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International Development Research Centre

The International Development Research Centre is a public corporation established by Act of the Canadian Parliament "to initiate, encourage, support and conduct research into the problems of the developing regions of the world and into the means for applying and adapting scientific, technical and other knowledge to the economic and social advancement of those regions, and, in carrying out those objects,

(a) to enlist the talents of natural and social scientists and technologists of Canada and other countries;

(b) to assist the developing regions to build up the research capabilities, the innovative skills and the institutions required to solve their problems;

(c) to encourage generally the co-ordination of international development research; and

(d) to foster co-operation in research on development problems between the developed and the developing regions for their mutual benefit."

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Annual Report 1976-1977
International Development Research Centre

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INTERNATIONAL DEVELOPMENT RESEARCH CENTRE

CENTRE DE RECHERCHES POUR LE DEVELOPPEMENT INTERNATIONAL

LOUIS RASMINSKY
CHAIRMAN

BOX 8500
OTTAWA, CANADA
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July 29, 1977

The Hon. Don Jamieson
Secretary of State for External Affairs
Ottawa, Canada

Dear Mr. Minister:

I have the honour to transmit herewith the Annual Report of the International Development Research Centre for the fiscal year ending March 31, 1977 for submission to Parliament as required by section 22 of the International Development Research Centre Act (Revised Statutes of Canada, 1970, 1st Supplement, Chapter 21).

Yours very truly,

L. Rasminsky

Louis Rasminsky
Chairman

Introduction

The year under review, April 1976 to March 1977, has been an active one for the International Development Research Centre, and one during which the Centre has seen a number of its initiatives come to fruition.

The IDRC played a key role in the establishment of the International Centre for Agricultural Research in the Dry Areas, and was instrumental in bringing together a group of donors to establish the International Council for Research in Agroforestry, which will begin operations in the near future. Both these institutions are aimed at filling vital gaps in the research capabilities of the Third World.

The Centre also continues to make a major contribution to the establishment and expansion of international information systems in fields such as agriculture, rural water supply and sanitation, and development sciences — systems that will provide for a worldwide exchange of scientific information.

What follows is a brief review of some of the research supported by the IDRC during the past year — new projects, continuing projects and completed projects. First, however, a few facts and figures.

During the year the Centre's international Board of Governors approved 137 new projects requiring a total appropriation of $26.7 million — a considerable increase in activity over previous years. The Agriculture, Food and Nutrition Sciences Division undertook 55 new projects totalling $12 million; the Social Sciences and Human Resources Division 25 new projects costing $5.7 million; the Health Sciences Division 29 new projects for $4.1 million; and the Information Sciences Division 21 new projects for $4. 5 million.

A further $1.9 million was committed during the year in support of 216 Division Activity Projects — seminars, workshops and consultancies that are usually preliminary to the undertaking of a full-scale project. The Centre also continued to invest heavily in the training and development of young Third World professionals through its Human Resources Award program, which made available 87 grants totalling $1.8 million.

During the year 42 projects were completed, bringing the total number of projects completed since the Centre opened its doors to 94. In addition, many projects have now entered a second or even a third phase, as researchers continue to build on the results of earlier years.

Agroforestry — the combination of crops, trees and animals on the same piece of land — is one area in which the Centre is concentrating its research support.

There have been several changes in the membership of the Centre's Board of Governors, including the welcome return of Mr Maurice Strong, who was a member of the Centre's original Board in 1970. Dr Louis Berlinguet, former Vice-Chairman of the Board and Chairman of the Executive Committee, relinquished these positions to take up the new staff position of Senior Vice-President.

There have also been a number of changes among the Centre's senior staff. Dr Lucien Michaud left his post as Vice-President, Canada and Donor Relations, to become President of Laurentian University. Cheik Hamidou Kane returned to his native Senegal to take charge of the redevelopment of the port of Dakar. His post as Vice-President, International, is now held by Mr Nihal Kappagoda of Sri Lanka, formerly the Centre's Regional Director in Asia. Mr Jon Church was appointed to the new post of Vice-President, Administration. A full list of the Governors and Officers of the Centre is included elsewhere in this publication.

A considerable proportion of the Centre's headquarters staff are Third World nationals, and the majority of the staff of the five regional offices are drawn from the regions they serve. The regional offices — in Bogota, Cairo, Dakar, Nairobi, and Singapore — are vital to the Centre's operations. They are in the front line, maintaining essential contact with the governments, research institutions, universities, research workers and scientists of the developing countries, and providing the communications link to ensure that the Centre's priorities remain relevant to the needs and aspirations of the nations of the Third World.

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Land and People

Two-thirds of the world's surface is covered with water. On the remaining one-third — an area of about 57 million square miles — live some four billion human beings. Man may venture onto the sea, or under it; he may fly in the atmosphere or beyond; but he must return eventually to terra firma. Like it or not, man's home for the foreseeable future is here on dry land. This is man's habitat — it is our common ground.

Habitat was the name given to the United Nations Conference on Human Settlements in Vancouver last year. Much of the emphasis at that conference was on the problems of the cities, but there were those who pointed out that virtually all humans live in settlements, and that the majority of these are small towns and villages in the rural areas of the developing countries. And what happens here in the rural areas of the world determines to a large extent what happens to the cities in the future.

Many of the problems of the cities, especially in developing countries, are the result of mass migration from the rural areas. All over the world people are leaving the land, moving from the villages and towns to the cities in search of a better life, with the result that already overcrowded cities become impossibly congested. Growth in city population far outstrips the city's ability to provide for its inhabitants. The word "megalopolis" has entered the language — by 1985, according to economist Barbara Ward, there will be 273 cities with populations of more than one million, and there will be 17 with populations of more than 10 million. The possibility of urban collapse is very real in many of these centres; and as the problems encountered by New York City dramatically demonstrated during the past year, the dangers are by no means limited to the Third World. We are on common ground.

Some countries have made attempts to persuade, or coerce people back to the land, to resettle them in new communities away from the cities. Such solutions at best can only be partially successful, and in any event they beg the real question: why are the people leaving the rural areas to move to the cities? And its corollary: what can or should be done to make people want to stay in the small towns and villages?

The answers are many, complex and as yet incomplete. At risk of over simplification, they can perhaps be summed up in a simple statement: if people are leaving the rural areas in search of a better life, then one solution is to make life better in the rural areas. As in good medical practice, the solution ultimately lies with prevention rather than cure.

A resettlement project in Malaysia — one solution to the problem of overcrowded cities is to improve life in the rural areas.

If conditions are to be improved for rural peoples, one of the basic requirements in many countries is land reform. When the farmer and his family have security, they are less likely to want to leave the land.

The redistribution of land, however, does not automatically solve all the problems; often there is also a need for organization, instruction and, above all credit, so that the small farmer can make the most of his land. The government of the Philippines has undertaken a unique project to ensure that these factors are not neglected in the national land reform program.

Small farmers are encouraged to form village associations, to which they contribute a small portion of their incomes as savings, and through which they receive training in modern farming techniques and cooperative organization. Only when it is ready is the association transformed into a "cooperative" under the management of a full-time government official. To retain their membership, farmers must continue to contribute savings and practice modern farming. Membership is important, because only members can obtain credit and participate in the land reform program.

For the past three years the IDRC has been supporting an evaluation by the University of the Philippines of the impact of the program, with the objective of making it more effective and efficient. The evaluation, now completed, has been a major undertaking. There are some 15,000 village associations in 40 of the country's 68 provinces. Some 8,000 people were interviewed nationwide to obtain comparisons between those provinces participating in the land reform program and those that are not. Preliminary reports indicate that the evaluation will benefit not only the country's 600,000 small farmers, but also their counterparts in other countries where the program's progress is being closely followed.

Such reforms, and other attempts to modernize rural areas in developing countries, inevitably have an effect on the traditional ways of life of the rural people. Concerned that any negative aspects of such change should be minimized, the Centre is supporting a number of projects in Africa and Asia that examine the processes of modernization and change and their impact on the lives of rural peoples.

Researchers in Indonesia and Malaysia are studying the effects of technological change on rural communities. In Kenya social scientists are seeking ways to bring about greater cooperation and understanding between central government planners and active local communities that are

attempting to bring about development through their own efforts. And in Nigeria, where the federal and state governments are restructuring the local government system inherited from the colonial era, a Centre-supported study was completed during the past year (see box).

Whatever plans governments may devise to speed the development of their countries, however, their implementation depends in large part on the efficiency and honesty of the bureaucracy. Yet little is known about either the extent or the effect of "negative bureaucratic behaviour" on development efforts.

The countries of Asia are concerned to find out, however, and in 1975 the Centre approved a grant to three governments that had requested support for a pioneering study of negative behaviour within their own bureaucracies. News of the study generated considerable interest in the region. Within a few months two more countries joined the original three, and during the past year proposals were received from five more, bringing the total number of participants to ten.

Nigeria's chiefs are more than a tradition

The rapid modernization of rural areas requires the active participation of all the people, and such participation requires an efficient system of local government. Aware of this need, the Nigerian government has in recent years given priority to restructuring all levels of government.

A determined effort is being made to design a new system of local government that will incorporate the best of what is traditionally African, and provide a link between the federal government and the country's 55 million people living in 19 States.

As part of that effort a team of researchers from the University of Nigeria at Nsukka recently completed an in-depth two-year study of local government institutions in three states. With the support of an IDRC grant, the researchers set out to determine the effectiveness of various traditional forms of local government, their impact (or lack of it) on development programs, and what the people thought about them.

Some of the study's conclusions were surprising. For example, 90 percent of those interviewed favoured retaining the rule of the chiefs, even though they were aware that not all the chiefs were genuine, and that some had actually usurped their power. Many saw the chief as a sort of "father figure" whose authority held the community together and guaranteed the continuance of traditions. The researchers, however, felt that the chiefs should be more than mere custodians of tradition, and recommended that they be given an important role to play in the process of modernization, with political, socio-economic and judicial responsibilities.

The role of the modern chief was just one of the recommendations put forward by the University team, some of which have been rejected, but many of which have already been incorporated into the government's plans, a fact of which the researchers are justifiably proud.

Nigeria is one of the largest and most populous African nations. Its attempts to restructure and revitalize government at the local level are being closely watched by other African nations. And the knowledge gained by the Nsukka study will be shared by researchers in Africa and Asia who make up a network of Centre-supported projects concerned with the process of modernization and change in rural areas.

The studies, lasting two years, will begin by identifying and analyzing negative bureaucratic behaviour, which for this project is defined in terms of legal not moral criteria. The researchers will also study the differences between what is socially acceptable on the one hand, and what the law considers to be acceptable on the other. Finally, they will estimate the social and economic costs, and especially their effect on development programs.

Farming is naturally the primary occupation in rural areas, but there is also a need for alternative or supplementary sources of income and employment. Many developing countries are looking to small-scale industry to provide this alternative, but even where traditional industries already exist, they are all-too-often inefficient and poorly managed, and would benefit from expert advice. This is the role of TECHNONET Asia, a network of 11 organizations from nine Southeast Asian countries that was formed in 1973 with IDRC support, and entered its second phase during the past year.

Through a monthly newsletter, a technical information service and, most important, the training of a cadre of industrial extension officers who can respond to requests for assistance from small industries, TECHNONET is providing an important service for Asian industries, many of them in rural areas. During the second phase there are plans to expand the training program and "Asianize" the technical information service so that the network will be completely autonomous by 1980.

Another Centre-supported project in Asia concerned with the promotion of small-scale industries has just got under way. Researchers in seven countries will take a close look at government programs in support of small manufacturing enterprises, including financial and technical assistance, training and extension activities, and coordination among different agencies in the field.

Basketweaving in the Philippines — small-scale industries like this one can benefit from the services provided by TECHNONET Asia.

IMPACT system helps spread the load

"Our concern is not with schools, it is with the education of our children." That simple statement sums up the concept behind an innovative attempt to provide universal primary education in Southeast Asia without the crippling costs normally associated with such an objective.

The scheme is called Project IMPACT. It began in 1974 at two separate rural locations, in Naga district in the central Philippines and near Solo in Indonesia. This experimental approach to the problems of mass education is being undertaken by the Southeast Asia Ministers of Education Organization (SEAMEO) through INNOTECH, the regional Centre for Education Innovation and Technology.

Peer group teaching in a village school — the IMPACT system allows children to get an education and help on the family farm.

Self-instructional booklets developed by the research teams and known as "learning modules" are the key to the IMPACT system. These modules follow the normal syllabus for Grades 4 to 6, but divide the learning into booklets covering about 3 to 5 hours work, and contain tests which are checked by a tutor or teacher.

Each child proceeds at his or her own pace, and is free to obtain help from parents or friends, older students acting as tutors, or teachers. To a large degree the children in fact teach and test each other. Comparative tests in both countries have shown that IMPACT students score higher than their counterparts in conventional schools.

The five schools at Naga and four near Solo have been transformed into learning centres — part library, part testing area, part administrative centre. Most of the studying is done outdoors, and the flexible system allows students to fit family duties into their schedule, so that in theory no child need "drop out" because of irregular attendance. The IMPACT system in fact tackles the issues of out-of-school youth by suggesting that they are not a separate category, but can catch up with studies at any time. Experiments with "learning posts" in village homes have also helped draw some out-of-school youth and even a few adults into the system again.

On the economic side, the system has spread the teaching load so that a school of 280 students that used to employ 10 teachers is now run by three or four instructional supervisors (the new name for teachers in the IMPACT system). This saving is one of the project's major achievements, and the teachers have shown remarkable adaptability in adjusting to their new role.

The second phase of Project IMPACT will not be completed at Naga and Solo until 1979, but it has aroused such interest in developing countries that the IDRC is preparing a booklet for publication in 1977. Entitled *Project Impact*, it will describe the progress of the first three years of the experiment.

In each country a minimum of 100 manufacturers — in sectors such as textiles, leather and wood products — will be asked about their experiences with government programs, as will the agencies concerned. The researchers will also look into the broader question of the place of small enterprises within national development programs. Care is being taken in this project to use common methodologies so that a comparative evaluation can be made at the end of the study.

The promotion of small-scale industry is accepted as an important development objective in many Third World countries; the study should yield findings that will assist in developing policies to meet that objective

Another project in the field of science and technology research that could have broad application is now underway in Mexico. Its aim is to pave the way for the rational development of technologies that will be of real benefit to poor rural communities. The problem of relating appropriate technology to rural development is a complex one. The Mexican project is a pilot study that will begin by examining past experience in the field, and defining criteria for measuring the success, or failure, of a particular innovation.

It is a field which there is a great deal of uncoordinated activity, but there have been few attempts at an overall evaluation of such activities. This Centre-supported project, which is an integral part of a larger study of the rural economy being carried out by Mexican researchers, should help to provide some guidelines for planners, not only in Mexico but also in other countries concerned with linking new forms of technology to the problems of rural development.

Industry and technology, even on a modest scale, usually require some form of energy. There is little likelihood, however, that electricity can be made widely available in the rural areas of developing countries in the foreseeable future. The search for alternatives is complicated by the fact that surprisingly little is known about present or future energy supply and demand in rural areas. The government of Fiji, for example, plans to introduce rural industry to the islands, but is hampered by an almost total lack of information about rural energy supply.

Now a research team from the University of the South Pacific, supported by an IDRC grant, is surveying rural communities in selected areas to establish what are the present and future energy needs in the islands. As part of the project the researchers will also study alternative energy sources, with special emphasis on the feasibility of biogas production using waste vegetable matter.

