of International Congresses on Andean Crops held between 1977 and 1994. These conferences played an important role in promoting research and genetic-resource conservation in a wide range of institutions in the Andes region and especially in the universities of southern Peru. IDRC support was also used to publish and distribute research reports and the proceedings of meetings. Since 1994, two further congresses have been held with support from other sources.

As a result of Centre support, the social actors no longer found themselves as isolated elements but rather as components of a complex organization of actors that formed a variety of alliances. This evolution is also seen in the changing relationships and partnerships in which the Centre participated. IDRC promoted and strengthened the concept of "networking" as one of its fundamental strategies. The approach has evolved to encompass a combination of relationships that include North-South transfers of funds and knowledge and South-South exchanges of knowledge and experiences. Two Latin American examples of this evolution are RIMISP (Red Internacional de Metodología de Investigación de Sistemas de Producción), a specialized network focussed on production systems research methodology, and CONDESAN (Consortio para el Desarrollo Sostenible de la Ecorregión Andina), a wide

consortium of organizations working on sustainable natural resource utilization and management.

IDRC also supported consortia to attempt to bring some order and greater user accessibility to the services that were available. With the plethora of organizations and agents seeking to develop and promote their own particular commodity or service approach, resources can be wasted and clients left confused by multiple offerings they may not fully comprehend or want. Any move to sustainable NRM, market development, and dealing with competition and unemployment means that organizations based on traditional systems are inadequate. Research and development work is still required in traditional areas of specialization, but responding to rural needs from a producer's perspective requires that packages be prepared that respond to many individual situations and problems not addressed on a speciality basis. No one organization can handle all this. Consortiums can form alliances that address issues on a broader basis than any one of the partners could achieve with their own resources and programming focus. Mutual interactions can be reinforced as can the capacity for beneficial influence, the possibilities for replicating successful experiences, and the benefit from mutual learning starting from the errors that should be avoided. The concept still requires further development, but IDRC support for work at pilot or benchmark sites, linked to a broader consortium of partners, is contributing to this learning process.

Lessons

Much has been learned through IDRC's project support for agricultural research in Peru and Bolivia. The overall impact or influence can be summed up in the mission given the Centre at its creation: build research skills; expand opportunities for indigenous researchers; and contribute to the search for solutions to development problems in the researchers' own societies.

Be Realistic

Causal relationships in research and development are notoriously difficult to ascertain and ascribe to narrowly focussed influences and actors, including funding agencies. A narrow technical approach is often followed as it appears easier to measure and ascribe results to than a broad multi-issue, multi-actor initiative. Yet, the results of a strongly focussed agenda are usually limited by many other development processes and actors. In the IDRC-funded projects that were reviewed, there is a continual play between a narrow technical approach and a multifaceted initiative and the broad field of possibilities in between. It usually took several phases of a project to establish a base and build the range of alliances necessary to affect change. By that time, direct claim of association with visible advances and any consideration of a directly measurable cause-effect relationship was rendered illusory. A different paradigm is needed to judge and value the contributions of any particular actor or organization to the economic and social changes inherent in development.⁽²⁾

Understand the Local Context

The projects examined were, for the most part, limited to agriculture and focussed on technology improvement; however, they were developed and managed in a way that permitted researchers to relate their work more broadly to needs in the local context, to identify local actors with whom to collaborate, to define new development challenges, and to collaborate in the analysis and interpretation of major problems. The work did not begin and end with the projects, but IDRC support facilitated greater impetus and scope in on-going efforts being made to acquire knowledge, test potential solutions, and build a much wider range of alliances and collaboration for change in Andean society.

Value Indigenous Knowledge

Several themes broached in a number of the projects anticipated developments that appeared in later research agendas and in growing international concerns for the environment. One forward thinking theme was the development of a broader awareness of the importance and potential of Andean products and animals, among them quinoa, alpacas, and guinea pigs and the indigenous knowledge contained in the systems that have evolved for their production. Another was the systematic collection, assessment, and maintenance of genetic materials in well-organized germplasm banks, which later served as the basis for a much greater focus on biodiversity and its importance.

Overall, the IDRC-supported projects focussed on specific topics related to valuing Andean products and knowledge with the effect of creating a development systems "school" oriented to research for development in the Andean context. This has left an intellectual heritage of a style of research and work that is defined through in-situ experimentation and, as a consequence, has added to the social capital of Peru and Bolivia. That IDRC has actively contributed to this social capital formation is recognized and confirmed by the many researchers who continue to work on topics such as recuperation of traditional technology, germplasm banks and biodiversity, and the socioeconomic and market forces that are irreversibly modifying the Andean context and environment.

