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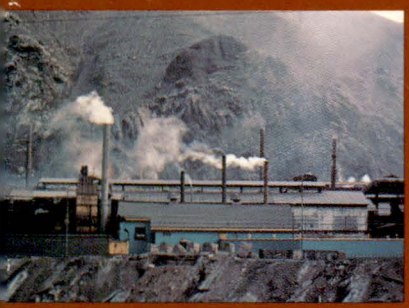
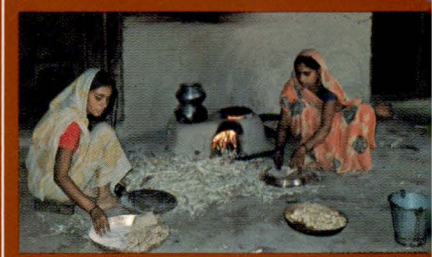
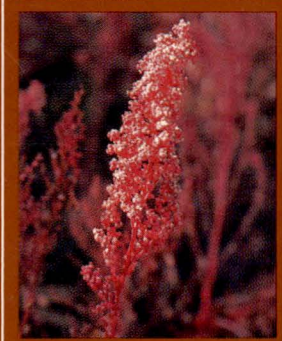
Review of IDRC Activities 1981







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Review of
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1981

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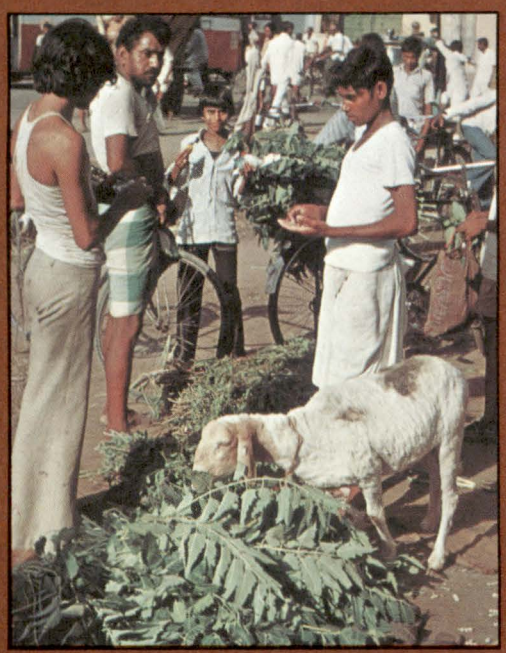
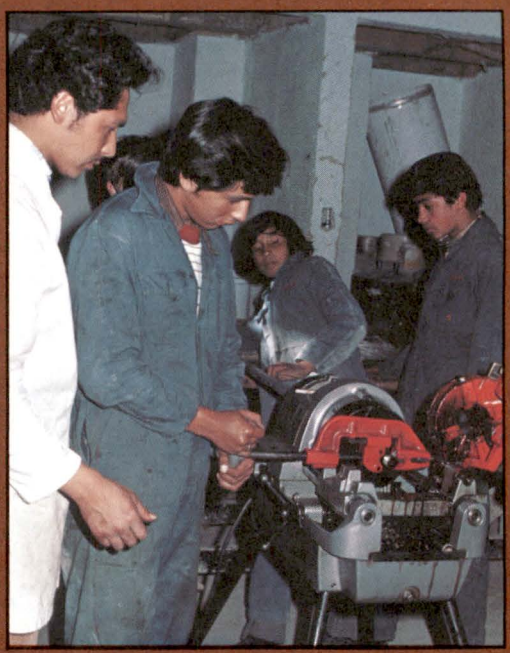
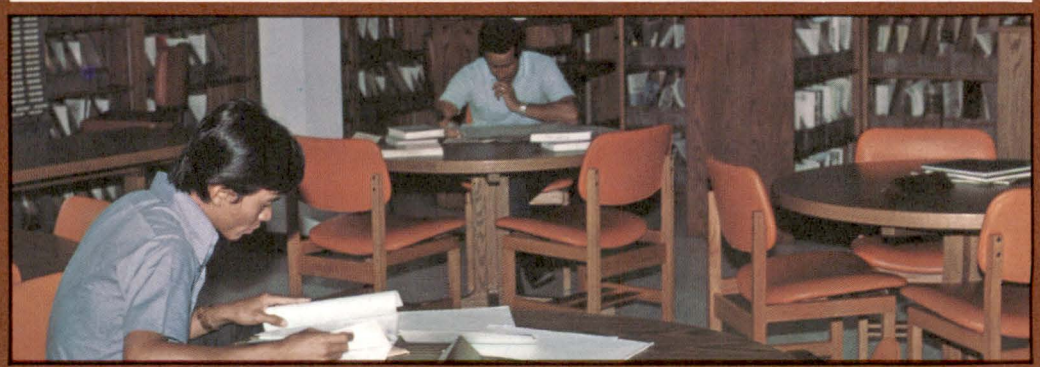






Introduction

The year 1981 might well be called the Year of the Summit. Four such extraordinary, multinational gatherings took place: the Western economic summit in Ottawa, the Commonwealth Heads of Government meeting in Melbourne, The North–South summit in Cancun, and the Francophone African deliberations in Paris.

Canada played significant roles in the first three of these meetings, but what is more important is the fact that, at all of these gatherings, the leaders of the developed and the developing countries alike publicly recognized their interdependence. That might seem a very small step, but in attitudinal terms, it marks a considerable breakthrough — and one long overdue.

IDRC President, Ivan L. Head, visits a Centre-supported project in East Africa.

It is short-sighted to assume that North–South relations are played according to the rules of a zero-sum game in which each point gained by one participant is a point lost to another. International development, in fact, is a mutually beneficial process in which all win, or in default of which all lose. The overall health and vitality of the developing world is central to the well-being of the economically developed nations, Canada among them.

That is one reason why IDRC pays the attention it does to the strengthening within the developing countries of indigenous

scientific competence. The Centre continues to emphasize, as it has since its inception, agricultural research, the health sciences, improved communication and exchange of information, and a better understanding of the social dimension of development. In addition, increasing emphasis is devoted to the Centre's fledgling Cooperative Program, designed in response to the request of the developing countries to permit collaborative scientific endeavours between them and Canadian research institutions. A report on the first full year of activity of this new program is to be found on page 33 of this booklet.