The one-year study will also examine possibilities for local manufacture of plant hardware for new energy production, and will look into the sociological implications of any changes that may result from new energy supplies. To ensure contact between the project and the policymakers, an advisory committee has been set up consisting of both government and university experts.

Another reason families move away from rural areas is to seek better educational opportunity for the children. To provide a school and teachers for every village is beyond the resources of most countries, so the children must often travel long distances on foot in order to attend a school that is probably overcrowded and understaffed. Many of them never complete the primary grades, and only a tiny percentage pass through the secondary school system.

Since 1973 the Centre has been supporting Project Impact, an exciting experiment in the delivery of mass primary education in Indonesia and the Philippines (see box). This project, which entered its second phase during the

past year, has attracted considerable attention from educators in other developing countries, many of whom have visited the project sites over the past two years. As a result of one such visit the Centre received a proposal from the government of Malaysia for a project that would build on the achievements of the Impact experiment and determine if such a program could be replicated in a different social and cultural context.

The project, which was approved for funding at the end of the past year, is aimed primarily at improving the quality of education for children in rural areas, while at the same time reducing costs. It will become part of the Malaysian government's concerted program to eradicate poverty and provide educational equality throughout the country.

With education comes the need for information. In most developing countries newspapers circulate in the cities and large towns. Where they do penetrate to the village level they are often already dated, and in any case contain little that is of direct relevance to the rural people.

The need for a special kind of news media for rural areas was recognized at a seminar in Bali, Indonesia, in 1975, attended by communicators, publishers and policymakers from Asia and Africa. Such media should be able to report relevant news about science, technology and development in suitable language; to serve as an outlet for the views of rural people; and generally to provide a vehicle for non-formal adult education.

The Asian Mass Communications Research and Information Centre (Amic), one of the co-sponsors of that seminar, has recently begun a follow-up project with the support of the IDRC. In the early stages Amic will study past and present experiments in operating rural news media, and assess the type of print media best suited to rural areas. The second phase will be a feasibility study on establishing an experimental development-oriented newspaper in a typical Asian village. The studies, the first of their kind, will be carried out in India, Philippines, Sri Lanka and Thailand over a period of 18 months.

Land tenure, essential services, good government, education and varied employment opportunities all contribute to a better standard of living. These are some of the "social" needs of people in rural areas. But life for rural peoples can never be secure so long as they are subject to the scourge of tropical diseases, the hazards of environmental degradation and the vagaries of the elements. What can be done to improve these aspects of rural life in the Third World is the subject of the next section of this review.

Water and Health

The close of the year under review saw another United Nations symposium — the Water Conference in Mar Del Plata, Argentina. That gathering focused on what had earlier been a major concern at Habitat: the need for fresh, clean water — for drinking, for washing, for irrigation — and the fear that water supplies, far from keeping pace with population growth are actually diminishing.

Again it is the rural areas in developing countries that are in greatest need, and it is here that the IDRC has been placing increasing emphasis in the past two years. The question of water supply, however, is a complex one. The installation of a pump or a well in a village does not of itself guarantee that health conditions in the village will improve. Lakes created by large scale irrigation dams can result in the spread of water-related diseases. And excessive irrigation can lead to the salination and waterlogging of irrigated areas, rendering them unfit for farming.

Water supply, then, must be considered not simply in terms of making more water available. It involves a whole range of disciplines — environment, health, hygiene, sanitation, appropriate technology, water management and use, education and training, and socio-political questions. It is in these areas that the IDRC is concentrating its research support.

One aspect of the water supply problem is technology. At the village level that usually means a hand pump, and the problem with hand pumps is that they very often don't work, largely because they are not designed for the type of intensive use they are getting. What is needed is an inexpensive, reliable pump that requires little maintenance and can be manufactured locally rather than imported. It might seem a simple requirement, but the fact remains that hand pump design has changed little in 100 years, and such changes as have taken place have been piecemeal modifications.

At the University of Waterloo in Canada a concerted effort is underway to design prototype pumping systems specifically for use in developing countries. The research team, supported by an IDRC grant, is concentrating on reliability under strenuous use, simplicity and low cost. Complete prototype systems will be supplied to researchers in developing countries for field testing and possible local manufacture. In addition the Waterloo team will develop a uniform guide for pump testing in order that an accurate assessment can be made of a pump's performance under conditions of actual use in rural areas.

Water supply in the marketplace at Blantyre, Malawi — what is needed is an inexpensive, reliable hand pump.

The same principles apply to another water technology project supported by the Centre, this one in Peru, where an evaluation of a new simplified water treatment plant is being undertaken. The plant is one of three developed by the technical assistance arm of the PanAmerican Health Organization (PAHO), which is concerned with making water treatment plants available to smaller communities in developing countries by reducing operation, maintenance and import costs to a minimum.

The experimental El Imperial plant in Peru incorporates a simplified technology that eliminates the need for pipes, pumps and any type of mechanical equipment. Only one part, the pressure feed chlorinator, is imported. The evaluation involves collecting extensive data on the plant's operation, programming the data through a computer to test the plant's efficiency, and determining what further modifications are needed so that construction and operation costs can be reduced still further.

For the really small community, however, the problems are more basic. In Nigeria an estimated 70 percent of the people live in communities with less than 1,000 population. Perhaps 10 percent of these people have access to "safe" water supplies — and because it is easier to provide water to larger communities, they have usually been passed over in water supply programs. These smaller settlements are the target of a project just begun by the University of Ibadan with the support of the IDRC.

The aim of the project is to devise appropriate technical and management strategies for improving water supplies at the village level. Since the availability and quality of water vary widely over the country, the multidisciplinary research team will operate in three representative areas. They will survey individual households and community leaders in 40 settlements to come up with a detailed analysis of existing water supply and use, related health factors, and the success or failure of any previous attempts at improvement. The survey will also provide field training for students from the University.

The data gathered will provide the basis for a proposed second phase of the project, which would lead to the development of alternative methods of improving rural water supplies. In view of the wide range of environmental conditions to be studied, the project could have application in many other African countries, and the Nigerian researchers have already established contact with other African researchers who could possibly become directly involved at a later stage.

Improved water supply alone will not yield full health benefits, however. Equally important is the safe disposal and treatment of wastewater and sewage, yet this is an area largely overlooked by both governments and donor agencies in developing countries. Most Third World nations cannot afford the high construction costs of conventional sewage disposal and treatment systems that are taken for granted in industrialized nations. Low-cost alternatives must be found for the traditional systems that pollute natural ground and surface waters and provide breeding grounds for disease-carrying insects and parasites.

In Tanzania, Ghana and Botswana the Centre is supporting research seeking such alternatives. Although the three are separate projects, their objectives are similar in many respects, and they comprise an informal network of researchers linking the different regions of Africa. Their common objectives include the study and adaptation of existing technology and methods, and the dissemination of information based on their findings — both nationally and internationally.

The IDRC was instrumental several years ago in bringing together a number of international organizations to form the Ad Hoc Working Group for Rural Potable Water Supplies and Sanitation, with the aim of promoting

Pond power!

Sri Mrisa is the president of the Biraharekrishnapur village council in the east Indian state of Orissa. He is very proud of the village's three fishponds. Until about a year ago the ponds were used for drinking water, washing, laundry, and some fish harvesting. On an average year the fish taken from the ponds brought in about 1000 Rupees. This year, says Sri Mrisa, the fish harvest brought in more than 22,000 Rupees.

The reason for the sudden dramatic increase in both the quantity and quality of Biraharekrishnapur's fish can be summed up in one word: polyculture. Fish farming has long been a tradition in rural India, but the traditional use of only one fish species in a pond resulted in poor yields, usually about half a ton per hectare of pond annually. Scientists at the Central Inland Fisheries Research Institute (CIFRI) found that polyculture — a combination of species with different feeding habits — plus proper pond fertilization and management, could produce a tenfold increase in yields.

These experiments however, were carried out under controlled conditions in the Institute's own ponds. Would they produce the same results in remote villages? CIFRI approached IDRC for a grant to fund a demonstration and testing program in Orissa and West Bengal. Biraharekrishnapur was one of the villages selected.

The first step was to clear the ponds of unwanted fish, using an inexpensive locally developed process that works within 24 hours. Then the ponds were re-stocked with six species of carp — the Indian carp Catla, Rohu and Mrigal, and the exotic Silver, Grass and Common carp. Some are surface feeders, some column feeders and some bottom feeders. The ponds were fertilized once a month with manure and superphosphate. The villagers were entirely responsible for stocking, fertilizing and managing the ponds — CIFRI provides only technical advice and encouragement.

At the end of the first year the yield was 3.5 tons of fish per pond hectare — a success story that has been repeated in dozens of other villages in the two states as the CIFRI teams move on to a new set of villages each year.

Perhaps the most encouraging sign is that the villagers almost invariably opt to plough the extra money back into the community. In Biraharekrishnapur they will no longer have to use the ponds for drinking and washing water — Sri Mrisa says the 22,000 Rupees will be used to sink a 150 foot well and pump up clean, fresh water.

improvements in this important field through a global program of information, education, research and training. The Centre also agreed to become the Group's "lead agency" for information activities.

In Peru the Centre is supporting research at CEPIS (the PanAmerican Centre for Sanitary Engineering and Environmental Sciences) to develop plans for a regional information system with special emphasis on rural water supply and sanitation, to serve Latin America and the Caribbean. Once operational, such a system could well serve as a model for a specialized global information network that would be an essential component of the Group's overall program.

The need for information and education is paramount if health is to be improved in rural areas. It has been observed that parasitic and infectious diseases such as hookworm, typhoid, cholera and dysentery persist in small rural communities even where a supply of pure water is available. The problem is poor hygiene — water becomes contaminated when stored in unsanitary containers, and diseases are passed quickly from one family member to another if basic preventive measures are not taken.

In Guatemala a team of researchers supported by the IDRC is studying the domestic routine of families in such villages. They hope, by winning the confidence of the people, to be able to isolate the cycle of contamination and infection — a cycle that results in a staggering 96 percent of the people in some areas being almost continuously subject to debilitating disease. If they succeed, their findings will enable other researchers to detect similar health risk situations, and to develop programs of sanitary education tied to water use in the home that will break the cycle of disease.

Funding was also approved at the close of the year for the establishment of a six-country network that will link Africa, Asia, Latin America and the Middle East in a study of wastewater disposal. The six projects will concentrate on the potential of stabilization ponds in the treatment of wastes, and the possibility of making sewage disposal profitable by using the ponds for fish production.

Aquaculture, or fish farming, is a traditional practice throughout much of Asia. Fish are often raised in community ponds that also serve as a supply of water for washing and drinking. Such systems are obviously inefficient in many respects. Properly maintained and stocked ponds are capable of producing far larger quantities of fish — and providing money to pay for a clean water supply, as happened in one Centre-supported project in India (see box).

The Indian project is part of a network of aquaculture projects the Centre is supporting in Asia. The most recent of these is in Singapore, where the government is making a determined effort to reduce the island's dependance on imports for 75 percent of its fish by developing intensive fishculture systems. The project will concentrate on management and disease control, induced breeding techniques, and the development of fish feed technology.

The success of the three-year project could have far-reaching consequences for the development of aquaculture in the tropics, especially in island communities.

Another field in which India and Singapore share a common concern is that of population. Too many people place too great a strain on water supply and sanitation systems, as well as other vital resources. Not surprisingly, both countries are leaders in the field of family planning and population research. In recent years the IDRC has supported a series of studies of Singapore's population policies, and this year approved a grant that will enable Indian scientists to continue development and testing of an experimental contraceptive vaccine.

The vaccine, developed entirely by Indian scientists at the All-India Institute of Medical Sciences, has been hailed by Western scientists as a "major breakthrough in biomedical research". Further testing is vital, however, and

Tropical diseases can be beaten

It is estimated that about one million children die of Malaria in Africa each year.

Fifteen years ago there were about 60,000 known cases of malaria in India. In 1975 there were about four million. In Africa about one million children die of malaria each year, and about one adult in four suffers from malaria fever at some time. Worldwide there are about 200 million malaria sufferers.

What has happened is that the parasites that cause the severest form of the disease have developed resistance to the major anti-malarial drugs, and the mosquitoes that carry the parasites have developed resistance to many insecticides. It is a deadly combination. Dr Adetokunbo O. Lucas, former president of the Nigerian Medical Research Council, says that the disease is now so deeply entrenched in the environment in some parts of the world that insecticides and drugs have no real effect.

Dr Lucas is optimistic, however, that malaria and other tropical diseases that affect a total of one billion people in the Third World, can be beaten. He now heads the World Health Organization's Special Programme of Research and Training on Tropical Diseases, an internationally funded cooperative effort that for the first time puts research into tropical diseases on something like an equal footing with other fields of medical research.

The concept of such a program was enthusiastically endorsed by members of the World Health Assembly early in 1975. The same year the IDRC, as one of the earliest supporters of the idea, was instrumental in bringing together groups of scientists to assess the current global research capacity and to develop the specialized task forces that are the Programme's front line weapons.

There are several of these task forces — working groups of top scientists — and each is concentrating on a specific problem. The Programme itself is not concerned only with malaria, it will also tackle other major tropical diseases such as leprosy, schistosomiasis (snail fever), onchocerciasis (river blindness) and trypanosomiasis (sleeping sickness). It was in malaria research that the first breakthrough came, however, when Dr. William Trager of the Rockefeller University of New York succeeded in maintaining a laboratory culture of *Plasmodium falciparum* for several months. This is the first time a continuous culture of any of the malaria parasites has been maintained for any length of time, and represents a significant step towards the development of an anti-malarial vaccine.

The IDRC is continuing to support the Special Programme, which now also has pledges for long-term financial support from many other countries and institutions around the world.

this will be carried out under the auspices of the International Committee for Contraception Research (ICCR) in six countries over a period of several years.

The hCG vaccine, as it is known, acts against a hormone called human chorionic gonadotrophin (hCG), preventing the completion of the fertile cycle that is essential for a successful pregnancy. There is also a strong possibility that the vaccine may be effective in the treatment of cancer in women and men, an aspect that also requires further study.

The project is part of a major international effort centred on the work of the ICCR, which has established a collaborative worldwide network of adequately supported scientists to develop new forms of contraceptive technology. The IDRC is supporting several parts of this program.

In the semi-arid tropics, a region in which the Centre has consistently supported a great deal of research, the farmer needs a reliable source of irrigation if he is to improve his situation. Yet the development of large-scale dams and irrigation schemes for purely socio-economic gain, without regard for the implications to health, often brings misery and disease to the rural people also. Tropical diseases carried by insects that live by the water or parasites that live in it already affect millions of people in rural Africa. Man-made lakes and waterways often help to make these diseases even more widespread.

Until very recently, research to combat tropical diseases has received very little support, but in 1975 the World Health Organization, assisted by the IDRC, began to draw up a special program for tropical disease research. At the end of 1976 the program was approved by the World Health Assembly, and it is already beginning to produce some promising leads (see box).

The battle against disease is one aspect of the problem — there is also a need to know more about irrigation: how water behaves in different soils, how much water different crops consume, and more about irrigation technology and equipment. Nowhere is this need more acute than in the semi-arid tropics. In 1975 the IDRC provided a grant to establish the International Irrigation Information Centre (IIIC). Its aim: to collect and evaluate information about the use of water on the farm, and to make that information available to the people directly concerned: farmers, researchers and extension workers.

It was a pilot project, based in the Middle East, where much of the research in this field is carried out. During the first year the embryo centre achieved its preliminary goals, and this year the IDRC approved a further three-year grant that will enable the IIIC to consolidate its position and seek additional funding from other sources. Already the IIIC is publishing quarterly an irrigation newsletter and an annotated bibliography, both of which will be expanded. The first of a series of specialized reviews has been produced and the Centre's documentation service has attracted requests for information from over 30 countries.