Encourage Local Researchers

IDRC supported researchers in regional universities and local organizations that had a stake in the environment to be studied. Although establishing these relationships in rural areas was more difficult than working with universities or other research organizations in the capital cities, in the long run, the experience gained and capability that was developed has stayed in the region and continues to contribute well beyond the specific objectives of the original projects. This has provided a good payoff in the relatively weaker institutions of the sierra. In Cusco and Puno, in Peru, there are now two graduate schools that teach a systems understanding of rural development. Other universities in Southern Peru as well as in Bolivia teach farming systems courses based on manuals and course materials prepared in the context of the PISA and PISCA projects. Methodologies tested and applied in Social Science and policy work and graduate training for a number of key individuals in various disciplines are other products of IDRC support.

Develop Networks

Universities have not always been stimulated to become major agents and leaders of change. This task has fallen to other actors, especially NGOs and specialized technical development agencies, where alumni of the university-based projects have taken positions of leadership. IDRC-supported researchers established working relationships with NGOs because of their applied focus and close association with the target population, which facilitated participatory research. The projects that were developed stimulated partnering relationships between universities, NGOs, local groups, and international development agencies. The PISCA project and other IDRC supported work encouraged this type of multilateral collaboration on a local basis well before it became more common through networks and consortia.

Balance Participation and Accountability

IDRC followed a model of cooperation that differed from most other agencies and country programs. Instead of projects based on leadership by Canadian cooperants supported by local staff, management and direction of the projects was left in the hands of nationals who were supported by interaction with IDRC program staff and occasional specialist consultants. To some degree, this introduced problems with respect to methodology and implementation of specific objectives. However, it resulted in more direct assimilation of the research process and local concerns into the overall process of change.

This contrast in the IDRC approach was encountered in the PISA project, which was funded by CIDA. IDRC initially attempted to administer the project according to its normal collaborative practices. However, it ran into difficulties both with CIDA, in terms of accountability and reporting, and with INIA, the national recipient agency, where responsibilities were split between various groups without adequate overall authority to guide how project funds were allocated. After a critical review, IDRC changed its project-management strategy and introduced a highly qualified research team with a strong technical team leader. The result was much better analyzed and focussed technical results and improved relationships with CIDA because of closer adherence to project specifications, more precise and timely reporting, and improved cash flow. This shift came at the expense of producer participation and collaboration in development activities. Although the IDRC model of research support provides a positive example of effective collaboration and is excellent and creative for relatively small projects, on a large multi-million dollar project like PISA, a stronger directive hand may be needed to deal adequately with administrative and accountability requirements.

Introduce Gender Equity

The gender equity theme was only nascent in IDRC at the beginning of the period in which the projects were developed and almost non-existent in the Andean institutional and cultural context. As a result, little reference is found in the projects to gender equity. Currently, the Andean context is still predominantly male oriented and managed. But women play a strong role in almost all production and marketing activities, and this fact was recognized in many

projects that made explicit efforts to include women in farmer training courses and in university thesis studies in the pilot communities. Over half the farmer trainees in the PISA project were women. However, for cultural reasons few women were involved in the lead professions around which the projects were organized and this mitigated against a greater gender balance in research leadership roles. Although a basic awareness of this theme was present from the beginning, efforts to change the balance were passive, rather than active. The focus was on building capability, with no direct initiative to modify the structures that contributed to gender inequality. Nevertheless, a number of women, who received scholarships or worked in and were influenced by the projects, can now be found in senior leadership and research positions in the Andean context.

Include Environmental Concerns

After the 1992 World Conference on the Environment in Rio de Janeiro, many research and development organizations, IDRC included, turned their focus from agriculture and farming systems to a broader concern for the environment and natural resource preservation and sustainable use. Instead of a focus on production systems and income generation, research moved to another systems level in which concern for ecosystems, policy, and environmental protection dominated. Rural communities, agriculture, and food production were afforded much less attention except as production activities that had an impact on the environment. Impact is hard to determine at the farm and community level, but it is doubly difficult to measure in terms of human benefit at the ecosystem and environment level.

The notion of benchmarks, which has been applied in some more recent IDRC-funded projects, was inherent in the in-situ and on-farm experimentation supported in the Andes. The benchmark concept was adopted to show what could be accomplished after experimentation in a particular area was followed by extrapolation of the results to other homologous areas through modelling, in situ experimentation and testing, and dissemination programs. This benchmark concept can be applied as a framework to test and systematize experiences, record the dynamics of interactions, assess their replicability, and reinforce mutual learning just as on-farm research introduced similar functions in more limited confines in the past. Another useful approach to trying to determine impact has been to represent sets of key variables and their interactions in dynamic computer-based models similar to what was introduced in the PISA project and continues in the context of CONDESAN. While important, this approach still requires grounding in the reality of what goes on in the real-life interplay of actors, resources, and interests in given localities. More work is required to develop these concepts for measuring the benefits that accrue from projects at a broad environmental level.