As the Centre moves into its second decade, it is endeavouring to acquaint decision-makers within the developing countries of the wealth of scientific and technological knowledge that is now available for broad application and utilization. A good deal of this knowledge is the product of actual field research undertaken with the support of IDRC. Its practicality and its applicability under local conditions have already been proved. It now needs the support of government to be implemented for advantage.

The wise men who formulated the Centre's charter anticipated this generation of activity. IDRC is called upon by its statute not only to conduct research into "the problems of the developing regions," but also into "the means for applying and adapting" that knowledge. In discharging its mandate, the Centre attempts always to be practical. Practicality is a criterion employed in the assessment of proposals for research funding. Practicality demands as well that positive research results be applied for the benefit of the people of the developing countries and not left on an institutional shelf, there to gather either honour or dust. Human dignity is ill-served by stagnant knowledge.

Ivan L. Head
President, IDRC

Back to Basics

Food, energy, and water are three of humanity's most basic requirements. Yet simply acquiring enough of these occupies perhaps one-third of the world's people, all day, every day. To fail to do so is to fail to survive.

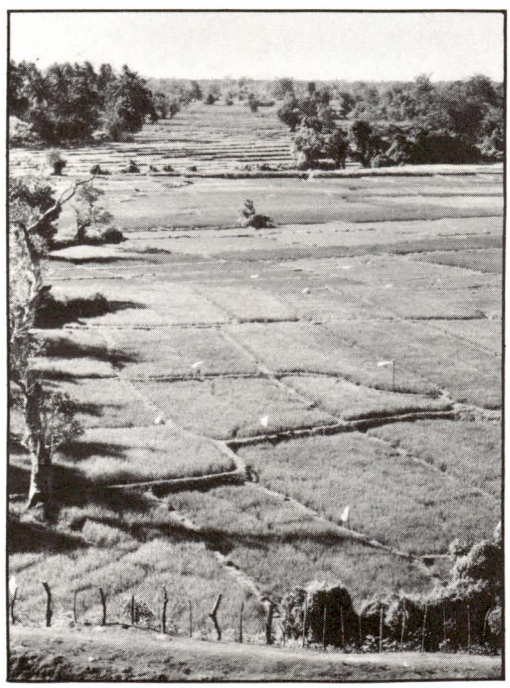
These are the poorest of the poor in the vast rural areas of the developing world: the small farmers with just a hectare or two of land, the landless labourers, the hundreds of thousands of refugees fleeing from war and deprivation. Those who fail in the daily search will be that much weaker tomorrow, that much more likely to fail again. The ultimate penalty for failure is death, from starvation, or more likely, from malnutrition and disease.

The facts speak for themselves. About 500 million people are suffering from serious malnutrition. About one billion people have no safe water or adequate sanitation facilities. About 100 million people live in areas where there is an acute shortage of fuel of any kind for cooking and heating. But, in spite of gloomy statistics like these, 1981 presented some cause for optimism, however fragile.

Item: Food — 1981 has been a bumper crop year, notwithstanding another poor harvest in the Soviet Union. The benefits of agricultural research and development are making themselves felt in some developing countries. For example, five years ago, India imported U.S. $1.67 billion of grain. Last year, India exported $2.7 billion of rice and other food items, and was actually in a position to offer food loans to neighbouring countries.

The World Bank's 1981 Development Report advises that per capita food consumption worldwide now exceeds the minimum requirement by eight percent. The same report adds, however, that in 52 of 127 countries for which statistics are available, per capita food consumption was below the minimum. In other words, there is enough food for everyone, but not everyone is getting enough.

IDRC's agriculture, food and nutrition sciences staff, while striving to find every means to increase food production, have long been aware that merely producing more food is not of itself sufficient to overcome the problem of world hunger. Hence the continued and growing emphasis on support for research projects in the postproduction field. A systems approach to research on the handling of food, from harvest to consumption, helps to reduce the



Flourishing rice fields in Sri Lanka: a bumper crop year for some nations.

government funding for research on the energy needs of developing countries, the funding to be provided over four years. Although the Centre already funds many energy-related projects (some of which are reported elsewhere in this review), the additional grant will permit the development of a coordinated program for research in this vital field that reaches across the divisional boundaries within the Centre.

One of the program's first steps will be to help the developing countries identify their own research needs in the energy field. A research review and advisory group will be formed to advise both national governments and donors on areas where research is needed. This is a technique the Centre has used successfully in the past in other fields.

Experimental solar energy equipment at Egypt's National Research Centre: identifying needs.

present unacceptably high levels of waste. It also ensures that the food gets where it is needed, when it is needed.

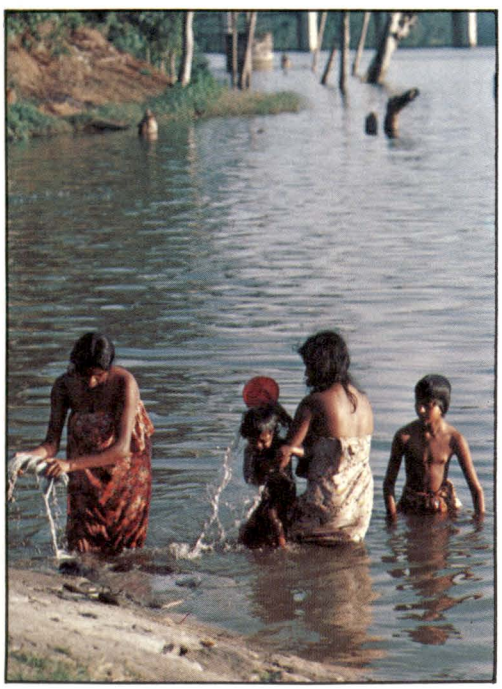
Item: Energy — A positive move was the commitment by Canada's Prime Minister, Pierre Trudeau, at the Nairobi UN Conference on New and Renewable Sources of Energy to make available $10 million in

Item: Water — The year 1981 marked the beginning of the International Drinking Water Supply and Sanitation Decade. The Decade's targets are ambitious: water and sanitation for an additional half billion people by 1990, technical and professional training for a million workers, and commitments by the developing countries and the

donor agencies to continue efforts to eradicate water and sanitation problems entirely by the end of the century.