So far this review has dealt only in passing with the work of the people who make up the bulk of any rural population — the farmers. The largest percentage of the Centre's budget, however, is devoted to research in agriculture and food production, to helping improve the lot of the small farmer. This aspect of the Centre's work is the subject of the third and final section of this review.

Farmers and Food

In the past year there have been signs that the world's spiralling rate of population growth has begun to decline. Not that the population is getting smaller, but that it is growing more slowly. Such a trend, if it continues, is encouraging, but it should not lead to any heady optimism, a sense that the problems are now as good as solved. Far from it. The fact remains that the global population is still increasing rapidly, and that even if it were miraculously to cease to do so overnight, there would still be millions of hungry people, malnourished people, starving people in the world. There would still not be food for everyone.

The majority of farmers in the Third World, however, are subsistence farmers. The subsistence farmer knows nothing about global trends, his concerns are more immediate: to grow enough food to feed his family, and, if luck is with him, to have a little left over to sell at the market. For him, his family and his neighbours, a bad year is not just a disaster, it is a tragedy.

In this situation change, any kind of change, is a risk — perhaps too great a risk. Yet his very subsistence is in itself testimony to his tenacity and traditional skills, skills that combined with the products of modern agricultural research could enable him to break out of the subsistence cycle. In its support of research into improving agriculture and food production, the IDRC has placed greatest emphasis on the small farmer, believing that a country's or a region's drive for greater self-sufficiency in food must begin here.

In Africa and Asia the Centre is supporting a network of projects concerned with cutting food losses through the improvement of postharvest systems.

In Senegal one of the most promising of these projects has just entered its second phase. During the first three years researchers at the National Agricultural Research Centre (CNRA) developed techniques for processing, drying and storing grains that are based on traditional methods and use local materials and labour rather than expensive imported equipment. Two young African scientists were also trained in postharvest research.

The second phase of the project will test the complete systems under real-life conditions in two Senegalese villages of different sizes. Simple mechanical threshers developed at CNRA will be compared with hand threshing. Storage racks that make maximum use of the sun and wind to dry the grain rapidly will be constructed from available materials. Grain storage trials will use both improved traditional bins and an innovative multicompartment silo

developed at CNRA and constructed from concrete blocks manufactured on the spot. In the larger village a cooperatively-owned mill will also be used, similar to one established in rural northern Nigeria in a Centre-supported project there.

The researchers believe that their findings will be valuable to almost all rural communities in West Africa, and once the final evaluation has been completed, a regional workshop will be held to demonstrate the results of the Senegal project to as many countries as possible.

Rice may be the Asian crop *par excellence*, but it is also widely grown by small farmers in other parts of the world, including West Africa. In Ghana a project began this past year that aims to adapt and test a pedal-operated rice thresher developed at the International Rice Research Institute in the Philippines under local conditions. Twenty of the machines will be made available to small rice growers whose farms are too small to qualify them for government assistance, such as the use of a combine harvester.

The project is being carried out by the Technology Consultancy Centre of Kumasi University. The researchers hope that by bringing simple mechanization within reach of the small farmers (who already produce 60 percent of Ghana's rice) they will not only increase rice production, but will stimulate an agricultural support industry to manufacture and maintain basic machines and equipment.

African farmers traditionally use the dried stalks of sorghum to build fences, granaries, even houses — the stalks are a useful by-product. Research into other possible uses of agricultural by-products is as yet limited, but the potential is enormous. In Egypt, for example, the four main crops — cotton, corn, rice and cane sugar — produce an estimated 8.3 million tons of by-products, yet this huge potential resource is largely unused, in spite of the fact that Egypt has a pressing need for animal protein, and currently must import feed for its livestock.

At the University of Alexandria a new project is being funded by the Centre aimed at increasing the country's meat production by making more efficient use of those agricultural wastes. The researchers will develop processing techniques to improve the digestibility and nutritive value of the by-products, and test the resulting feed supplements in trials at the University's experimental farm.

The three-year project will also involve training for a significant number of animal science students, and detailed economic studies of the newly developed feed production techniques. If the technology can be kept simple and inexpensive, its potential for use in many areas of the developing world can be imagined.

The IDRC grant will also enable Egyptian scientists to visit other projects tackling similar problems, including Mexico, where researchers at the National Council for Science and Technology have been studying the use of sugar cane as a cattle feed supplement for the past two years. The Centre recently agreed to fund a second two-year phase of this project, during which scientists will be able to test the full potential of the sugar cane based feed supplement, and assess the economic benefits to both the small farmer and the small sugar mill operator.

Diseases and pests that affect staple crops can also drastically reduce the food supply. Sorghum, grown by small farmers throughout the semi-arid tropics, is prey to the parasitic witchweeds of the *striga* family that can reduce the yield from a single sorghum crop by 50 percent or more, and eventually render the land unfit for sorghum cultivation. With IDRC support a new chemical treatment has been developed that may be able to destroy the

hitherto indestructible weeds (see box) and is now undergoing intensive field testing.

The root crop cassava is also a staple throughout much of Africa, Asia and Latin America. Almost since its inception the IDRC has supported a growing network of cassava research, with the emphasis on increasing production at the small farm level. Part of this effort is the search for an effective means of controlling the green spider mite, *Mononychellus tanajoa*, a tiny but extremely destructive pest that is particularly harmful to young cassava plants. The mite,

An end to the witchweeds?

Sorghum ranks fifth among the world's cereal crops, and has the potential to do much better. In the semi-arid tropics it ranks second only to maize, and is a staple food for a least 400 million people. Scientists predict sorghum production could be quadrupled in developing countries, outstriping both wheat and maize.

But in Africa and Asia there are vast areas of arable lands where sorghum can no longer be grown. The reason is something the farmers call witch-weed and the scientists call *Striga* spp. These are parasitic weeds. Their seeds may lie dormant in the soil for up to 20 years, to be activated only by a stimulant produced by the root of a suitable host plant — such as sorghum.

Sorghum provides food for millions.

Then the witchweeds reappear. Drawing nutrients from the host plants, they drastically reduce the sorghum yield, and produce beautiful yellow flowers tha spread millions more seeds in the soil. Repeated attempts to grow sorghum on the land simply enable the witchweeds to multiple to the point where it is no longer worthwhile planting a sorghum crop.

Since 1973 the IDRC has been supporting research at the University of Sussex, England, to develop a cheap synthetic stimulant that will cause the weeds to germinate prematurely — and die for lack of a host plant. The key is strigol — the chemical exhuded by the roots of sorghum and some other plants, and only identified in 1972. If the scientists could develop a chemical compound with the same stimulant properties as strigol, and if it could be mass-produced economically in developing countries, a major constraint to sorghum production would be removed.

During the first four years of painstaking research, the group at Sussex, under Professor Alan Johnson, succeeded in producing synthetic compounds that will germinate the seeds of both *Striga* and another parasitic weed, Orobanche, in the laboratory. The Centre is now supporting a further two years of research to make the compounds more stable in a variety of soils, to develop pilot-scale production of the most potent stimulants, and to carry out extensive field testing in Egypt, India, Nigeria and Tanzania.

The aim now is to bring the new chemical to the point where it can be made commercially available to small farmers as rapidly as possible.

A scientist at the Commonwealth Institute for Biological Control in Trinidad collects tiny mites from a cassava leaf.

which is found in much of Latin America and the Caribbean, was accidentally introduced into East Africa some years ago, and, thanks to the mite's remarkable ability to drift long distances on wind currents, is spreading rapidly. It is feared it may soon cover the entire continent if unchecked.

For the past two years scientists at the Trinidad station of the Commonwealth Institute of Biological Control have been exploring the possibilities of using the mites' natural enemies to control them. They were able to identify and study no less than 14 predator insects that prey on green spider mites. The most promising of these will now take part in the second phase of the project, which will involve their controlled release in the actual environmental conditions of East Africa. Special quarantine facilities have been constructed by the East African Agricultural and Forestry Research Organization (EAAFRO). Here the scientists will release the predators and observe their effect on the mite populations, and on the cassava plants. They hope these studies will lead to a breakthrough in biological control that would be of immediate benefit to the small farmer whose cassava crop today is threatened by the spread of the mites.

The slash-and-burn shifting cultivation technique traditionally used by small farmers in the humid tropics is a wasteful system, since it depletes both the forest and the soil, and leaves large areas of land unused over many years. Before any large scale change can be made, however, it is necessary to understand more about agroforestry — the combination of food crops, trees and animals on the same piece of land — a field in which little research has been done. The IDRC is now supporting three closely related projects in Nigeria, Cameroon and Ghana that will greatly increase the available knowledge of agroforestry techniques in this region.

While the approach and methodology of each project will vary, they share a common general objective: to develop systems that will increase both food and wood production, improve the productivity of the land and provide greater income and security for the small farmer.

Agroforestry will be given greater international attention as a result of a study of research priorities completed by the Centre during the past year. The study, which was carried out by an international working group of experts, concluded that there is a great need for more research and more information on agroforestry, and recommended a coordinated international effort. The Centre convened a meeting of international donor agencies in November, at which a

committee was formed to establish the International Council for Research in Agroforestry (ICRAF), which will begin operations early in 1978.

In the semi-arid tropics small farmers face a different set of problems. Once the trees have been cut, they will not grow back unassisted, and without trees to provide shade and retain moisture the land may rapidly turn to desert. Since 1974 the Centre has been supporting a growing network of savannah forestry projects in the semi-arid regions of Africa, all of which have the common aim of preventing further depletion of treed areas and the resultant erosion of agricultural land. There are now 11 projects in the network. In order to gain maximum benefit from this concerted effort, the African researchers and administrators involved requested IDRC support in establishing, as a pilot project, a coordinating organization.

With IDRC funding for four years, the project will provide expert African research advisors who will visit each of the 11 projects several times each year, design training manuals and courses, prepare state-of-the-art reviews and generally ensure the effectiveness of the network. During the fourth year there will be an independent evaluation of the project's activities. It is a novel approach for this region of Africa, and one that could open up an entirely new strategy for the development of forestry in semi-arid areas.

The development of new varieties and new crops is another way in which small farmers can be helped to become more productive. Considerable progress has been made in recent years at the International Centre for the Improvement of Maize and Wheat (CIMMYT) in Mexico on the development of new lines of sorghum that will thrive at low temperatures. To consolidate this work the IDRC is funding a further two years' research in Mexico that will be carried out, at CIMMYT's request, under the supervision of scientists from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India, where the bulk of the world's sorghum research is conducted. Such a cold-tolerant sorghum would make the crop more widely available to small farmers in highland tropical areas of Asia, Africa and Latin America, and provide security for farmers who at present are faced with the prospect of severe losses as a result of a sudden cool spell.

CIMMYT has also been instrumental in the development of triticale, a hardy hybrid cross between wheat and rye. The true test of this new grain, however, is its ability to adapt to other regions of the world. The IDRC is supporting a number of triticale outreach projects that will help improve the grain's adaptability. In northern India, for example, where the foothills of the Himalayas provide a challenging testing ground, with a wide variety of agro-climatic conditions and little or no irrigation.

The Indian Council for Agricultural Research asked for IDRC support in expanding a small-scale triticale improvement program. The Indian scientists believe that triticale will be able to out-yield both wheat and barley in the unirrigated areas. The project will test a wide range of triticales in order to produce lines suitable to the region that are nutritionally superior to local grains, and, equally important, are acceptable to the local people for use in making products such as *chapati*, the unleavened bread that is a staple in many Indian homes.

Quinoa is not a new crop — in fact it is known to have been cultivated in the Andean region of Latin America in the time of the Incas. It is a member of the chenopod family, and is believed to be among the most nutritious grains in the plant kingdom. Quinoa is still grown by hillfarmers in Bolivia, Peru and Ecuador, but until recently there have been no attempts to develop it as a major crop. Now the IDRC is supporting a research program at the Bolivian Institute of Agricultural Technology to develop improved, high-yielding, disease-

resistant varieties that will allow an increase in production and reduce that country's dependence on grain imports.

The project will involve the collection, classification and selective breeding of the most promising varieties, and their introduction at the farm level. It will also provide much-needed training opportunities for young Bolivian researchers. For the farm families who scrape a precarious living from the Andean highlands, it will bring a better income and improved nutrition.

Keeping ahead of the paper chase

Researchers in agriculture, forestry and fisheries write a quarter of a million new scientific and technical papers every year. Most of this research can be applied in many parts of the world, but because publishing and library services in developing countries are usually quite limited, there is a constant risk that research programs there will be launched in ignorance of work done elsewhere on the same subject. Western-based services involve costly duplication, require scarce foreign exchange, and often do not include important developing-country literature, especially if it is not published in scientific journals.

Helping developing countries to draw upon and contribute to the world's storehouse of agricultural knowledge can therefore have immeasurable benefits, and forms a major part of the IDRC's Information Sciences program. Transferring information among many disparate researchers in developing countries implies a systematic arrangement, recognized by FAO in its AGRIS, AGLINET and CARIS projects, which involve governmental participation.

AGRIS is a bibliographic system that, since January 1975, has been listing recent agricultural documents. Each participating country appoints a national centre to collect, classify and index documents produced within its territory — a job that in any case is vital for national planning purposes. The records from individual countries are sent in a standard form to the AGRIS Coordinating Centre where they are condensed into a printed bibliography, copies of which are distributed free to participants. Centres with adequate computer facilities can receive the same information on magnetic tape and use it for specialized services tailored specifically to their needs.

By themselves, however, bibliographic references are useless: people generally need to read original documents. AGRIS is therefore accompanied by AGLINET, a network of cooperating agricultural libraries through which the original literature can be made available. The third system, CARIS, identifies and records agricultural research institutions, researchers and their current programs, enabling anyone to consult directly the source of any particular knowledge.

The IDRC's efforts to help developing countries participate in AGRIS have been concentrated on regional centres in Latin America and Southeast Asia, which collect literature from countries in their region, process it for input to AGRIS and provide various forms of output service. They also disseminate material that is important regionally but is not within the AGRIS subject scope. These centres provide a focal point round which national activities can develop and eventually branch off, so training is another important function.

The basic concepts of AGRIS developed out of INIS, an intergovernmental bibliographic system that has been successfully serving the nuclear energy industry for the past 10 years. Similar "mission-oriented" systems are either now operating, or are being considered, for population, education, development studies and other fields of direct concern to developing countries.

The rapid dissemination of information about recent research findings is vital to agricultural development, to enable scientists working in similar fields to coordinate their efforts, exchange ideas and avoid duplication of effort. The IDRC is already supporting the activities of specialized international agricultural information centres for cassava, grain legumes and farm irrigation, and during the past year approved a further grant to help establish a centre for information on sorghum and millet.

Since its inception the IDRC has committed about $3 million to agricultural information programs. A good portion of this has helped developing countries participate in programs such as AGRIS, a computerized global system for information on agricultural science established by the FAO. As part of its continuing role in AGRIS, the Centre approved several grants during the past year (see box).

At a different level, there is an equally important need to find new low-cost techniques of communicating directly with the small farmer. In Uraguay the Centre is supporting a pilot project using small cassette tape recorders to bring the message of rural development to small isolated communities or individual farms, and to allow them to communicate with each other. Trained volunteers lead discussion groups through each pre-recorded program, and the people can record their reactions on the blank side of the tape, to be replayed to other groups. Feedback from many groups can be condensed and redistributed on new cassettes for further discussion and comment.