Be Persistent

This review suggests that impact and reach should be characterized by durability. This concept suggests the need for influences to be sustainable and capable of assuring their own reproduction and continuity. Durability suggests that projects address the root causes of a situation not just the symptoms of a problem. However, this does not imply that there is a direct cause and effect relationship between eventual results and impact. The results of research projects help many actors, especially those closely involved in the problem situations, to identify opportunities to escape limiting conditions or do something about them.

It is difficult to identify durability in individual IDRC projects because they are time-limited and fundamentally concerned with research in which direct cause-effect relationships are difficult to identify. The output of the research only took on broader applied meaning within communities when it was combined with the efforts of other organizations and by farmers themselves. Where projects were executed under the rubric of "research for development," the array of disciplines involved, and the need for linkages and alliances were recognized, but only within the necessarily limited and focussed content of specific research experiments and projects. To address the causes of environmental degradation and underdevelopment, broad linkages must be established beyond the scope of any particular project or organization.

For changes to manifest durability in a qualitative sense, time is needed not only for the changes to be expressed, but also for consolidation to take place. An important question therefore is, over how long a time should support for research be continued? In many projects, a continuity was observed that some might interpret more as repetition and a form of perpetuating dependence on IDRC as a source of financing. In research, however, the time to fruition is intrinsically long and depends on numerous, repetitive experimental tests.

Research for development should be prolonged for a sufficient time to allow observable outputs to appear and to permit the identification of project-related influences. Continuing support is needed to facilitate new actions that further consolidate previous advances. This type of reinforcement is illustrated by projects that included graduate-degree programs and university research-related training.

Strive for Institutionalization

Many projects sought to institutionalize the research for development approach IDRC was promoting. Institutionalization in this case was seen as the adoption and application of the methods encouraged in individual projects within the structure of the recipient organizations. In most cases, this did not happen in the manner anticipated, especially in large government bureaucracies and universities. In consortia, alliances, and other coordination arrangements where assimilation did happen, individuals carried their project-gained experiences to new environments in other organizations. In this sense, the concept of institutionalization goes beyond consolidation of actions in a single organization to a process that leads to ideas and actions being integrated more broadly into research methods used by individuals in many organizations.

An example of institutionalization was observed in the relationships among organizations involved in the PISCA-related projects. Initially, relationships were established individually between IDRC, IICA, and the universities. As the projects and experiences evolved, the partners began to create networks and to view the group of universities as a network that included components with certain specializations. Interactions with government agencies appeared as did others with NGOs, producer organizations, and development organizations in other countries. This led eventually to the creation of a consortium in which NGOs, community organizations, and others were now seen as equal members or partners. What had been consolidated, or "institutionalized," was consensus and agreement on the efforts and approaches that were needed for development and change, or research-development activities, to become internalized among various organizations.

Work with NGOs

When IDRC started to develop projects in Peru and Bolivia, a large network of NGOs was being formed. The NGOs were not a condition or part of the IDRC support, which initially only sought alliances with the universities and with public agricultural research bodies. Today, NGOs are practically *sine qua non* for the realization of a wide variety of projects because they provide the organizational context needed to assure continuity. NGOs are to an important extent the guardians of the values that were introduced in the first IDRC-supported projects, which were developed without alliances with NGOs. With the passing of time, it was through the NGOs that the values and practices nurtured in the projects were converted into institutionalized values and the results of the projects were applied.

Future Challenges

Traditional societies cannot support their growing populations in the same manner they have used in the past. These societies have been far from static as they have evolved over time in response to outside influences and have taken on new technologies and practices that they deemed beneficial to their own interests and well-being. The problem is not that they will not or cannot adapt to change but rather that they react to the threats imposed by the rapidity of the changes. Rural societies often lack the knowledge, experience, and means to judge the degree of long-term risk implied in adopting changes offered to them through the many channels they now encounter. They are also stricken by poverty and cannot afford changes that have not been shown to be completely reliable in their specific set of circumstances .

The IDRC-supported projects studied were predicated largely on the entrance of peasants and their communities into a market economy where they could sell an excess that would result from increased productivity. This market entrance and expansion meant raising the image and value of traditional crops in a larger marketplace. In part, this has been accomplished, but the development of markets involves more than selling additional quantities of the same product. New and expanded markets require different product characteristics and greater homogeneity in product quality. For example, export markets for quinoa demand large white grains and an absence of any of the black hulled types often found in local markets. Traditional types are of various colours and smaller grains. Producing the types valued in

export markets is generally more expensive for the poorest small farmers because these varieties require greater attention and more inputs and may be more risky to produce. It is the relatively better off farmers who can afford to enter the higher value and expanding market sectors; whereas, the poorest with little land and few other resources become stuck in a subsistence risk-averse mode of low-level productivity.