Only time will tell how well this immense undertaking succeeds, but already there are signs of progress in many countries. IDRC's health sciences program has been active in this field for many years, and continues to press the importance of social and economic aspects of water and sanitation programs, while at the same time providing valuable support for technological research and development. Because of its sensitive and complex nature, this is a field that also involves the Centre's social sciences, information sciences, and communications programs.

To say that these basic problems facing



Water and sanitation for half-a-billion people by 1990: ambitious target.

the Third World are almost overcome is both misleading and cruel. Yet, in the face of statistics that are often so immense as to be almost incomprehensible, it is often easy to be overwhelmed, to assume that these problems are simply too large to be resolved.

Such an attitude denies the very real progress that has been made. Even in the low-income countries, the average life expectancy has increased from 37 to 51 years over the past 30 years; adult literacy has increased from 22 to 39 percent of the population; economic growth rates have increased from 0.6 to 1.7 percent; and GNP per person (in 1980 dollars) has increased from $170 to $250. The struggle is a long, uphill one, but progress is being made. And now, more than ever, it is vital that we do not allow ourselves to slip back, to lose the ground that has been gained.

IDRC's contribution to this uphill journey is modest, yet nonetheless significant. Applied research provides the essential toeholds that enable societies to obtain firm footing, and to make progress, step by step. The following pages present a brief review of some of the projects now being carried out by Third World scientists that make up the current research programs of the International Development Research Centre.

Agriculture, Food and Nutrition Sciences Program

Since its inception, the Agriculture, Food and Nutrition Sciences Division has directed virtually all its resources to the encouragement and support of applied research for the benefit of rural peoples, who constitute the vast majority of the populations of the Third World nations. Operationally, it is the largest of the Centre's program divisions, accounting for approximately 39 percent of the total project budget. In 1981, the division initiated 51 new projects, totaling some $12.1 million.

Because they are the areas that suffer the greatest constraints to increased agricultural production, the semi-arid regions of the developing world are the principal focus of much of the division's research support. The emphasis is on research to improve production and processing of traditional crops, such as sorghum, millets, grain legumes, oilseeds, and root crops, that are staples for hundreds of millions of people and yet have received relatively little attention from agricultural researchers until recently.

The division supports specific research programs in international and regional research centres, and endeavours to forge cooperative links between these and projects carried out by national institutions. IDRC is a founding member of the Consultative Group on International Agricultural Research (CGIAR), and supports selected programs within the CGIAR's family of research centres.

The division's program of work is divided by discipline into five sectors:

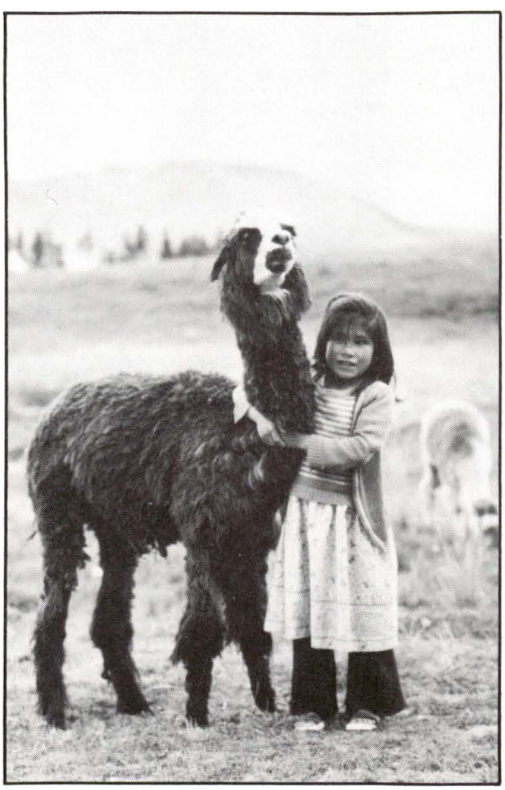
- Crop sciences, especially crops of the semi-arid tropics, and multiple cropping systems;
- Fisheries, including aquaculture and mariculture, development of artisanal fisheries, coastal ecosystem management, study of fish diseases, and utilization of neglected species;
- Animal sciences, with emphasis on livestock management and disease, pasture improvement, by-product utilization, and the study of animals in integrated farming systems;
- Forestry, particularly social forestry, afforestation and savanna forestry, tree improvement, forest-products utilization, and integrated forestry systems;
- Postproduction systems, including agro-industrial development, operations research, and study of consumers' nutritional needs and attitudes to food quality.

A complete review of the division's first 10 years of activity is to be found in the recent IDRC publication, "A Decade of Learning" (see page 35).

The director of the Agriculture, Food and Nutrition Sciences Division is Joseph H. Hulse, who has held the position since joining the Centre in 1970.

The Year in Brief — In the semi-arid tropics, hardy drought-resistant grains, such as sorghum and the millets, and protein-rich grain legumes are the staple diet of most rural peoples. Research to improve these crops is a high priority.

In Zimbabwe, little research has been done in the past to assist the country's four million small farmers. A new project here will help a team of young researchers establish a plant-breeding program for sorghum and pearl millet to improve small-scale grain production. In Bangladesh, where the minor millets could provide an important winter crop, as well as insurance against drought, researchers are attempting to increase the use of millets in rice-based agriculture.



Alpaca and friend in Peru: high potential.

Another research team in Bangladesh recently completed the first phase of a project to upgrade local legume varieties and, in a second phase, is testing the results under farm conditions. Lentils and chick-peas, staples throughout the Middle East, are the subject of a similar project in Jordan; and, in Egypt, two ongoing projects dealing with different aspects of legume research entered second phases during the year.

Egypt is also attempting to increase its food production through development of farming systems suitable for desert soils. The division has considerable experience in the support of farming systems research, experience that will benefit the Egyptian project. Networks of similar Centre-supported research operate in Asia and Latin America, where several cropping systems projects that have shown early promise are continuing with second-phase activity.

In the Andean highlands of Peru, the division's animal sciences program is supporting a project to introduce forage plants that will thrive at these altitudes, thus enabling local farmers to increase cattle production. Another project in this region is aimed at more fully exploiting the potential of the llama and the alpaca, native animals that, because they live at altitudes beyond the range of most livestock or crops, offer great economic promise for poor mountain farmers.