The aim of the cassette forum is to foster cooperative rural development activities among neighbouring groups. Initially the experiment is being tried in two areas of the country, but if it succeeds it could become a national program, and perhaps spread to other countries with similar problems that have already indicated an interest in such low-cost means of rural animation. For the farmers and their families it means, perhaps for the first time, regular access to new ideas, new attitudes and new knowledge.

The IDRC functions a little like the cassette forum — serving as a catalyst, bridging the gap between scientists, administrators and policymakers in different countries, different regions, different disciplines. Like the tape recorder, the Centre is in a sense a tool to be used by the developing countries, a tool that also can bring new ideas, new attitudes and new knowledge to help speed the development process.

It is that ability to continually produce and absorb new knowledge that differentiates man from the other inhabitants of this small planet. It is the search for new ideas, the drive for self-improvement, the need for common solutions that link our disparate cultures, that bring together Egyptians, Mexicans and Ethiopians, Ghanaians and Filippinos, Kenyans and Trinidadians. Here, too, we are on common ground.

PROGRAM PROJECTS APPROVED TO MARCH 31, 1977 (1000's)

Region of Activity	PROGRAM DIVISIONS							
	Agriculture, Food & Nutrition Sciences	Information Sciences	Health Sciences	Social Sciences & Human Resources	Publications	Canada & Donor Agency Relations	TOTAL	% OF TOTAL
Africa	13,166	1,591	2,582	3,053	–	216	20,608	21.92%
Asia	16,830	4,616	5,368	9,743	114	–	36,671	39%
Caribbean & Latin America	8,307	1,806	4,051	4,832	–	–	18,996	20.20%
Global	864	2,417	2,554	4,711	–	–	10,546	11.21%
Canada	2,131	1,192	445	3,378	7	59	7,212	7.67%
TOTAL	41,298	11,622	15,000	25,717	121	275	94,033	
% OF TOTAL	43.92%	12.36%	15.95%	27.35%	.13%	.29%		100%

PROGRAM PROJECTS APPROVED IN FISCAL YEAR 1976–77 (1000's)

Region of Activity	PROGRAM DIVISIONS							
	Agriculture, Food & Nutrition Sciences	Information Sciences	Health Sciences	Social Sciences & Human Resources	Publications	Canada & Donor Agency Relations	TOTAL	% OF TOTAL
Africa	4,888	248	203	416	–	216	5,971	22.35%
Asia	3,417	2,640	604	1,880	42	–	8,619	32.36%
Caribbean & Latin America	2,702	577	1,841	993	–	–	6,113	22.88%
Global	583	1,015	1,310	1,246	–	–	4,154	15.54%
Canada	486	–	105	1,207	7	59	1,864	6.98%
TOTAL	12,076	4,480	4,099	5,724	49	275	26,721	
% OF TOTAL	45.19%	16.77%	15.34%	21.49%	0.18%	1.03%		100%

Projects for which funds were approved during the fiscal year 1976–77

Agriculture, Food and Nutrition Sciences

Afforestation (Bolivia)
For the Ministry of Agriculture and Farmers Affairs, La Paz, to enable the Centro de Desarrollo Forestal to undertake species trials with a view to establishing an extensive afforestation program in the highlands of Bolivia. $175 400 – 3 years

Afforestation (Peru)
For the National Development Foundation, Lima, to enable it to support the Ministry of Agriculture in identifying suitable species and developing adequate methods for the establishment of forest plantations in the Andean highlands of Peru. $295 900 – 3 years

Agroforestry (Cameroon)
For the Office National de la Recherche Scientifique et Technique, Yaoundé, to enable it to support the Institut de Recherches Agronomiques et Forestières in developing methods for improving farming systems in the humid tropical areas of Cameroon, using legumes to increase agricultural and forestry production. $220 500 – 3 years

Agroforestry (IITA)
For the International Institute of Tropical Agriculture, Ibadan, Nigeria, to develop cropping systems with a view to improving and increasing food crop production for the small-scale farmer. $95 200 – 3 years

Agroforestry (Nigeria)
For the University of Ibadan, to enable its Department of Forest Resources Management to develop farming systems combining forest trees and food crops in the upland areas of the humid tropics. $271 400 – 3 years

Animal production systems (CATIE)
For the Centro Agronomico Tropical de Investigacion y Ensenanza, Turrialba, Costa Rica, to develop integrated crop-livestock production systems for use on small- and medium-sized farms in Central America, in particular to optimize the use of crop by-products and agricultural residues in such systems. $478 000 – 3 years

Aquaculture (Turkey)
For the General Directorate of State Hydraulic Works, Ministry of Energy and Natural Resources, Ankara, to develop a comprehensive plan for fish production and management in the Keban reservoir. $212 500 – 3 years

Savanna timbers (Mali) — phase II
For the National Directorate of Water and Forests, Ministry of Rural Development, Bamako, to continue research on the management and utilization of savanna timbers, specifically, to develop suitable techniques to process savanna woods with a view to achieving optimal output. $161 500 – 3 years

By-products (Egypt)
For the University of Alexandria, to increase animal production and the supply of animal protein for human consumption through the

efficient utilization of agricultural and industrial wastes and by-products by the Egyptian animal feed industry. $254 000 – 3 years

By-products (Mexico) — phase II

For the Consejo Nacional de Cienca y Technologia, Mexico, to continue research in the development of cattle feeding systems that can make the most efficient use of sugar cane and cane by-products. $396 200 – 2 years

Cassava germ plasm (Brazil)

For the Instituto de Ciencias Biologicas, Universidade Federal de Goias, Brazil, to collect and conserve germ plasm of wild cassava species occurring in and around Goias State in Brazil and screen collected material for characteristics of potential economic value and for their ability to cross-breed with domestic cassava. $46 500 – 3 years

Cassava (Indonesia), supplement

For the Universitas Brawijaya, Malang, to enable the University to complete the first phase of this three-year project, and to ensure continuity with the proposed second phase. $8000

Cassava (Indonesia) — phase II

For the Universitas Brawijaya, Malang, to continue evaluation and development of the "Mukibat" system of cassava production suitable for small farm operations and increase carbohydrate production in cassava for human food. $328 000 – 4 years

Cassava mealy-bug (CIBC)

For the Commonwealth Institute of Biological Control, Trinidad, to undertake research on cassava mealy-bug population dynamics and natural enemies, preliminary to future programs of biological control. $56 000 – 3 years

Cassava microbiology (Guelph) phase II

For the University of Guelph, Canada, to develop a low-cost process for the production of high-protein animal feed by converting cassava starch and inorganic nitrogen into microbial protein. $102 000 – 2 years

Cassava mites (CIBC) phase II

For the Commonwealth Institute for Biological Control, Trinidad, to continue research on the control of the mites *Oligota minuta* that infest small farmers' cassava crops in East Africa. $48 000 – 2½ years.

Cassava processing (Thailand) phase II

For the Asian Institute of Technology, Bangkok, to continue research to improve methods of chipping and pelleting cassava, and to expand the improved processes to a larger scale to permit technical and economic evaluation by Thai cassava processors. $57 000 – 2 years

Cassava (Zanzibar)

For the Ministry of Agriculture to undertake research to improve the quality and utilization of cassava germ plasm in Zanzibar. $54 500 – 3 years

Cold-tolerant sorghum (ICRISAT)

For the International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, to continue research to extend sorghum adaptation to highland areas of the tropic, semi-arid tropic and temperate zones of developing regions. $198 000 – 2 years

Cowpea processing (Ghana)

For the Food Research Institute, Accra, Council for Scientific and Industrial Research to develop and establish processing technologies for cowpeas suitable for operation in rural communities and develop, adapt, and evaluate equipment and standards for utilization of cowpea flour in foodstuffs. $180 000 – 3 years

Cowpea processing (Nigeria)

For the University of Ibadan to test the acceptability of mechanically-prepared cowpea flour as a substitute for cowpea paste in the preparation of domestic and small-scale commercial cowpea foods. $14 000 – 1½ years

Cropping systems (IRRI) — phase II

For the International Rice Research Institute to enable it to undertake a comprehensive and systematic analysis of all the agronomic and economic data available from research into cropping systems and patterns utilized by small farmers in Asia carried out in the first 4-year phase of the project. $1 398 300 – 2 years

Cropping systems (Thailand)

For the Ministry of Agriculture and Cooperatives, Bangkok, to increase production and family income among small farmers through the establishment of a coordinated cropping systems research program in four representative agro-climatic regions. $398 800 – 2 years.

Drought resistance (Laval), phase II, supplement

For Laval University, Montreal, to extend research in a project to assess differences in drought resistance on tolerance shown by various cultivars of sorghum and millet. $49 800 – 1 year

Fish parasites (Indonesia)

For the Directorate General of Fisheries, Djakarta, to conduct research on the most effective measures for the eradication and control of *Lernea* and other parasitic infestations and diseases of important fish cultivated for food through detailed biology studies of the parasites. $181 500 – 2 years

Fish nutrition (University of Victoria)

For the University of Victoria, Canada, to determine the basic nutritional requirements of local Malaysian carp, Tawes (*Puntius gonionotus*) and grass carp (*Ctenopharyngodon idella*); and to develop a test diet to provide best growth for least cost. $94 000 – 2 years

Fish culture (Singapore)

For the Primary Production Department, Ministry of National Development, to develop an economically viable intensive fish farming system for Singapore and establish production levels for aquaculture comparable to those of poultry and swine husbandry, in experiments conducted initially on milkfish, mullet and major carp. $230 000 – 3 years

Food grain improvement (Sri Lanka)

For the Department of Agriculture to improve cowpea, mung bean and black gram crops, and develop sorghum types suitable for dryland farming in Sri Lanka. $165 000 – 3 years.

Forestry cooperative research (Africa)

For the Agriculture, Food and Nutrition Sciences Division of IDRC to facilitate cooperation and exchange of information among African forestry research workers engaged in projects of widespread interest and stimulate and improve coordination in the development of forest science in Africa. $545 000 – 4 years

Inland fisheries (Sarawak)

For the State Ministry of Agriculture and Community Development, Sarawak, Malaysia, to assess the potential for inland fisheries development in the Baram District, and to study the ecology and breeding habits of important commercial fish. $145 000 – 3 years

Grain legume quality (INCAP)

For the Pan American Health Organization, Washington, to enable it to support the Institute for Nutrition of Central America and Panama, Guatemala City, in a project to improve the nutritional quality, cooking properties, and acceptability and utility of food legumes of the general *Phaseolus spp.* (common beans), *Vigna unguiculata* (cowpeas), and *Cajanus cajan* (pigeon peas.) $485 000 – 3 years.

International Council for Research in Agroforestry (ICRAF)

For the Agriculture, Food and Nutrition Sciences Division of IDRC for the planning, implementation and operation of an International Council for Research in Agroforestry to channel resources, facilitate cooperation, and promote implementation of research into production systems combining trees, agricultural crops, and animals. $300 000 – 1 year

Legume processing (Indonesia)

For the Faculty of Agricultural Technology, Gadjah Mada University, Jogjakarta to investigate more economic alternative legume protein sources for the domestic and commercial production of *tempe* and *tofu*, two popular cake-like foodstuffs traditionally prepared using soybeans. $32 400 – 2 years

Orobanche (Egypt)

For the University of Alexandria to enable its Department of Pathology to develop a biological control method for *Orobanche crenata* on broad beans, using species of fungi that are natural parasites of this weed. $45 000 – 3 years

Oysterculture (Jamaica)

For the University of the West Indies, Mona, under the direction of the Ministry of Agriculture, to conduct research on the culture of the mangrove oyster to determine optimal conditions of cultivation and establish an economical and practical system of oysterculture for rural fishing communities of Jamaica and other Caribbean territories. $198 100 – 3 years

Plant by plant interactions (UBC)

For the University of British Columbia, Vancouver, Canada, to investigate the possibility that mungbean and cowpea residue effects are caused by the release of chemical toxins into the soil, to characterize the nature of such toxins, and to determine the differences between varieties with regard to production of and susceptibility to toxins. $24 500 – 2 years

Postharvest rice systems (Korea)
For the Seoul National University, Suweon, to examine the influence of alternative postharvest techniques on traditional Japonica and newly introduced Indica varieties of rice and determine the most technically efficient methods of cutting, drying, threshing, and milling of rice and established barley varieties. $59 000 – 2 years

Postharvest rice technology (Singapore) phase II
For the Singapore Institute of Standards and Industrial Research to undertake phase II of a project to develop and test improved methods of storage of milled rice. $66 000 – 2 years

Postharvest systems research and development (Southeast Asia)
To enable the Agriculture, Food and Nutrition Sciences Division of IDRC to support a program designed to raise the levels of productivity of rice and other important grains by improving existing, and by devising new postharvest systems best suited to the conditions obtaining in countries of Southeast Asia. $302 000 – 3 years

Postharvest technology (Senegal)
For the Délégation générale à la recherche scientifique et technique, Dakar, to establish suitable postharvest systems in two Senegalese villages and to evaluate their economic and technical efficiency. $270 000 – 2½ years

Quinoa (Bolivia)
For the Bolivian Institute of Agricultural Technology, Ministry of Rural Affairs and Agriculture, La Paz, to increase the yield capabilities and grain quality of quinoa (a food grain indigenous to the High Andes regions of South America). $315 000 – 3 years

Rice research (WARDA)
For the West African Rice Development Association, Monrovia, Liberia, to select and test high-yielding rice varieties that mature early and are resistant to pests and cold, and to determine the optimum growing conditions and agronomic practices in an effort to increase the production of rice in the Senegal River region. $410 000 – 2 years

Root crops (Cameroon/IITA)
For the National Office for Scientific and Technical Research, Yaoundé, Cameroon, and the International Institute of Tropical Agriculture, Ibadan, Nigeria, to develop a cadre of trained Cameroonian research workers capable of increasing production of cassava, coco yams, and sweet potatoes by improvement in yield capability, resistance to disease, and overall quality. $322 200 – 3 ½ years

Silicone soil treatment
For the Hebrew University of Jerusalem, Israel, to determine the feasibility of applying chemical and mechanical treatments to the soil, and to assess the costs of such treatments under real conditions. $45 500 – 2 years

Small farm equipment (Ghana)
For the Technology Consultancy Centre, University of Science and Technology, Kumasi, to assess the viability of the use of pedal-operated rice threshers in Ghana, as part of a program to stimulate an agricultural support industry and to bring some mechanization within the reach of small farmers. $25 000 – 2 years

Sorghum, finger millet, pigeon peas (Uganda) phase II
For Makerere University, Kampala, to enable its Faculty of Agriculture to undertake research to breed and select sorghum, finger millet, and pigeon peas for high stable yield, disease resistance, particularly for use in crop mixtures. $171 500 – 2 years

Sorghum/millets (EAC), phase II
For the East African Community, Arusha, Tanzania, to continue and strengthen the sorghum breeding program at Serere, Uganda, to expand the millet crossing and selection program at Serere,and to test the improved varieties throughout the millet-growing areas of East Africa. $132 500 – 2 years

Sorghum (Senegal), phase II
For the Délégation générale à la recherche scientifique et technique, Dakar, to continue the selection and testing of sorghums under different agroclimatic conditions, to develop agronomic and management practices for the improved sorghums in combination with other crops, and to continue the training program at Laval University, Canada, and at the Centre national de recherches agronomiques in Bambey. $380 000 – 2 ½ years

Striga (Sussex) phase III
For the University of Sussex, England, to continue the development and testing of germination compounds used for the control of the parasitic weed Striga through an expanded program of field testing in Egypt, India, Nigeria, and Tanzania. $84 000 – 2 years.