The social changes that are under way are taking many people away from the land and their traditional community practices and social structure. Research and development is challenged to find ways to create alternative employment and income opportunities through such things as rural agroindustry, a wider range of rural and village services, migration to larger district and regional urban centres, and the creation of livelihoods under periurban conditions. All of these efforts are part of an ever-shifting range of conditions that are impacting on traditional societies and forcing them to modify their own beliefs and practices in response to the many external influences they encounter. In this context, there is a real challenge to identify and select research topics that have a true synergistic potential and that respond to the fundamental bottlenecks that are limiting positive change rather than deal only with the more visible negative symptoms of change.

Future research and development activities should not lose sight of their potential beneficiaries as they sift through the mass of interacting environmental and market-demand variables that demand attention in current projects. In many peasant communities, inhabitants are locked not only into a situation of prolonged poverty, but in a situation where strong cultural and traditional practices give them a sense of place and value. These groups continue to adopt some changes that appear to augment their capacity to produce adequate food (food security) and, to the extent possible, make available surpluses for sale in often adverse markets. A major objective for them is to avoid the risk of catastrophic loss. Some IDRC support has touched on this issue, but the results have not had a major impact on a beneficiary population's improvement or well being. Technical results that mitigate the most severe effects of production constraints such as frost, pests, or diseases in plants and animals can have a substantial effect even if yields are not greatly improved. If basic food-production risk is reduced, it provides greater freedom for producers to enter other enterprises and endeavours. These are the problems of the poorest members of rural societies. They are also the most difficult problems to address and upon which to show obvious impact.

In many agencies, IDRC included, the old themes of food and agriculture seem to have become passé. Is this partly the result of a sense or evidence that past agricultural systems oriented work was not effective and did not show adequately dramatic impact or influence? This review of past projects, especially those that exhibit continuity in other projects currently in progress, does not seem to support that impression. As agriculture per se was losing importance in IDRC, new initiatives appeared from a social sciences perspective and assumed a more general focus on environmental issues. Traditional interpretations of production systems were enriched by the inclusion of additional variables, which added a new perspective to efforts to understand these complex systems. The new initiatives often built on, or assumed, a knowledge base of variables established by the traditional economics and agricultural sciences. However, they added a concern for other variables such as an emphasis on the global economy, a growing concern for threats to the natural environment, an enhanced perspective from the social sciences in general, and attention to issues of equity, especially related to gender, in particular.

In conferences on Andean production systems, many organized with IDRC support, there has been a growing integration of the knowledge contributed by the agricultural and social sciences, although the former still dominate in the Andean context. For those who work on these themes and are in contact with rural people, the concerns for agriculture and food are not a thing of the past. They still represent important ways to create opportunities to improve the lives of the rural people they interact with each day.

This is not to suggest that IDRC should return to past priorities in its programming structure, only that they not be forgotten in a search for new "solutions." What is needed is an analytically strategic approach. As an example from current programming, conflict elements in access to and use of natural resources (especially land and water), and the mechanisms for conflict resolution, are being addressed within the experiences of several consortia that have arisen out of projects supported by IDRC. Of particular interest are the "round tables" or consensus groups being developed in CONDESAN benchmark sites such as those in Cajamarca (Peru) and El Carchi (Ecuador). The round tables are not only a manifestation of the positive character of alliances, they are a demonstration of the consensus needed to reach agreements on working together. These initiatives should be further developed in the context of testing and introducing methods that facilitate smoother and more equitable outcomes in the broader change process. Within this context, not only will actors learn how to resolve conflicts and common problems with which they are confronted, but these experiences will also serve as opportunities to learn how to carry out cooperative work to solve shared problems while keeping the interests of a broad range of beneficiaries clearly in mind.

New challenges lie ahead for IDRC and its partners. New perceptions and expanded concepts are required to move the models of social and productive interchange toward greater levels of maturity. Today's challenge is to reach for new degrees of interdependence without dependence, for new levels of internal democracy, and for greater efficiency, productivity, and equity in the utilization and protection of a vulnerable natural resource base.

1. Concern for the environment increased after the World Conference on the Environment in Rio de Janeiro in 1992 when IDRC was given responsibility for Canada's response.
2. Current research in IDRC on "Outcome Mapping" may provide at least a partial solution to this perennial dilemma.