Improving on-farm technologies is an important part of the division's postproduction systems program. Grants were approved during the past year for projects in Panama and Peru to develop appropriate technologies for processing important regional crops such as bananas, plantains, and potatoes. In Thailand, a project to develop a solar dryer moved into a second phase, while another, aimed at developing a low-cost passive cooling system for storing fresh vegetables, has recently begun. And, in Zambia, researchers are working on a low-cost system for drying vegetables for long-term storage.

Several projects to develop improved rice-handling technologies moved into second- or third-phase activity during the year. In the Philippines, researchers are developing commercial-scale and village-scale mills. In Korea and Ghana, however, the emphasis is on small-scale, manually operated, portable threshers for field use.

If a crop is to win consumer confidence, it must be presented in acceptable form. In Tanzania, researchers are hoping to

increase the use of sorghum as a dryland crop by developing sorghum-based flours and baked goods that will have popular appeal. In Ethiopia, a similar project is developing modern techniques for the production of traditional foods, as well as sorghum-based baby foods.

Processing and preservation of fish present very different problems, some of which were ingeniously solved in the first two phases of a Centre-supported project in the Philippines. Researchers developed a low-cost fish dryer fuelled by rice hulls. This will be field tested in phase three, as will improved techniques for handling, packaging, and storing dried fish.

The division's fisheries program is placing increasing emphasis on research in Latin

Bagging sorghum-based baby food at the Ethiopia Nutrition Institute: new uses.

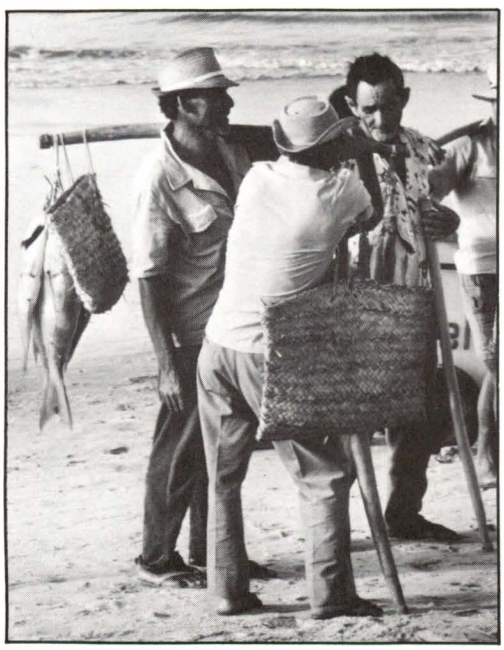
America, drawing on the extensive experience acquired in Asia over the past 10 years. Wild fish in the Brazilian Amazon will be studied for their aquacultural potential in an ambitious new project. And, in the Dominican Republic, researchers are developing fish-culture systems that can be used in lakes, canals, and other waterways to provide a cheap source of protein for rural peoples.

Aquaculture includes plants and other aquatic life forms as well as fish. In Chile, researchers are working with coastal villagers to develop some of these less-traditional sea products, such as molluscs and edible seaweeds. By providing additional income

for people who derive their livelihood from fishing, the project should help reduce the risk of overfishing.

One of the main concerns of the division's forestry program is "social forestry," which is dealt with in more detail later in this chapter. The program also continues to support the International Council for Research in Agroforestry (ICRAF), which it helped to establish in 1977, as well as several integrated-forestry projects that use combinations of trees, crops, and animals in a systematic way to increase production from the land.

Although it is in fact a grass, not a tree, bamboo is also a concern of the forestry program. This versatile plant is used for everything from food to furniture



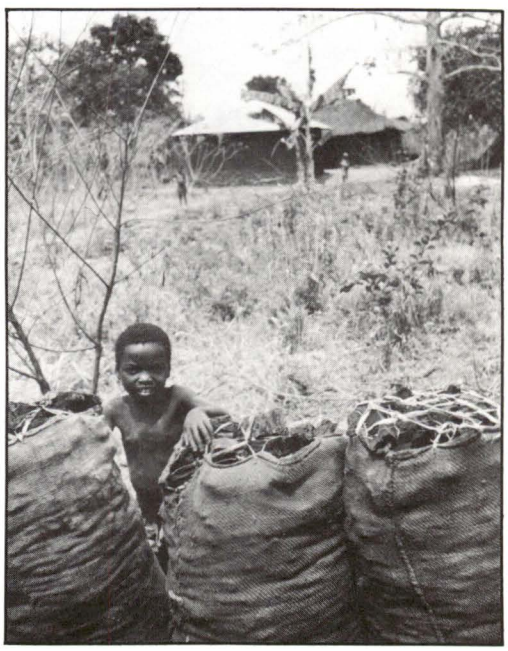
Fishermen's tales in Brazil: increasing emphasis on fisheries in Latin America.

throughout much of the tropics, yet little research on it has been undertaken until recently. The program now supports several bamboo research projects, forming a small but growing network that recognizes the economic importance of this plant.

Wood for Fuel — Restoring the Balance

In Nairobi, this past August, a thousand people of many nationalities marched in a solemn procession, bearing armloads of firewood to the steps of the UN Conference on New and Renewable Sources of Energy. Their aim was to dramatize the phenomenon that has been called "the hidden energy crisis": the fact that the Third World is fast running out of fuelwood.

A few statistics illustrate the proportions of that crisis. One-third of the world's population, about 1.5 billion people — virtually all of them living in the developing countries — depend on fuelwood for cooking and



Young charcoal seller in Tanzania: the Third World is running out of fuel.

heating. Of all the wood cut in the developing countries, 90 percent is for fuel. The total forest area destroyed each year is roughly equivalent to the land area of Great Britain. At that rate, the world's forests will be halved by the year 2000 — in less than 20 years.