Summer forage (Egypt)
For the National Agricultural Research Centre, Ministry of Agriculture, to enable its Animal Production Research Institute, Cairo, to develop methods for increasing summer fodder crops production and for conserving such crops. $250 000 – 3 years

Triticale (Chile) phase II
For the Catholic University of Chile, Santiago, to continue research to increase on-farm grain production by developing high-yielding triticale cultivars for human consumption and for animal feed. $207 200 – 3 years

Triticale (Manitoba)
For the University of Manitoba, Winnipeg, Canada, to enable its Faculty of Agriculture to undertake research aimed at improving triticale as a mobile crop species through developing new primary triticales with improved kernel characteristics. $121 800 – 1 year

Triticale outreach (Ethiopia), phase II
For the Institute of Agricultural Research, Addis Ababa, to continue to breed, test and select superior triticale varieties that are best suited to Ethiopia's wide range of ecological conditions and strengthen and expand the demonstration program on farmers' fields. $176 200 – 3 years

Trypanosomiasis (East Africa), phase II
For the East African Community, Arusha, Tanzania, to continue its research aimed at the development of effective control measures of Animal Trypanosomiasis and East Coast Fever, lethal cattle diseases in Africa caused by protozoal organisms, and to train African scientists in the field of haemoprotozoal research. $698 000 – 2½ years

Winter triticale (Guelph) phase II
For the University of Guelph, Canada, to continue research, to identify, evaluate, develop and improve winter hardy triticale materials for yield, disease resistance, grain quality, and other favourable agronomic characteristics. $93 000 – 1 year

Canada and Donor Agency Relations

CAAS — National secretariat, supplement
For the Canadian Association of African Studies (CAAS), Ottawa, Canada, to provide travel support for 50 African students who attended the 1976 CAAS annual conference on 19-22 February at the University of Victoria, British Columbia, Canada. $5000

Canadian Association for African Studies (CAAS)
To enable CAAS, Ottawa, Canada, to undertake phase II of the CAAS National Secretariat Project, in fostering relations between Canadian and developing country scholars and researchers. $53 680 – 2 years

Développement de la recherche dans le Sahel (Afrique)
For the Office of the Vice-President, Canada and Donor Agency Relations of IDRC to second a specialist to the Secretariat of the Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans la Sahel, and to provide organizational support for the Secretariat. $216 000 – 2 years

Royal Society of Canada, phase III
For the Royal Society, Ottawa, Canada, in continuing support for the International Foundation for Science; to enable young scientists from developing countries to undertake research in the natural sciences on problems related to their countries. $170 000 – 16 months

Health Sciences

Bilharzia (Egypt)
For the University of Alexandria to test and develop methods of utilization of *Ambrosia maritima* as a molluscicide, with a view to controlling Bilharziasis. $49 700 – 2 years

Biomedical support program (Latin America), phase II
For the Corporacion Centro Regional de Poblacion, Bogota, to enable it to continue the Latin American Program of Research in Human Reproduction to promote and stimulate development of applied research on human reproduction through a small awards program directed at young researchers in Latin America. $500 000 – 4 years

Collaborative research in human reproduction (Mexico), phase II
For the National Institute of Nutrition, Mexico City, the Scientific Research Institute, University of Durango, and the Departments of Reproductive Biology of the Universities of San Lui Potosí,

Guanajuato, and Yucatán, to reinforce the development in the field of reproductive biology of each participating centre according to the research, teaching, and health priorities of the region; to improve the exchange of information between the centres; and to enhance the administrative capacity of each centre. $162 500 - 2 years

Community health I (Indonesia)

For Sriwijaya University, Palembang, South Sumatra, to assess the effectiveness of government health centres. $21 500 - 8 months

Community health II (Indonesia)

For the Universitas Sumatra Utara, Medan, to undertake a survey of community health needs in sub-district Medan-Tuntungan, with a view to implementing the most appropriate health services to be offered by a proposed primary health centre in the area. $22 000 - 1 year

Community health III (Indonesia)

For the University of Andalas, Padang, West Sumatra, to undertake a survey of community health needs in Padang district with a view to strengthening health services in the area. $13 000 - 8 months.

Gastroenteritis (Guatemala)

For the PanAmerican Health Organization, Washington, to enable it to support the Instituto de Nutricion de Centro America y Panama, Guatemala City, in identifying the malabsorption syndrome in children and designing a sanitary education program to combat it. $359 084 - 2 years

Health and family planning/village personnel (Korea)

For the Center for Population and Family Planning, Yonsei University, Seoul, to test the use of two low-cost local manpower resources — village health workers and village movement leaders — to extend the family planning delivery system in rural areas in an effort to improve contraception acceptance and continuation rates. $49 800 - 2 years

Health services evaluation (Iran)

For Pahlavi University, Shiraz, to enable the Department of Community Medicine to undertake an evaluation of the Kavar health care delivery system and to assess the performance of village health workers. $119 000 - 2 years

ICOMP/IDAP (Global)

For the International Committee on the Management of Population Programmes, Makati, Philippines, to enable it to support the Institutional Development Assistance Project to enable four institutions (Indian Institute of Management, Ahmedabad; Administrative Staff College of India, Hyderabad; Asian Institute of Management, Makati; and Instituto de Estudios Superiores de Administracion, Caracas) to undertake research on improving management of population and family planning programs. $100 000 - 1½ years

Infertility lactation (Chile)

For the Centro Nacional de la Familia, Santiago, to test the effect of progesterone pellets and plastic IUDs impregnated with methyl norgestierone on the processes of fertility. $183 800 - 30 months

Manually operated low-lift pump prototypes

For the University of Waterloo, Canada, to enable its Waterloo Research Institute to design and fabricate prototype piston pump components for testing under conditions of actual use in manually-powered drinking water and irrigation water pumping in Assam State, India. $9 170 - 3 months

Medex program (Guyana)

For the Ministry of Health, Georgetown, to develop an expanded health manpower infrastructure with a view to improving the delivery of basic health services to the dispersed communities of Guyana. $275 500 - 3 years

Medical auxiliaries (Panama)

For the Ministry of Health, Panama, to study the Rural Health Program that currently exists in the provinces of Colon and Bocas del Toro, and to design a model containing the core elements of the Program. $86 000 - 10 months

O/C blood disorders (Hong Kong)

For the University of Hong Kong to assess the effects of oral contraceptive pills on blood coagulation factors and subclinical venous thrombosis. $59 700 - 2 years

O/C health (Costa Rica)

For the Teaching and Research Centre of the Costa Rica Social Security Fund, San José, to undertake a baseline study of a group of Costa Rica women undergoing oral contraceptive treatment, to assess possible harmful side effects and to identify specific areas for further research. $49 900 - 2 years

O/C metabolic effects (Korea)

For Yonsei University, Seoul, to enable its Centre for Population and Family Planning to study the effects of oral contraceptive pills on the metabolic functions of the adrenal, renal, and thyroid glands, on the hormones involved in lactation, and on the milk of lactating mothers. $48 500 - 2 years.

Piggery waste treatment (Singapore)

For the Primary Production Department, Ministry of National Development, to develop alternative methods for the treatment of piggery wastes and reclamation and reuse of wastewater. $302 985 - 2 years

Rural water technology research

For the Health Sciences Division of IDRC to undertake field trials in developing countries on the piston pump prototype systems developed at Waterloo University, with a view to the manufacture of a reliable, low-cost piston hand pump suited to local production variations in developing countries. $48 000 - 1 year

Social and psychological implications of abortion (Singapore), supplement

For the Division of Health Sciences of IDRC to provide additional funds necessary to complete data analysis and final report of a project to assess the effect of abortions on the mother and family unit. $13 750 - 1½ years

Stabilization ponds (Peru)

For the PanAmerican Health Organization, Washington, to enable the PanAmerican Center for Sanitary Engineering and Environmental Sciences, Lima, to develop design criteria for low-cost wastewater treatment by stabilization ponds through evaluation of performance of existing ponds and study the health implications and economic feasibility of treating and using wastewater for irrigation and fish culture. $56 040 - 1½ years

Sterilization effects (Thailand)

For Chulalongkorn University, Bangkok, to enable the Chulalongkorn Hospital Medical School and the Siriraj Hospital to study the effects of various techniques of tubal occlusion on sterilized women. $73 500 - 2 years

Traditional healers (Indonesia)

For the University of North Sumatra, to determine and analyze the role of traditional healers in the delivery of health care to rural people in North Sumatra. $35 500 - 1 year

Tropical diseases (Global)

For the World Health Organization, Geneva, in support of the Special Programme for Research and Training in Tropical Diseases to develop new tools for the prevention, diagnosis and treatment of tropical diseases through the combined application of biomedical, clinical, epidemiological and operational research. $500 000 - 1 year

Viral gastroenteritis (Caribbean)

For the PanAmerican Health Organization, Washington, to support the Caribbean Epidemiology Centre and the University of Toronto in studying the epidemiology of infantile gastroenteritis in the Caribbean, and more specifically, to isolate and identify the role of viral agents in the causation of the disease. $168 400 - 2 years

Wastewater disposal: state-of-the-art review

For the Information Sciences Division of IDRC to prepare a state-of-the-art review on community wastewater and excreta disposal and their relationship to water supply. $39 150 - 6 months

Wastewater reclamation (Global)

For the Division of Public Health Engineering, College of Engineering, Madras; Department of Botany, University of Malaya, Kuala Lumpur, Dor Fish and Aquaculture Research Station, Dor; and the Ministry of Water Development, Nairobi, to study treatment and fish production capabilities of pond configurations receiving wastewaters of varying characteristics under tropical and temperate climates. $709 630 - 2 years

Water management (Nigeria)

For the University of Ibadan to define management and technical strategies for implementing improved water supplies for communities not included in existing water development programs. $34 000 - 15 months

Water pump systems (Canada)

For the University of Waterloo to supply well-designed prototype pumping systems for field testing in selected developing countries. $47 940 - 7 months

Information Sciences

AGLINET Union list of serials

For FAO, Rome, to undertake the compilation of a first-edition Union List of serials held by a network of cooperating agricultural libraries (AGLINET). $42 000 – 1 year

AGRIS corporate names

For the Information Sciences Division of IDRC to prepare a list of corporate names for the identification of information in the AGRIS data base. $44 000 – 15 months

AGRIS (Egypt)

For the Ministry of Agriculture, Cairo, to achieve better control of the country's agricultural literature, to feed data on this literature into the AGRIS data base and produce an Egyptian National Agricultural Bibliography, and to train staff for present and future operations. $67 700 – 2 years

AGRIS trouble-shooters

To enable the Information Sciences Division of IDRC to recruit two professionals to provide assistance and training to agricultural information programs in developing countries participating in international systems, particularly AGRIS (International Information System for Agricultural Sciences and Technology). $253 000 –2 years

Asian Information Centre for Geotechnical Engineering, supplement

For the Asian Institute of Technology, Bangkok, to enable it to continue to support the Information Centre in Bangkok in gathering and disseminating information on geotechnical engineering and research in Asia. $19 360 – 8 months

Asian Information Centre for Geotechnical Engineering, phase II

For the Asian Institute of Technology, Bangkok, to support the Information Centre in Bangkok to continue and improve activities and services, providing information on geotechnical engineering and research relevant to the Asian region. $140 600 – 3 years

Bolivia National Information Centre

For the Centro Nacional de Documentacion Cientifica y Tecnologica, Universidad Mayor de San Andrés, La Paz, under the direction of the Ministry of Planning, to establish a national fund and system for information on development and coordinate the resources of Bolivia in the fields of scientific, technical, social, and economic information. $216 480 – 3 years

Cassava Information Centre, phase II

For the International Centre of Tropical Agriculture, Cali, Colombia, to complete the basic bibliographic work begun in the first phase of the project and to introduce new activities that would reinforce the Centre, thus shifting the emphasis from dissemination of existing documents to the production of new ones to improve communication and cooperation among cassava workers. $218 750 – 2½ years

CEPIS Information system design

For the PanAmerican Health Organization, Washington, to support the Centro Panamericano de Ingenieria Sanitaria y Ciencias del Ambiente, Lima to design a master plan for a regional information system on sanitary engineering and environmental sciences, with a special emphasis on rural potable water supply and sanitation. $141 900 – 20 months

Development reference service (SID), supplement

For the Information Sciences Division of IDRC to extend the assignment of a reference librarian to the Society for International Development, Paris, an additional 6 months on a project to develop a reference guide to information services servicing francophone Africa. $8 500 – 6 months.

Ferrocement Information Centre

For the Asian Institute of Technology, Bangkok, to increase information activities and operations of its Ferrocement Information Centre. $45 000 – 3 years

Health care bibliography, phase II

For the Information Sciences Division of IDRC to continue to identify, collect, abstract, and index information, and publish bibliographies on low-cost health care and health manpower training in developing countries. $232 000 – 1½ years

International Education Reporting Service, phase II

For Unesco, Geneva, to continue support of an International Educational Reporting Service to identify, collect, process and disseminate information about innovation in education. $90 000 – 2 years

International Irrigation Information Centre, phase II

For the International Irrigation Information Centre, Bet Dagan, Israel, to continue, expand

and improve the present activities, providing information services on irrgation science and technology. $501 000 – 3 years

International Serials Data System (Thailand)

For the International Serials Data System — Southeast Asia Regional Centre, Bangkok, to establish a regional centre to identify and provide bibliographic control for serials published in Thailand, Philippines, Indonesia, Singapore, and Malaysia, as part of the ISDS. $74 485 – 5 years

LANDSAT Bangladesh

For the Ministry of Planning, Dacca, to conduct surveys of the Karnaphuli area using both aerial photographs and sequential satellite (LANDSAT) imagery and data. $144 900 – 1½ years

LANDSAT Mali

For the Ministère du Développement industriel et du Tourisme, Bamako, to train necessary personnel and produce a series of thematic maps of the Sikasso region through analysis of land satellite (LANDSAT) imagery and data. $180 950 – 20 months

NIDA Development information seminar

For the National Institute of Development Administration, Bangkok, to host a seminar on the formulation of information policy with a view to fostering among senior planners, administrators, and policy makers an understanding of information systems in the context of socio-economic development. $38 000 – 1 year

POPINS feasibility study

For the United Nations Population Division, New York, to enable an Interim Steering Committee and a Technical Task Force to study the feasibility of establishing a worldwide network to disseminate information on population, to be known as POPINS — International Population Information Network. $27 100 – 9 months

Sorghum and millets information centre

For the International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India, to establish an information centre on sorghums and millets. $306 500 – 3 years

TECHNONET Asia — phase II

To enable the Information Sciences Division of IDRC to continue to support the TECHNONET project in developing extension services for small and medium industries in Southeast Asia. $1 675 000 – 3years

Publications

Family planning communication (Indian Ocean Region)

For the International Planned Parenthood Federation, Indian Ocean Regional Office, Colombo, Sri Lanka, to provide media organizations, policymakers and research institutions with up-to-date information in family planning through the dissemination of a regional family planning fact book and a bimonthly newsletter. $5 500 – 1year

Media survey (Canada)

For the Canadian Council for International Cooperation, Ottawa, to undertake a survey of Canadian newspapers with a view to determining the use of editorial material relating to international development issues. $7 000 – 6 months

Rural press research

For the Asian Mass Communications Research and Information Centre, Singapore, to assess the type of print media most suited to function as a link between scientists and rural people. $36 000 – 1½ years

Social Sciences and Human Resources

Agrarian reform (Peru)

For the Instituto de Estudios Peruanos, Lima, to evaluate agrarian reform in Peru and to assess the new organizations established to carry out the program. $200 000 – 2 years