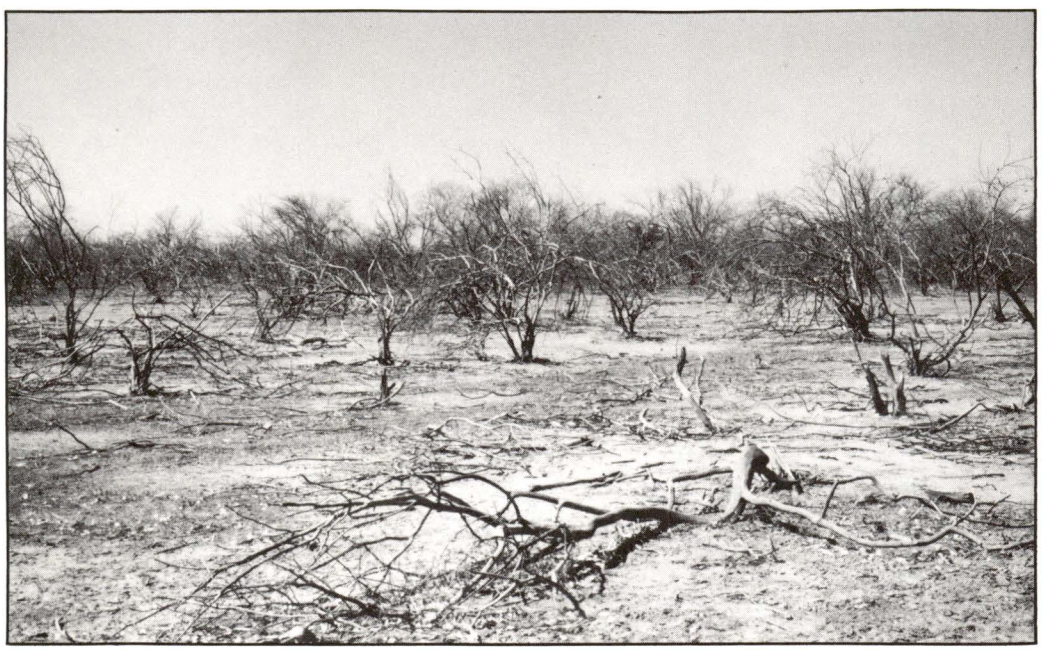
The side effects of such massive deforestation include soil erosion, destruction of

farmland, desertification, climatic changes, and, inevitably, increased pressure on the remaining forested areas. There are no easy or instant solutions. Alternative fuels or energy sources are either not yet available, or too expensive. It does little good to tell people not to cut trees when there is no affordable alternative and they are already down to one cooked meal per day.

Early in its existence, IDRC recognized the firewood crisis and, from the beginning, the forestry program has placed a great deal of emphasis on what is called social or community forestry. The objective is to develop simple techniques for the production of fuel, fodder, and small timber to meet the basic daily needs of rural people. Social forestry continues to be the main thrust of a program that is expected to expand rapidly in the next five years as part of a Centre-wide emphasis on research for renewable energy.

The greatest concentration of Centre-supported forestry research has been in the Sahelian region of Africa. One of the most successful projects there has been the village woodlots project in Niger. The key to this and similar projects is community involvement. A village woodlot or a shelterbelt will have no chance unless the villagers understand its purpose, and accept some responsibility for it. To achieve this, the research must have a sociological component aimed at identifying the villagers' perceptions of their needs, and reinforcing support for rural forestry development programs.

The project is now in its second phase and, during the next three years, it will concentrate on passing on the knowledge gained in phase one — teaching basic forestry techniques to the villagers for the production and protection of fast-growing trees. The project is being closely observed by several donor agencies, including the World Bank, which is interested in large-scale replication of the project in the region if its early promise is fulfilled.



Dead forest in the Sahel: no instant solutions.

In Egypt, forestry researchers are striving to develop improved species of casuarina, a hardy tree that grows well in arid climates. The tree has great potential for use in shelterbelts to aid reclamation of farmland. It can also be a good source of useful timber

and, as a bonus, it has the ability to extract nitrogen from the air in the soil and fix it in its roots, effectively providing its own nitrogen fertilizer.

This project, too, has just started second-phase research. Building on the breeding program that was developed in phase one, the researchers are testing four fast-growing species in field trials under a variety of conditions. They are also studying the tree's reproductive characteristics and its nitrogen-fixing capability. This phase of the project will also see the establishment of a seed bank and of a training program for extension officers involved in afforestation work with farmers.

The results of the Egyptian project will have wide application in other arid regions, as will those from another project of the forestry program, in Peru. This ambitious project, now in its second phase, is developing afforestation techniques in the Peruvian highlands with the purpose of strengthening the economies of depressed regions through a combination of forest plantations and pastoral farming.

Some 39 species of eucalyptus and conifer were tested in phase one, and the most suitable species are being fully evaluated in phase two, which includes technical and economic feasibility studies. The project has also been broadened to include studies of fodder trees, such as prosopis, to reclaim unproductive arid land. Trial plantations will be irrigated with waste water pumped by windmills.

As part of a new strategy for forestry development, India is establishing large-scale community forestry programs in several states. If the strategy is to succeed there is an urgent need to identify compatible tree–grass–legume combinations to increase the productivity of degraded farm and wastelands (at present, only about half of India's land area is cultivated).

This new four-year project should also have application in many other areas of the developing world that face land degradation as a result of increasing population pressures. Its objectives are to improve the land to the point where it can produce not only fuelwood, but fodder, small timber, and minor forest products for the rural people.

Health Sciences Program

Most of the projects supported by the Health Sciences Division are concerned with the health problems of people in the rural areas, because these regions of the Third World have the greatest need. Doctors and hospitals are rare outside the cities and, in many rural areas, there are no medical services of any kind.

Because of the enormous scale of the problem areas, the division makes every effort to use its project funds so that they may work as a catalyst, providing maximum impact and stimulating local research capacity. The division maintains worldwide links with other international agencies to ensure that its research results are shared, and it participates in major international research efforts such as the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases, and the work of the International Committee on Contraceptive Research.

The rapid growth of industrialization and urbanization in many developing countries has led to an increase in health problems previously more common in the developed world, and in turn has led to some shift in emphasis in certain areas of the division's program. There is also a special concern for the health of rural–urban migrants living in squatter settlements around major towns and cities, often without access to even the most basic of facilities.

About 14 percent of the Centre's project budget is appropriated by the Health Sciences Division. During the past year, the division initiated 37 new projects with grants totaling $4.4 million.

The program focuses on five main areas of research:

- Fertility regulation, stressing the need for better and safer contraceptive methods, studies of possible side effects of existing methods, and studies in maternal and child health care;
- Basic health services, including studies of rural health-care needs, training and personnel requirements, middle-level health-care management, health economics, and the development of new therapeutic methods;
- Tropical diseases, including diseases related to malnutrition, diarrheal diseases, and research at the national and international level seeking biological and environmental control of endemic tropical diseases;
- Rural water supply and sanitation, with emphasis on management and social aspects, waste reclamation, as well as the development and evaluation of appropriate water and sanitation technologies;
- Occupational health, investigating specific work conditions and work-related health problems in the fast-growing industrial sector, as well as the use of modern technologies in agricultural production.

The director of the Health Sciences Division, Dr John Gill, has held that position since 1975.

The Year in Brief — The 1980s have been designated as the International Drinking Water Supply and Sanitation Decade in recognition of the importance of these two factors in improving health. The division has been encouraging research in this field for several years, and is concerned with the sociological aspects of water supply and sanitation, as well as with the implementation and evaluation of simple, inexpensive technologies.

In Ecuador, researchers are studying sand filters that can provide potable water at low cost and, in Thailand, another new Centre-supported project is developing

catchment and storage systems for rainwater. In Ethiopia, researchers are studying the socioeconomic and cultural factors involved in water supply to develop more effective installation programs. Also in Africa, an attempt is being made to help combat the present scarcity of trained personnel in the water and sanitation fields through national and regional training workshops.

Public acceptance is essential to the success of sanitation programs. Thus, in the Philippines, the division is supporting a survey of people's attitudes and behaviour to find out why new toilet facilities in a community may or may not be used. In Chile, a new project is examining the impact of improved housing and sanitary conditions on diarrheal diseases in adults and children, which are major causes of morbidity and mortality. The division also supports the World Health Organization's global program for the control of diarrheal diseases.

Water supply in Ethiopia: finding the right pump is only part of the solution.

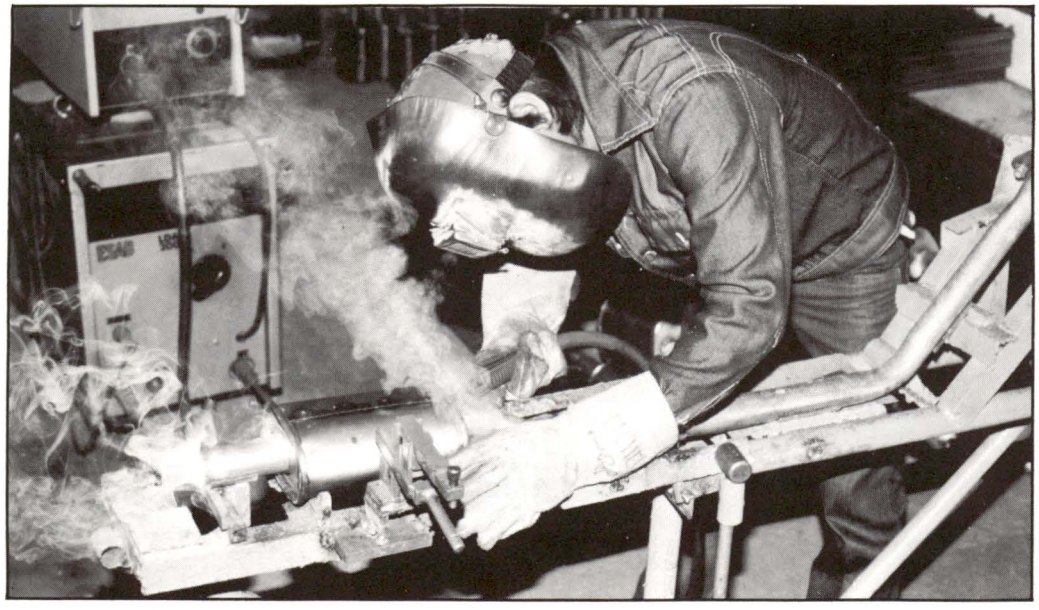
Another global effort to which the division contributes is the UN Special Programme for Research and Training in Tropical Diseases. A number of serious ailments are not covered by this program, however, such as Chagas' disease, dengue hemorrhagic fever, and a number of sexually transmitted diseases. These are the subject of separate research projects supported by the division in Latin America, Asia, and Africa. The division's first venture into China involves a special training program in epidemiology through Canadian institutions for some 30 key Chinese health scientists.

Community health services are important in the control of disease. Two projects in the Philippines are part of the division's program to improve rural health-care delivery. One is concerned with extending and upgrading the skills of village midwives, while another aims to design an improved, simplified record-keeping system for village health volunteers. Another new project in Sumatra is developing a disease-reporting system for use at the district health-centre level.

Two projects are testing simple aids to combat two of the principal causes of child deaths in the developing world. A time–temperature indicator to reveal impotent vaccines could be particularly valuable to health workers in remote areas. Its development is described in more detail elsewhere in this chapter. Another project is designing and testing simple instructional materials to

who are thought to be at greatest risk.

Family planning plays an important part in child health, because it allows the mother a reasonable spacing between births. The division's program of research for fertility regulation is supporting a project to devise effective information packages to accompany the introduction of new contraceptive implants in Ecuador, Indonesia, and Thailand. A related project will train medical staff in the use of the implant method. In Chile, research is continuing in the second phase of a project to determine the feasibility of developing antibodies to interfere with the male fertilization process. In Canada, the division is supporting research studying a possible link between vasectomy and arteriosclerosis, or coronary artery disease.



Small-scale industry in the Philippines: occupational health problems on the increase.

promote the use of a simple, inexpensive oral rehydration technique to combat dehydration resulting from diarrhea. The project involves four Southeast Asian countries.

In Sudan, a new project will follow up work by Sudanese researchers on mycotoxins — naturally occurring fungal toxins such as moulds that appear on food and can result in serious illness if eaten. The researchers are particularly concerned about the effects on malnourished children,

Several new projects have begun in the field of occupational health. In Sudan, researchers are studying the prevalence of silicosis among chromite miners and will make recommendations for improved working conditions in the mines. And, in Singapore, researchers are undertaking a review of occupational health conditions in several Asian countries where rapid industrialization has led to an increase in work-related health problems.

Taming the Measles

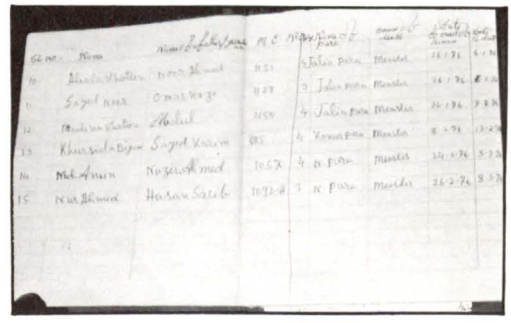
Only a generation ago, diseases such as measles, diphtheria, whooping cough, and polio were a common childhood threat worldwide. In the industrialized nations, the threat has gone as a result of mass immunization programs that have made large-scale outbreaks of such diseases a rarity.