Association of Development Research and Training Institutes of Asia and the Pacific (ADIPA) — phase II

For ADIPA, Islamabad, Pakistan, to continue to foster the development of collaborative research between member institutes in different countries throughout the region. $125 000 – 3 years

Bureaucratic behaviour (Asia)

For the National Institute of Development Administration, Bangkok, Thailand, and the University of Malaya, Kuala Lumpur, Malaysia, to enable them to join the country teams from Indonesia, Korea, and the Philippines, in a study of the legal codes and administrative regulations of each participating country, to identify and

analyze what is regarded as negative bureaucratic behaviour, estimate the economic and social costs of such behaviour, and assess its influence on the success or failure of development policies and programs. $49 970 – 2 years

Bureaucratic behaviour (Singapore)

For the University of Singapore to study the effectiveness of the administrative structure in Singapore and reasons for the relative lack of deviant bureaucratic behaviour. $19 500 – 1½ years

Culture and fertility (Southeast Asia)

For the National Institute of Economic and Social Research, Jakarta, Indonesia; the National Family Planning Board, Kuala Lumpur, Malaysia; Mahidol University, Bangkok, Thailand; and the Institute of Southeast Asian Studies, Singapore to study the relationships between culture and fertility in Southeast Asia and to develop a methodology for identifying and assessing the variables indicating these relationships. $98 150 – 13 months

Decentralization programs (Tanzania)

For the University of Dar-es-Salaam, to study the effectiveness of local participation in the planning and implementation of development programs, to evaluate the efficiency and effectiveness of development administration systems under the decentralization programs, and to examine the latter's impact on rural development. $160 000 – 3 years

Delivery system for mass primary education (Malaysia)

For the Universiti Sains Malaysia, Minden, Penang, to enable its Centre for Educational Studies to study the educational problems in the rural areas of Malaysia and to develop alternative methods to increase the effectiveness of instruction in primary schools. $500 000 – 3½ years

Delivery system for mass primary education — phase II

For the Regional Centre for Educational Innovation and Technology, Manila, of the Southeast Asian Ministers of Education Organization to continue development and testing of an effective and economical delivery system for mass primary education, and specifically, to expand existing programs to include all primary grades including those at two additional test sites; to further develop, improve and demonstrate components and overall system. $658 000 – 3 years

Development strategies and population policies (Latin America), supplement

For the Centro Latinoamericano de Demografia, Santiago, Chile, to complete a project to examine the demographic impact of socio-economic development strategies adopted in Brazil, Chile, Costa Rica and Cuba. $44 658

Human resources development

For the Social Sciences and Human Resources Division of IDRC to continue its program of awards to encourage and support the growth of individual competence through training and research in the development field. $1 775 000 – 1 year

Implementation of development programs

For the Eastern Regional Organization for Public Administration, Manila, to cover additional costs incurred in printing the book *Implementation: the problems of achieving results*. $851.95

Indonesian demographic journal, phase II

For the University of Indonesia, Jakarta, to enable its Demographic Institute to undertake phase II of a project to publish a journal on demography that will expand population studies and provide an information link among the many universities in Indonesia. $26 000 – 2 years

International Review Group on Population and Development

For El Colegio de México, to enable it to support the International Review Group in its recommendations of directions for research and resource allocations to research that would contribute more effectively to the development of a rationale in determining public policy in population. $50 000 – 1½ years

Pearson Memorial Scholarships

For the Division of Social Sciences and Human Resources of IDRC to implement a Pearson Scholarship Programme to assist in the development of young professionals from developing countries. $432 000 – 2 years

Performance of public enterprise (Caribbean)

For the Institute of Development Studies, University of Guyana, Georgetown, and the Institute of Social and Economic Research, University of the West Indies, Kingston, Jamaica, to describe systematically the public enterprise sector in the Caribbean, to determine performance criteria in the light of national goals, and to make concrete policy recommendations for improving their performance. $375 460 – 2 years

Population distribution policies (Latin America)

For the Corporacion Centro Regional de Poblacion, Bogota, Colombia; the Centro de Estudios de Poblacion, Buenos Aires, Argentina; the Centro de Estudios Sociales y Economicos, La Paz, Bolivia; the Instituto Brasileiro de Administracao Municipal, Rio de Janeiro, Brazil; Facultades Latinoamericanas de Ciencias Sociales, Buenos Aires, Argentina; the Centro para el Desarrollo Rural y Cooperativo, Santiago, Chile; the Centro Paraguayo de Estudios Sociologicos, Asuncion, Paraguay; and the Centro de Informaciones y Estudios de Uruguay, Montevideo, to study policies and programs that influence the distribution of people in human settlements. $210 000 – 1½ years

Population incentives/educational bonus (Korea)

For Keimyung University, Daegu, to enable its Institute of Industrial Management to undertake a limited survey to define the effect of a proposed government incentives program on the socio-economic determinants of fertility, to determine the magnitude of such incentives and to estimate the cost of the program. $29 850 – 15 months

Rural energy studies (Fiji)

For the University of the South Pacific, Suva, to enable its Centre for Applied Studies in Development to study the existing and potential energy needs of the rural people of Fiji and determine the social acceptance of proposed government innovations. $28 000 – 1 year

Sites and services evaluation (Philippines)

For the National Housing Authority, Quezon City, to evaluate the sites and services project in the Tondo district of Manila, assess the impact of the project on the people living in the area, and to develop information that would help in the efficient execution of the project. $150 000 – 4 years

Small industry entrepreneurial development

For the Bureau of Business Research, University of Dacca; the Management Development Institute, New Delhi; the Integrated Development Centre, Soon Jun University, Seoul; Faculty of Economics and Administration, University of Malaya, Kuala Lumpur; Department of Accounting and Business Studies, University of Technology, Lae, Papua New Guinea; the Institute of Small Scale Industries, University of the Philippines, Quezon City; the National Institute of Development Administration, Bangkok; and the Association of Development Research and Training Institutes of Asia and the Pacific, Bangkok, to determine the role of small enterprises in the development process and to evaluate government support programs for such enterprises. $155 000 – 1½ years

Social science development — East Africa "circuit rider"

For the Social Sciences and Human Resources Division of IDRC to place a senior scientist in Africa, with a view to contributing to the development of younger social scientists and research institutions. $255 000 – 2 years

Study-service research network (Nepal)

For Tribhuvan University, Kirtipur, to enable its Institute of Nepal and Asiatic studies to gather and analyze information about the study-service program of the National Development Service, with a view to providing recommendations for improvements in its operation. $24 700 – 16 months

Technologies for the Mexican peasant economy

For the Centro de Investigacion y Docencia Economicas, Mexico, to identify the social and economic factors that have contributed to the generation and diffusion of technologies for the Mexican peasant economy. $35 000 – 1½ years

Tracer studies (Chile)

For the Centro de Investigacion y Desarrollo de la Educacion, Santiago, to increase the understanding of work patterns and their relationship to schooling by surveying members of a 1970 cohort of grade eight students who left school at varying stages after grade eight but did not complete their secondary education. $78 000 – 1 year

Value of children (Asia), phase III, comparative study

For the Korean Institute for Research in the Behavioural Sciences, Seoul, to survey the satisfactions and costs of children, and the motivations for childbearing in South Korea, Philippines, Thailand and Turkey, specifically to conduct a comparative analysis of the national surveys. $39 500 – 33 months

Division Activity Projects

During the year under review a total of $1,883,489 was appropriated for 216 division activity projects. These projects, usually involving relatively small amounts, consist of two main types of activity:

Consultancies, contracts assigned on a limited-term basis either to advise in the preparation of a project, or to advise the Centre in specific areas in planning its overall program.

Meetings, workshops and conferences, organized in support of specific projects or to bring together developing country scientists to explore new fields from which projects may result.

Division activity projects have provided support for a wide range of activities, including a meeting of experts on rural water supply and sanitation in Nicaragua, a seminar for scientific communicators in Cairo, a practical workshop on operational research for health programming in Cameroon, and the establishment of a consultant group for aquaculture research priorities in Southeast Asia, to give just a few examples.

Sixty-six consultancies and 150 meetings were funded under this program during the year. The table below shows a breakdown of how those funds were allocated by program division.

Figures for the fiscal year ending March 31, 1977

PROGRAM DIVISION	MEETINGS	CONSULTANCIES	TOTAL
Agriculture, Food and Nutrition Sciences	98,497.34	234,085.00	332,582.34
Health Sciences	125,904.06	116,150.04	242,054.10
Social Sciences and Human Resources	419,809.70	199,562.00	619,371.70
Information Sciences	246,355.00	185,056.00	431,411.00
Vice-President International	88,625.00	–	88,625.00
Canada and Donor Agency Relations	75,585.04	30,660.00	106,245.04
Publications	63,200.00	–	63,200.00
TOTALS	1,117,976.14	765,513.04	1,883,489.18

Financial Analysis and Statements

The 1976-77 Budget

The 1976-77 Budget was formulated in the expectation that cash resources for that year would total $36.026 million. Our projections assumed a Parliamentary Grant of $29.7 million, interest earnings of $1.766 million and a cash carry-over from the previous year in the amount of $4.560 million. This level of funding enabled the Board of Governors to authorize an appropriation budget of $40.791 million, representing a 7% increase over the appropriation level of the previous year.

New commitments of $36.247 million were expected in 1976-77. This would bring cumulative commitments to $65.647 million, of which it was estimated $31.975 million would have been liquidated by the end of the fiscal year. Of total expenditures, it was anticipated that $27.834 million would be devoted to program activities and $4.141 million would be necessary to support general management. A cash carry-over of $4.051 million was expected.

The IDRC Program of 1976-77

The objectives set in the budget were closely achieved. Appropriations of $39.201 million were approved representing 96% of the budgetary target.

Commitments for the year amounted to $35.677 million, or 98.4% of the budgetary estimate. Cash expenditures of $33.547 million, on the other hand, were 105% of budget. This level of expenditure had the effect of reducing the year-end carry-over to $1.697 million.

The increase in reported expenditures over the budget forecast resulted from a decision to accrue certain costs that had formerly been taken into account only when payment was made. In accordance with this decision $1.261 million in respect of project expenditures was accrued. Similarly $0.961 million was accrued to establish a provision to cover the costs of vacation and other leave credits payable to employees when they leave Centre employment. These credits, set up only in March 1977, include those accumulated in prior years.

At the end of the fiscal year 1976-77, the Centre had uncommitted appropriations (projects approved by the Board of Governors, but not yet covered by a formal contract) in the amount of $12.083 million and outstanding commitments of $31.507 million. As noted earlier, a carry-over of $1.697 million has been brought forward into 1977-78.

Management Costs

In spite of continued domestic and international inflationary pressures, the Centre's management costs have been effectively controlled. Expenditures of all sectors of management have been kept within the budgeted limits.

A more meaningful measure of control than a comparison with the budget may be to relate 1976-77 expenditures to those of the prior year. At $4.818 million, Division management costs rose by 3.8% over the 1975-76 figure. General administration expenditures of $3.977 million were 12.7% higher than in 1975-76. The costs of the Regional and Liaison Offices, at $1.654 million, were virtually unchanged from the previous year. Expressed as a proportion of total expenditures, the costs of all three management sectors compare favourably with the budgetary forecast and with prior year experience. The percentage spent for Division management stands at 14.3%, that for general administration at 11.9% and that for the Regional and Liaison Offices at 4.7%. Total management costs, at 30.9% compare favourably with the 34.8% of 1975-76 and the 34.9% anticipated in the budget.

Special Projects

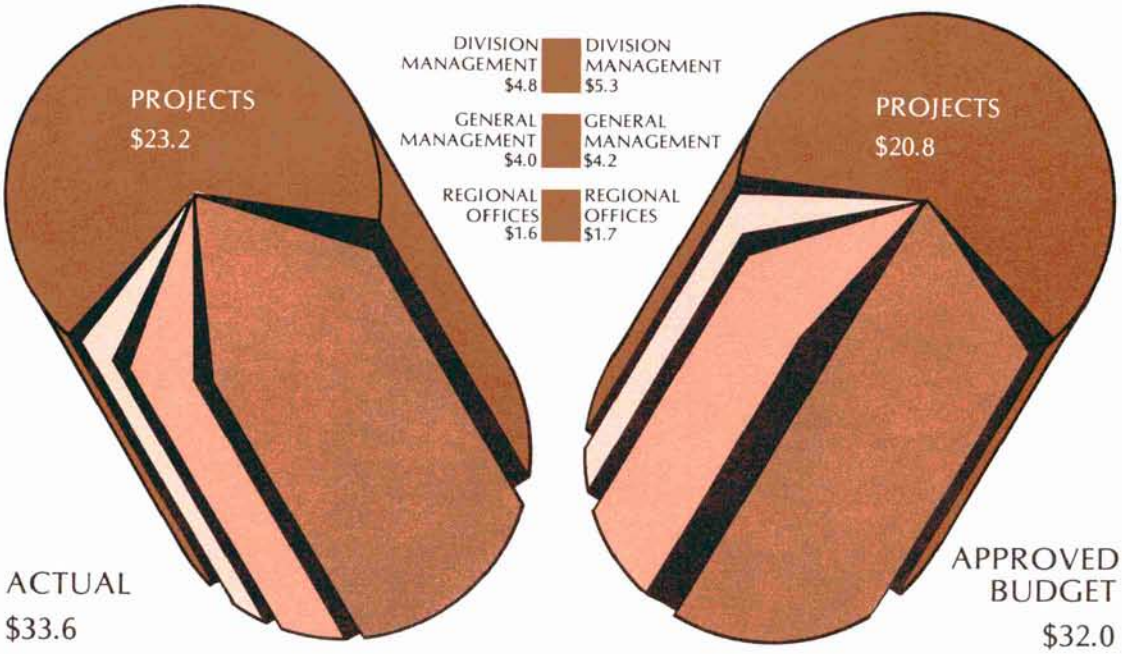
The International Development Research Centre continues to act as a managing agency for the Canadian International Development Agency in the handling of the triticale, cassava/swine and control of wildlife diseases (Kenya) projects. In addition, the Centre acts as the executing agency for the International Bank for Reconstruction and Development in the establishment of the International Centre for Agricultural Research in the Dry Areas. Expenditures in support of these and other projects totalled $2.805 million in the fiscal year. The management costs associated with these projects, which are borne by the Centre, totalled $50,820 for the period.