In the developing world, however, these childhood diseases are still prevalent and a simple case of measles can become fatally complicated if the victim is already weakened by poor diet or intestinal parasites. In fact, measles is a major killer of children under five years old in many countries.

Under the leadership of the World Health Organization's Expanded Programme for Immunization (WHO/EPI), protection against childhood diseases is rapidly being made available in developing countries. Immunization campaigns are an accepted part of public health programs as parents come to understand the importance of this simple procedure. Acceptance, however, is largely dependent on success and here the WHO/EPI has been running into problems, because the results, in terms of prevention of disease, have been disappointing.

There are several probable reasons for the unexpectedly high failure rates in immunization campaigns in developing countries. One has to do with malnutrition. It is known that there is a link between malnutrition and immunocompetence — the body's ability to build defence mechanisms against infection. Thus the malnourished child is doubly at risk: more likely to become ill, and more likely to develop complications. Most of the research to date has focused on severely malnourished children but some recent data suggest that moderate, or even mild, malnutrition also reduces the effectiveness of immunization.

In Colombia, IDRC is supporting a study of 360 children that will provide detailed information on the effectiveness of immunization over a 21-month period. The children are divided into three groups according to "nutritional status," which is measured by means of a simple device developed in an earlier IDRC-funded project. Each child



Village death register in Bangladesh: measles is a major child-killer.

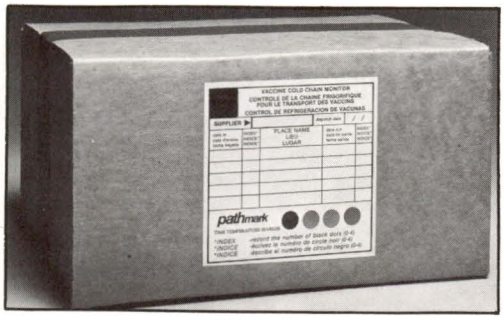
receives an identical immunization schedule, and is regularly tested to determine antibody levels and continued nutritional status. Routine home visits will also give a more detailed picture of each child's household environment.

If the project confirms a relationship between moderate levels of malnutrition and immune response, the implications for the planning and timing of mass immunization campaigns are considerable.

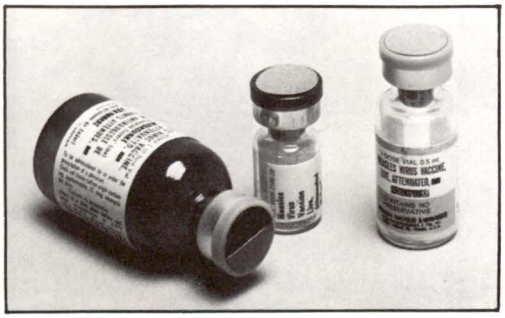
Another probable cause of failure is the fragility of the vaccine itself. Live vaccines, such as freeze-dried measles, deteriorate quickly when exposed to high temperatures or light. Avoiding these conditions, particularly in rural areas of the tropics, is often difficult. As a WHO/EPI report explains, the biggest practical problem is simply that of keeping vaccines safe and effective, through refrigeration, "from manufacture to child."

What makes the problem even greater is that a live vaccine looks just the same as a "dead" one — there is no way for the health worker to know if the vaccine is good or not. Thus, according to one estimate, 10 million children each year receive inactive vaccines. The result is a large waste of time and money, and, perhaps more damaging, loss of public confidence.

This situation could soon change thanks to the development of a simple time–temperature indicator, a telltale coloured sticker that can be attached to the vaccine vial, and changes from red to brown to black as the vial is exposed to adverse conditions. The prototype was produced by an American company that subsequently dropped the project because it saw no chance of sufficient profit return. The technology is now being developed by the Program for Applied Technology for Health (PATH). IDRC is one of the major donors to this project.



A case of measles: the management indicator tells the whole story.

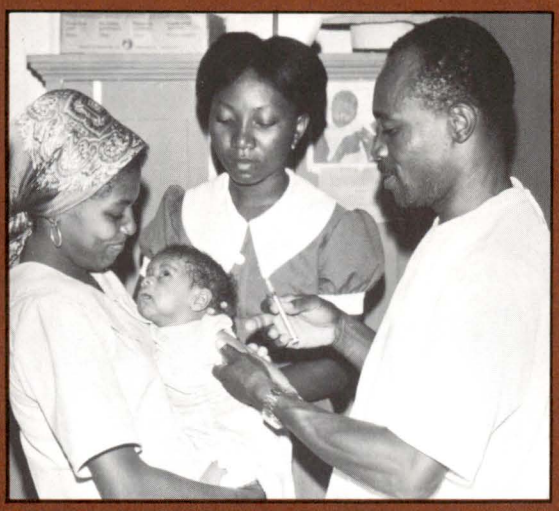


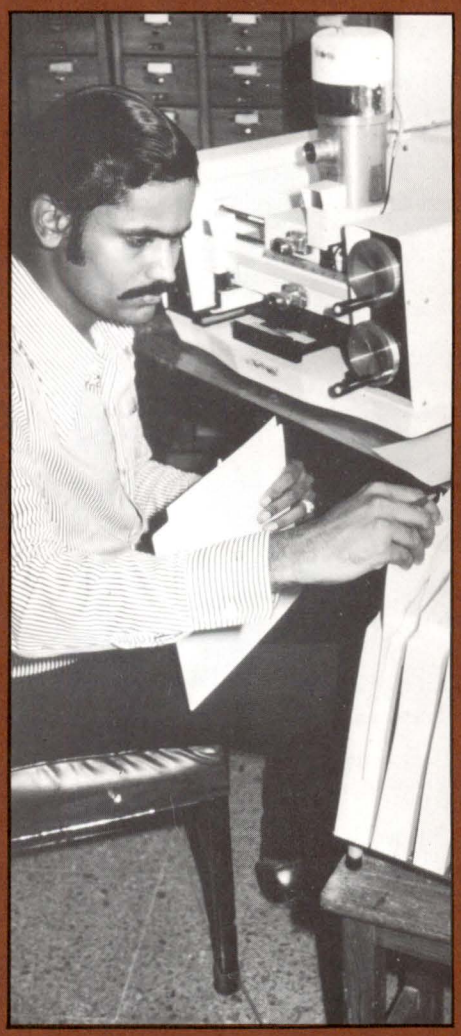
Vaccine vials with indicators: you can see the difference.