HIGHLIGHTS — 4 YEARS
($ Millions)

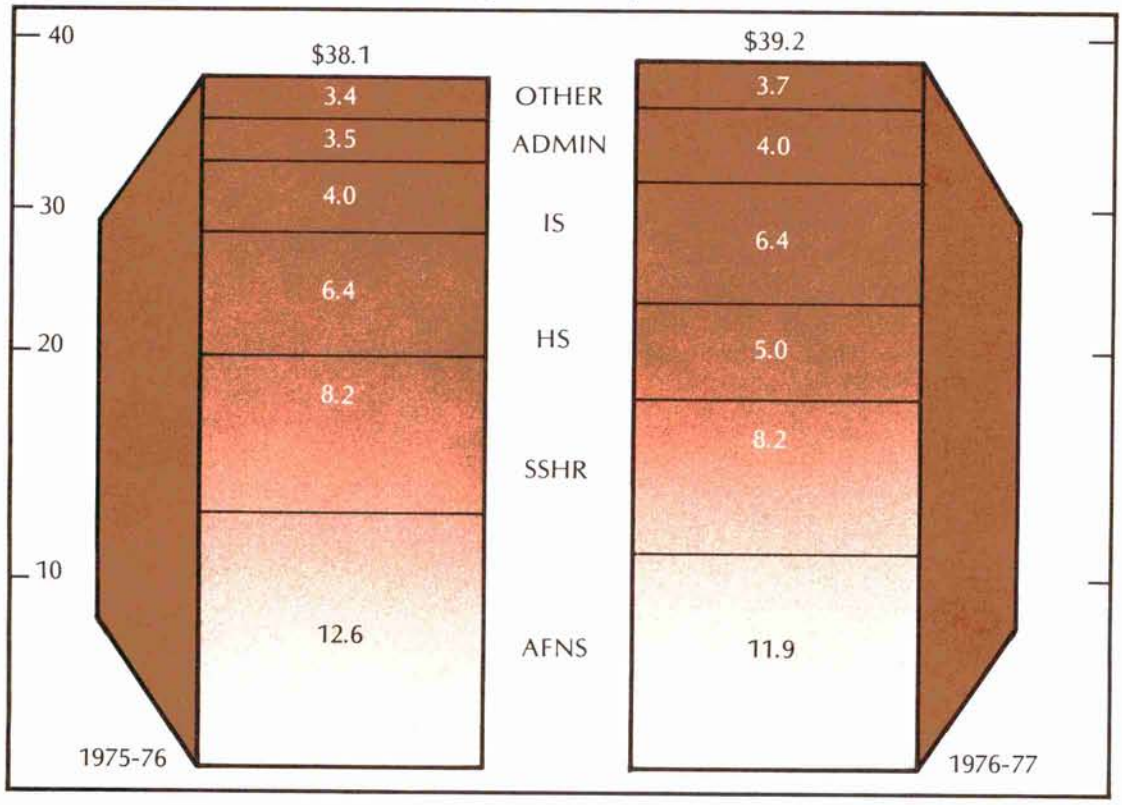
	1973–74	1974–75	1975–76	1976–77
APPROPRIATIONS	22.6	32.2	38.1	39.2
COMMITMENTS	18.2	29.2	38.6	35.7
UNCOMMITTED APPROPRIATIONS	9.2	11.5	9.8	12.1
OUTSTANDING COMMITMENTS	9.8	18.8	29.4	31.5
REVENUE	14.8	20.3	28.3	31.7
EXPENDITURES	13.0	21.6	28.0	33.5
CASH CARRY-OVER	4.5	3.2	3.5	1.7

Certain amounts have been restated to reflect a prior year adjustment recorded in the accounts during the current fiscal period.

1976-77 Distribution of Expenditures ($ Millions)



Distribution of Appropriations by Activity ($ Millions)



Management Report

(in thousands of dollars) (Excluding Special Projects) For the twelve months ended March 31, 1977

Sector/Activity	Approved Budget	Approved Appropriations	Balance Available for Appropriation
1. Program Operations			
Agriculture, Food and Nutrition Sciences	11,572	11,979	(407)
Health Sciences	5,050	5,020	30
Industrial and Engineering Sciences	250	47	203
Information Sciences	5,776	6,410	(634)
Publications	1,377	984	393
Social Sciences and Human Resources	8,275	8,228	47
2. External Liaison and Relations	2,850	2,556	294
3. Administration			
General Management	4,141	3,977	164
Unallocated Centre Reserve	1,500	—	1,500
TOTAL	40,791	39,201	1,590

Allocation of IDRC Financial Resources for Projects and Management — 1976-77 and 1975-76 (in thousands of dollars)

IDRC Activities	Approved Appropriations 1976-77	%	1975-76	%
Program Projects	26,959	68.8	26,449	69.4
Division Activity Projects	1,883	4.8	1,915	5.0
Regional and Liaison Offices	1,564	4.0	1,568	4.1
Division Management	4,818	12.3	4,640	12.2
General Management	3,977	10.1	3,530	9.3
TOTAL	39,201	100.0	38,102	100.0

Commitments	Cumulative Commitments 1976-77	Cash Payments During 1976-77	as at March 31, 1977		
			Uncommitted Appropriations	Outstanding Commitments	Total Encumbrances
13,664	25,374	10,675	2,202	14,699	16,901
4,516	9,656	4,726	1,868	4,930	6,798
42	69	49	—	20	20
3,879	8,218	4,439	2,756	3,779	6,535
936	993	838	44	155	199
6,283	14,199	6,525	5,008	7,674	12,682
2,380	2,568	2,318	205	250	455
3,977	3,977	3,977	—	—	—
—	—	—	—	—	—
35,677	65,054	33,547	12,083	31,507	43,590

Cumulative Commitments				Cash Expenditures			
1976-77	%	1975-76	%	1976-77	%	1975-76	%
51,926	79.8	45,229	80.0	21,834	65.1	17,025	60.8
2,769	4.3	2,423	4.2	1,354	4.0	1,227	4.4
1,564	2.4	1,568	2.4	1,564	4.7	1,568	5.6
4,818	7.4	4,640	7.3	4,818	14.3	4,640	16.6
3,977	6.1	3,530	6.1	3,977	11.9	3,530	12.6
65,054	100.0	57,390	100.0	33,547	100.0	27,990	100.0

Ottawa, Ontario
K1A 0G6

May 18, 1977

International Development Research Centre
and
The Honourable Don C. Jamieson, P.C., M.P.,
Secretary of State for External Affairs,
Ottawa, Ontario.

Sirs,

I have examined the balance sheet of the International Development Research Centre as at March 31, 1977, and the statements of revenue and expense and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion these financial statements present fairly the financial position of the International Development Research Centre as at March 31, 1977, and the results of its operations and the changes in its financial position for the year then ended, in accordance with generally accepted accounting principles applied, after giving retroactive effect to the changes to the accrual method of accounting for vacation and other leave benefits and the portion of cost relating to payments under contract as referred to in note 2, on a basis consistent with that of the preceding year.

I further report that, in my opinion, proper books of accounts have been kept by the International Development Research Centre, the financial statements are in agreement therewith and the transactions that have come under my notice have been within its statutory powers.

J. J. Macdonell
Auditor General of Canada

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
(Established by the International Development Research Centre Act)

Balance Sheet as at March 31, 1977

Assets

	1977	1976
Current assets:		
Cash	$ 43,021	$ 124,881
Bank term deposits and accrued interest	4,383,344	2,191,767
Short-term investments and accrued interest	797,751	3,857,882
Accounts receivable	96,760	52,579
Staff travel advances	58,887	81,027
Prepaid expenses	111,924	168,591
	5,491,687	6,476,727
Non-current assets:		
Recoverable deposits	50,762	46,124
Residence at cost net of accumulated depreciation $10,854 (1976 — $6,784)	115,903	119,973
	166,665	166,097
	$5,658,352	$6,642,824

Liabilities

	1977	1976
Current liabilities:		
Accounts payable and accrued liabilities		
— Projects (Note 2)	$1,760,222	$1,328,603
— Others (Note 2)	1,034,685	827,073
Funds provided for special projects (Note 4)	103,123	298,511
	2,898,030	2,454,187
Provision for employee termination benefits	1,062,352	644,626

Equity of Canada

Cumulative excess of revenue over expense:		
Balance at beginning of year		
As previously reported	4,559,872	4,293,126
Prior period adjustments (Note 2)	1,015,861	1,104,375
As restated	3,544,011	3,188,751
Excess of expense over revenue for the year	1,846,041	(355,260)
Balance at end of year	1,697,970	3,544,011
	$5,658,352	$6,642,824

The accompanying notes are an integral part of the financial statements.

Certified correct: R. J. Audet
Treasurer

Approved: W. D. Hopper
President

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
Statement of Revenue and Expense for the year ended March 31, 1977

	1977	1976
Revenue:		
Grant received pursuant to External Affairs Vote 30	$29,700,000	$27,000,000
Funds provided for special projects		
— CIDA	1,592,256	1,826,648
— Others	1,241,969	624,784
Interest and other income	2,000,337	1,280,851
	34,534,562	30,732,283
Expense:		
Programs:		
Agriculture, Food and Nutrition Sciences	10,623,958	7,946,922
Social Sciences and Human Resources	6,524,552	5,648,731
Health Sciences	4,725,519	4,352,898
Information Sciences	4,438,876	3,147,925
External Liaison and Relations	2,318,248	2,336,244
Industrial and Engineering Sciences	49,123	120,236
Special Projects	2,885,045	2,475,806
	31,565,321	26,028,762
Program related expenses — Publications	838,340	753,717
	32,403,661	26,782,479
Administration:		
Salaries, allowances and benefits	2,227,025	1,878,795
Office rent and accommodation	728,722	595,009
Communications	244,382	250,993
Professional and special services	152,097	195,155
Staff travel and relocation	147,572	183,330
Governors' meetings, honoraria and travel	140,816	107,643
Office supplies	94,681	99,918
Printing and duplicating	70,635	81,682
Insurance	53,171	48,850
Furniture and equipment	17,950	55,115
Sundry	99,891	98,054
	3,976,942	3,594,544
	36,380,603	30,377,023
Excess of expense over revenue	$1,846,041	($355,260)

The accompanying notes are an integral part of the financial statements.

Statement of Changes in Financial Position
For the year ended March 31, 1977

	1977	1976
Source of working capital		
Results of operations		
Excess of revenue over expense	$ —	$ 355,260
Non-cash outlay — depreciation	—	2,375
	—	357,635
Sale of residence	—	44,327
Increase in provision for employee termination benefits	417,726	308,963
	417,726	710,925
Use of working capital		
Results of operations		
Excess of expense over revenue	1,846,041	—
Non cash outlay — depreciation	4,070	—
	1,841,971	—
Increase in recoverable deposits	4,638	12,844
	1,846,609	12,844
Increase (Decrease) in working capital	(1,428,883)	698,081
Working capital at beginning of year	4,022,540	3,324,459
Working capital as at end of year	$2,593,657	$4,022,540

The accompanying notes are an integral part of the financial statements.

Notes to the Financial Statements
March 31, 1977

1. Accounting Policies

The Centre follows the accrual basis of accounting to record revenue and expense.

Centre funds held in foreign currency accounts have been converted into Canadian dollars at the rate of exchange in effect on the dates funds were originally transferred to such accounts. Had these funds been converted at the year-end rate of exchange, the Canadian dollar equivalent would not be significantly different.

Furniture, equipment and lease-hold improvements are expensed in the year of acquisition except for one revenue producing residence which is recorded at cost and is depreciated on a straight line basis at 4% per annum.

2. Changes in Accounting Policies

In 1977 the Centre adopted the policy of recording all project costs on an accrual basis, whereas, previously the position of these costs relating to payments under contract was recorded only at the time of actual disbursement.

In 1977 the Centre also adopted a policy of recording in its accounts a provision for vacation and other leave benefits earned but not yet paid. Previously the Centre had recorded such benefits only at the time of actual disbursement.

These changes in accounting policy, which were applied retroactively, resulted in additional expense for 1977 of $1,201,331 and a reduction in previously reported 1976 expenses of $83,673. The cumulative effect of these changes on the cumulative excess of revenue over expense as at March 31, 1977, amounted to a reduction of $2,222,036.

3. Commitments and Contingent Liabilities

Subject to funds being provided by Parliament, the Centre is committed to make contributions totalling $28,744,784 during the next four years.

In addition the Centre has submitted formal offers to prospective recipients totalling $2,687,304 and is awaiting acceptance of these offers.

4. Special Projects

The Centre has entered into agreements with various donor agencies whereby the Centre has assumed responsibility for project management on their behalf. The Centre receives funds under these agreements to meet actual project costs incurred. As at March 31, 1977, the Centre has commitments totalling $1,288,849 which will be met by funds provided under such agreements.

5. Comparative Figures

Certain figures for the previous year have been reclassified to conform to the current year's presentation.

Human Resources

In keeping with the Centre's commitment to invest in the training and development of young professionals, nearly every project supported by the Centre includes funds especially earmarked for this purpose.

Complementing this in-project training, the Centre has supported additional programs designed to promote the professional competence of scientists in developing countries. The Southeast Asia Population Research Awards Program (SEAPRAP), supported jointly with the Ford Foundation, has as its goal to expand population research capability in Southeast Asia by encouraging young researchers to develop proposals and to execute them in a local setting under the sponsorship of a senior research advisor in his or her institution.

With IDRC support, the Agricultural Development Council is continuing its regional research and training program in Asia. The objectives of the project are: to stimulate and improve the research and training capabilities of young scholars and mid-career professionals in both academic and government institutions; to increase the opportunity for research on crucial problems by scholars of the region; and to make available material relevant to the region for use in teaching and research.

The Centre grant to the Council for Asian Manpower Studies provides opportunities for research and training to Asian researchers in the field of Manpower Studies. Similarly, the Social Science Research Training Program of the University of Indonesia, funded by IDRC and the Ford Foundation, was set up to enhance the development of social sciences in Indonesia by providing research training opportunities to potential social science professionals in that country.

The Centre's Human Resources awards program, designed both to assist Third World researchers and to increase the present available resource base in Canada of professionals with training in the problems of development, was renewed for a seventh year.

A description of the seven award categories listed below is given on the following pages, together with a list of the candidates selected to receive awards during the coming year:

— Thesis Research awards — Ph.D. degree (Canada)
— Thesis Research awards — Ph.D. degree (Students from Developing Countries)
— Research Associate awards (Canada)
— Research Associate awards (Developing Countries)
— Senior Research Associate
— Research Fellows
— Pre-Post Project Training awards

A brief outline of the work undertaken by candidates having received awards during the year under review is also given.

Thesis Research Awards — Ph.D. degree (Canada)

This award is intended for the Canadian graduate student who has already made a commitment to the field of development by his choice of thesis topic. It is given to support research for the Ph.D. Thesis after course work has been completed. The research will generally be conducted in a developing country.

Awards are for Canadian citizens and are made by means of an annual competition. During 1976-77 seven awards were made; five from among candidates recommended for awards in March 1976, and two candidates recommended in March 1977*. Three candidates recommended in 1977 had not taken up tenure at the time of writing.

AWARDED

Award holder	Thesis Topic	Location of Tenure
Alan B. Amey* University of East Anglia Norwich, England	Rural — Non-rural relations in Tanzania: An analysis of inter-sectoral resource flows	University of East Anglia Norwich, England
L. G. Clarke Dept. of Political Economy University of Toronto	Carrying out the revolution in the superstructure: The nature and significance of political campaigns in the People's Republic of China	People's Republic of China
Dennis K. Friesen Dept. of Land Resource Science, University of Guelph	Nutrient balance in oxisols and ultisols of the humid tropics as influenced by liming	International Institute of Tropical Agriculture Ibadan, Nigeria
Robert A. Hawes* Cornell University U.S.A.	To undertake research on natural resource assessment for development planning in the Guanare-Masparro region of Venezuela	Guanare, Venezuela
Miss Barbara M. Jamieson Dept. of Economics University of Toronto	The determinants of agricultural research expenditure in Kenya	Institute for Development Studies, University of Nairobi, Kenya
Gordon Mace Département des sciences politiques Université de Genève	Political regimes and regional integration in the case of Andean Group, 1968-74	Mexico, Lima, Peru
Kenneth W. Riley Dept. of Plant Science	Improvement of nutritional quality in sorghum	India (Hyderabad) University of Manitoba

RECOMMENDED (March 1977)

Mrs. Paz C. Buttedahl, Dept. of Adult Education, Florida State University
Ms. Pamela J. Ormston, University of British Columbia
Mrs. Virginia A. Shrivastava, University of Toronto

Thesis Research Awards — Ph.D. degree (Students from Developing Countries)

This award is designed to enable graduate students from developing countries, registered in Canadian universities, to undertake their thesis research in their home country. Candidates must be citizens of developing countries, in Canada on a student visa. The financial and academic terms of the awards are similar to those for Canadian students.

This program was conceived as a small contribution to counteract the "brain drain". Many developing country students are obliged to do a "Canadian" thesis because they lack the funds to undertake their field work at home. The awards will permit a number of students to do thesis work more relevant to development problems, and to be more easily integrated into the research communities in their own countries.

During 1976-77 four candidates selected in March 1976 took up tenure. Of the five awards recommended in March 1977 four have already been committed.*

AWARDED

Award holder	Thesis Topic	Location of Tenure
Teshome Akalehiywot Ethiopia	Investigation on the mode of action of water stress in the control of germination of different varieties of oat seeds	University of Calgary, Canada
Joshua O. Akol* Sudan	The resettlement of Southern Sudanese refugees — A basis for socio-economic development	Universities of Khartoum and Juba, Southern Sudan
Ahamad Baksh* Guyana	Education, unemployment and mobility in the emergent nation of Guyana	University of Guyana
Jean-Paul Burafuta* Burundi	Attitudes of the elite towards population growth and economic development in Burundi	Université de Bujumbura and Département de l'intérieur, Burundi
Mrs. O. C. Caoli Philippines	Science policy in the Philippines: Professional education and training	The Centre for Policy and Development Studies, University of the Philippines at Los Baños
Mrs. Rose Leke Cameroon	Immune mechanisms during experimental cerebral malaria	University of Montreal
Chijioke Odimuko Nigeria	Urban-rural feedback interactions: development and policy in Southeastern Nigeria	University of Nigeria
Godwill E. Okoro* Nigeria	Role of burning in phosphorus recycling and availability in selected acid soils of Nigeria	Intl. Institute of Tropical Agriculture, Ibadan, Nigeria

RECOMMENDED

Joseph Gogo, Dept. of Geological Sciences, McGill University

Research Associate awards (Canada)

These awards are designed to provide a "sabbatical year" for Canadian professionals at the mid-career level, to undertake training, research or investigation in the field of international development. The aim is to allow Canadians already involved in international development to update their skills and knowledge, and to encourage others who have little or no experience in developing countries to explore this field.

Ten awards are offered annually to Canadian citizens and landed immigrants with three years residence in Canada. The ten award holders for 1976-77 are listed below, followed by the list of the ten candidates recommended for awards in May of 1977.

AWARDED

Award holder	Project	Location of tenure
Louis-Marie Asselin Lévis, Québec	Production of methodology documents on agriculture statistics in Rwanda	Rwanda and Quebec
Paul Bélanger Longueuil, Québec	To undertake a training and instruction course on continuing education and development	Canada, West Africa and France
Miss Muriel Bent Middleton, N.S.	To study towards a Master's degree in community health	School of Tropical Medicine, Liverpool, England
Paul G. Duchesne Ottawa, Canada	To undertake studies towards a Master's degree at the School of International Affairs	Carleton University, Ottawa, Canada
Bruce Etherington Burlington, Ontario	Research on social and political factors in community development	Institute of Planning, University of the Philippines
William McCarter Burlington, Ontario	A systems analysis of low-cost/high density urban transportation	Institute of Planning, University of the Philippines
Nguyen Cong Thanh Quebec City, Que.	Functional design of water supply systems for developing countries	Asian Institute of Technology, Bangkok
Romain Paquette Sherbrooke, Québec	Differences between "mental maps" and actual land use maps in the Caribbean	Centre of Caribbean Studies of the University of Montreal, and Martinique
Samuel Wex Montreal, Quebec	Transnational economic relations and negotiations by less developed countries	Colombia University Law School, U.S.A.
John E. Wieler Winnipeg, Manitoba	Development program planning, design and evaluation	School of Development Studies University of East Anglia, England

RECOMMENDED

Andrée Black-Michaud, Montreal, Quebec
John Davies, Ottawa, Ontario
Adrienne Hunter, Toronto, Ontario
Arthur F. Huston, Regina, Saskatchewan
Charles D. Middleton, Toronto, Ontario
Baldev R. Nayar, Westmount, Quebec
Mrs. Donna L. Skillen, Hamilton, Ontario
Francis G. Snyder, Downsview, Ontario
John C. Steele, Toronto, Ontario
Walter D. Sutherland, White Rock, British Columbia

Research Associate awards (Developing Countries)

Awards made in this category are designed to assist Third World professionals, engaged in activities associated with development in their countries, to spend a year in research or training appropriate to their career development.

Award holders are selected from nominated candidates, rather than by open competiton. During 1976-77 31 award holders took up tenure (some of these were candidates selected the previous year) and nine candidates were recommended for awards.

AWARDED

Award holder	Project	Location of tenure
Salah Abu-Shakra Lebanon	Research on the efficiency of symbiotic N-fixation in legumes under semi-arid conditions	University of California, U.S.A.
Adetunji Adeniji Nigeria	Courses and practical training in cartography	University of Wisconsin, U.S.A.
Thia Eng Chua Malaysia	Coastal aquaculture and marine laboratories	Asia, North America and Caribbean
Kavi Chutikul Thailand	Research and training in development administration, with emphasis on agricultural and rural development	Cornell University, U.S.A
Cumberbatch, E. R. Barbados	Visit land settlement and irrigation projects and orchard crop development schemes in Israel, Malaysia and Taiwan	
Robert W. M. Cuthbert	Research on the Church as an agent of development in the Caribbean	Dept. of Religion Columbia University, U.S.A.
Angel F. de las Casas Peru	Participation, production, organization and development: The Peruvian case	Peru
Pierre O. Dougoue Ivory Coast	To study the planning, direction and evaluation of educational television production in Ivory Coast	Complexe d'Education Télévisuelle, Bouaké, and in Paris
Chukwuemeka Ebo Nigeria	To undertake studies in research methods	University of Michigan, U.S.A.
Mrs. S. El-Messiri Egypt	Research on mobility and identity in an Egyptian town	American University, Cairo
Gihad El-Mikaaty El-Rashidy Egypt	Studies and research on population growth in Egypt	David Owen Centre University College Cardiff, Wales
Mohammed A. El-Rayah Sudan	Studies towards a Ph.D. degree in mammalian systematics and ecology	University of Toronto, Canada
S. A. Farag Egypt	Effects of mass communication on human resources	Central Washington State College, U.S.A.
H. Giron de la Pena Mexico	Ecological developments, rural development, appropriate technology, low-cost and self-help housing	University of British Columbia and the Philippines Government
Edgar Hidalgo Colombia	Study for M.B.A. degree	Instituto Centro-americano de Administracion de Empresas, Managua, Nicaragua
Jack Ibrahim Lebanon	Studies and preliminary research in the field of water pollution and waste water	
Afaf Deeb Kandis Lebanon	A comparative study of socio-economic correlates in desired family size and fertility in some countries of the Middle East	Damascus, Syria, Jordan and Kuwait
N. S. Lamba India	Study on building new towns in developing countries	Chandigarh, India and University of Nairobi, Kenya

Mahawa Mbodj Senegal	Training course in tropical livestock feeding and nutrition	Dept. of Animal Science University of California, U.S.A.
Arun K. Misra India	Comparative economic analysis of the agricultural development potential of small farmers of Orissa, India and in Missouri, U.S.A.	University of Missouri, U.S.A.
Quy Bong Nguyen Vietnam	Exploration of primary education innovations in Southeast Asia	Ontario Institute for Studies in Education, Toronto, Canada
Mrs. L. Nkanza Zaire	National integration — State middle class, ethnic groups and foreign economic power	Harvard University and Ottawa
Lédéa B. Ouedraogo Upper-Volta	Yatenga pre-cooperative pool: an experiment in modernizing traditional structures	Organisme régional de développement, Yatenga, Upper-Volta
V. T. Palan Malaysia	To study the effect of non-contraceptive practices on fertility and family health	University of Michigan, U.S.A.
K. Honoré Patokideou Togo	To undertake research on social policies and their impact in rural areas	Central African Republic
Mohamed Riad Egypt	To undertake studies in the field of social work	School of Social Work University College Cardiff, Wales
Walter Rodney Guyana	To conduct historical research on the political economy of Guyana 1880-1939	Institute of Commonwealth Studies, London, England and Institute of Development Studies, Guyana
Daniel Samper	To undertake a study on mechanisms of self-control in the press	New York and London, England
Thirunavuk Sinnathuray Singapore	To undertake research and training in academic obstetrics and gynaecology	Monash University, Melbourne, Australia
Rehman Sobhan Bangladesh	To undertake a study of the Bangladesh development experience	Queen Elizabeth House Oxford, England
Mrs. S. Vichitsonggram	To study research methodologies and management of pre-school and non-formal education in Australia and other developing countries	Australian National University

RECOMMENDED

W. R. Chan, Kingston, Jamaica.
Nuhad J. Daghir, American University of Beirut, Lebanon.
Ahmed Fouad Khalifa, Cairo University, Egypt.
Jaime Nino Diez, Colombia.
Mohamed El-Din Shawky, Faculty of Agriculture, Cairo University, Egypt.
Kenneth L. Stuart, Chemistry Dept., University of the West Indies, Jamaica.
S. Thamutaram, Ministry of Agriculture, Kuala Lumpur, Malaysia.
Clive Y. Thomas, University of Guyana.

Senior Research Associate award

This award is designed for senior professionals in the field of development, both in Canada and in developing countries. Awards are offered by a process of nomination and selection by a committee presided over by the Chairman of the Board. Three awards were made in 1976-77 and three recommended (May 1977) as follows:

Award holder	Project	Location of tenure
Mauricio Guerrero Peru	To write a history of the Integracion Andina, Buenos Aires	Lima, Peru
Joseph G. Odero-Jowi Kenya	To undertake research on the East African Community and its future	IDRC Ottawa
Antoine Zahlan Lebanon	Science and technology policy study in the Middle East	University of Sussex, Science Policy Research Unit, England

RECOMMENDED

Nicolas Ardito-Barletta, Ministry of Planning and Economic Policy, Panama
Osman Ally Badran, Faculty of Agriculture, Alexandria University, Egypt
Miguel S. Wionczek, El Colegia de Mexico

Research Fellows

Through the Research Fellowships, the Centre aims to recognize excellence and major contributions by senior researchers in the development field. This Award provides the opportunity for senior research scholars to draw the greatest benefit from their previous experience through a year of research, reflection and writing.

Up to five appointments may be made each year by the Executive Committee of the Board of Governors on the recommendation of the President. The following Research Fellows were appointed this year.

Fellow	Project	Location of tenure
Prof. Gelia T. Castillo University of the Philippines	To study and write on the social dimensions of Philippine rural development	The Philippines
Dr Jorge Hardoy Instituto Torcuato di Tella, Buenos Aires, Argentina	Analysis of new approaches to implementation of urban policies in countries with different socio-political systems	Institute of Development Studies, University of Sussex, England

Pre-Post Project Awards

This award program is intended to provide training for individuals from developing countries prior to their participation in an IDRC-supported project, and to further the training of others who have been associated with IDRC projects.

Nomination and selection for this award are made by the appropriate program division in cooperation with the Division of Social Sciences and Human Resources. The number of grants to be awarded annually is variable, as is the level of the grant; the nature and location of training are dependent upon the individuals selected. The awards given during the year under review are:

Pre-Project Awards

Award holder	Field of training	Location of tenure
Mrs. Avril Chang England	Oysterculture	Jamaica and Vancouver, Canada
Mrs. V. Chin See-Arjoon Jamaica	Health manpower development	Seattle and Honolulu, U.S.A.
Ms. Araceli L. Dolendo Philippines	Handling and transportation of fresh fruit and vegetables	Commonwealth Scientific and Industrial Research Organization, Sydney, Australia
Fritz Njoh Elango Cameroon	Ph.D. program in plant pathology	Ibadan, Nigeria
Juan Alberto Fuentes Guatemala	To undertake discussions and define a program of work in connection with Central American technology policy studies	Central America
Mrs E. L. Hall	Master's program on community medicine	Liverpool School of Tropical Medicine, England
Carl Hanson Jamaica	Oysterculture	Vancouver, Canada
Eleanor M. Humphrey Guyana	Health manpower development	Seattle, Honolulu and Los Angeles, U.S.A.
Ahamad Kamari Malaysia	Handling and transportation of fresh fruit and vegetables	Commonwealth Scientific and Industrial Research Organization, Sydney, Australia
James Roland La Rose Guyana	Health manpower development	Seattle and Honolulu, U.S.A.
Mrs Lynette P. McKenzie Guyana	Health manpower development	Seattle and Honolulu, U.S.A.
Sasenarine Singh Guyana	Health manpower development	Seattle and Honolulu, U.S.A.
Kamal Sitinjak Indonesia	Handling and transportation of fresh fruit and vegetables	Commonwealth Scientific and Industrial Research Organization, Sydney, Australia
Mrs. Yvette O. Thomas-More Guyana	Health manpower development	Seattle and Honolulu, U.S.A.
Frank M. W. Williams Guyana	Health manpower development	Seattle and Honolulu, U.S.A.

Post Project Awards

Award holder	Field of training	Location of tenure
Hector Botero Colombia	Technical development	University of Sussex, England
Carlos Contreras Chile	Technology transfer	Madrid, Spain
Sidiki Coulibaly Upper-Volta	Research for a doctoral thesis in demography	University of Montreal, Canada
Marco A. Encalada Ecuador	Master's Program in communications research	Stanford University, U.S.A.
Richard C. Finlay Canada	Ph.D. program in plant science	University of Manitoba, Canada

Abdelwahab Ghobashi Egypt	M.Sc. program in plant breeding	The University College of Wales
German Gutierrez Colombia	M.Sc. program in agricultural economics	University of Guelph, Canada
Alberto Harth-Deneke San Salvador	Ph.D. thesis in connection with low-cost housing	Massachusetts Institute, U.S.A.
Lim Chhor Heng Malaysia	Master's degree in computer science	Dept. of Computer Science, University of Warwick, England
Alimur Rahman Bangladesh	To complete a doctoral thesis on the performance of public enterprise	University of Sussex, England
Ciro A. Villamizar Colombia	Ph.D. program in administration	Texas A. and M. University, U.S.A.

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(Bob Stanley, Editor-in-Chief/Rédacteur en chef) Published in three separate language editions, this is a quarterly magazine about the work supported by the International Development Research Centre and about related activities in the field of international development, and is available on request from the Centre's Publications Division.

Cette revue trimestrielle, consacré aux recherches financées par le Centre pour le développement international et aux activités connexes dans le domaine du développement international, est publiée en éditions anglaise, française et espagnole, et peut être obtenue sur demande à la Division des publications du Centre.

IDRC Features/Reportage CRDI

This monthly news features service on scientific, technical and educational subjects pertinent to development, is provided free of charge to selected newspapers and magazines in the developing world.

Ce bulletin mensuel d'information sur l'actualité scientifique, technique et éducative dans le domaine du développement, est distribué gracieusement aux principaux journaux et magazines publiés dans le monde en voie de développement.

Publications by staff and consultants
Publications rédigées par les cadres et conseillers du Centre

If the material listed in this section cannot be obtained from normal sources (authors, libraries, bookstores), IDRC will try to supply copies. In case of short supply, preference will be given to individual researchers in developing countries.

Si vous ne pouvez obtenir les ouvrages sous-mentionnés chez les dépositaires habituels (auteurs, librairies, bibliothèques) le CRDI s'efforcera de fournir les exemplaires demandés. Vu l'approvisionnement limité en certaines publications, les stocks en voie d'épuisement seront, de préférence, réservés aux chercheurs particuliers des pays en voie de développement.

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