In the first phase, the researchers extensively tested the indicators and developed techniques for pre-aging them to match the WHO maximum standard for measles vaccine of seven days at 37°C exposure. The work is being carried out in close collaboration with WHO/EPI. Toxicity studies were also undertaken to ensure that the chemical used on the indicators is safe in everyday use and a coating technique was developed that is protective but does not alter the indicator's performance.

The second phase of the project, begun late in 1981, should complete the necessary steps to mass-produce the indicators. This will involve development of a printing technology using the chemical indicator, a "management indicator" to go on the containers in which vaccines are packed, information and support materials for health workers, and extensive field testing and evaluation by 300 health workers in Mexico, Indonesia, and the Philippines. Liaison with vaccine manufacturers has been part of the project since the beginning, to ensure that the necessary machinery will be in place for mass application of indicators on individual vials and on shipping cartons. Both the Armand-Frappier Institute, in Quebec, and the Connaught Laboratories, in Toronto, are involved in this phase.

Barring unexpected setbacks, the indicator should be ready for mass production by the end of 1982. In future, health workers will be able to see at a glance if their vaccines are still effective.





Information Sciences Program

Reflecting the rapidly advancing information technology that is becoming a major force in shaping global society, the Centre's Information Sciences Division is also changing. While developing new initiatives in several areas, however, the main thrust of the division's program continues to be devoted to the promotion of cooperation among nations in the collection and dissemination of recorded knowledge, thus avoiding duplication of effort and a waste of scarce human and material resources. In its support for information projects in such fields as agriculture, health, population,

Microfiche collection at Tunisian documentation centre: more accessible information.

education, and economic planning, the division is closely involved with the work of the Centre's other three program divisions. Its activities frequently add a further dimension to their research programs, and in this way reinforce them.

During 1981, the Information Sciences Division received grant approvals for some 25 new projects (in addition to those projects managed in-Centre as continuing activities), with grants totaling $4.3 million. This represents 14 percent of the Centre's project budget.

The main emphases of the Information Sciences program are:

- Support for international cooperative information systems, either global or regional, with particular emphasis on assisting developing countries to participate in, contribute to, and benefit from such systems;
- Support for specialized information analysis centres dealing with narrowly defined topics of importance to international development;
- Library development, and the operation of IDRC's own library and information services;
- Extension services, especially for small-scale or rural-oriented industries in developing countries;
- Cartography, particularly the use of data obtained from satellites to produce thematic maps;
- Computer science, particularly the application of data-base management systems to the storage and retrieval of information in developing countries;
- Promotion of compatible information-processing methods so that information can readily be shared among institutions in different parts of the world;
- The application of improved telecommunications to rapid information exchange among developing countries.

The Director of the division since its inception has been John E. Woolston.

The Year in Brief — The program of the Information Sciences Division differs from those of the other divisions in that, in addition to supporting information activities proposed by developing-country institutions and carried out by them, it also funds and manages a number of in-Centre projects, such as the IDRC library, which continues to serve the needs of Centre staff and the Canadian development community at large. The data base of the library's holdings and several other bibliographic data bases are mounted on the Centre's minicomputer. After a successful pilot project of demonstration and training, these data bases are now available for interrogation from remote terminals across the country as a continuing service. Some of the data bases have been obtained from international agencies with interests similar to IDRC's; others have been developed by in-Centre projects, such as SALUS, a bibliography with abstracts on low-cost rural health care delivery. The machine-readable data base from this project is now backed by a file of microfiches of the documents that were summarized for inclusion in the bibliography, and copies of the microfiche file have been distributed to several developing-country institutions where they will be more accessible to users.

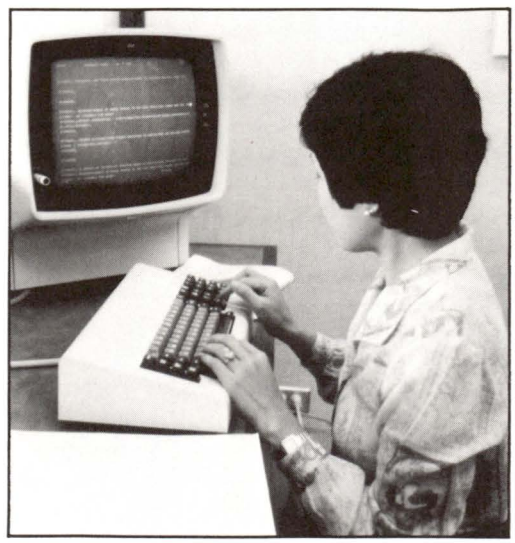
MINISIS, the computer software system developed by the division for managing such data bases, has been significantly enhanced, and continues to attract new users in developing and developed countries. Close to 40 organizations are now using MINISIS under licence from IDRC, including ILO (the International Labour Office), the organization that developed the original ISIS system.

The success of MINISIS has meant that division staff have spent a good deal of time presenting training courses, not only in Ottawa but also around the world. This illustrates another aspect of the information sciences program: it is continually responding to requests not for funds but for professional advice in the design of new systems and services, or the development of information tools such as multilingual thesauri, and for software. In many such cases, a grant or a consultancy will not fill the need. Often the division's own professional staff

are the ones most sought after to provide that professional help; often, as in the example of MINISIS, few people outside IDRC have enough experience or knowledge or are available to provide direct advice and assistance to developing-country institutions.

In terms of more conventional project activity, one of the division's larger programs continues to be support for international cooperative information systems, which provide a framework for the sharing of information among countries and for the optimum use of scarce information resources.

In the field of socioeconomic information, renewed grants were approved for two related regional networks begun with Centre support to serve ministries of planning and similar bodies in the framework of the Development Sciences Information System (DEVSIS). INFOPLAN, based at the UN Economic Commission for Latin America, in Chile, and CARISPLAN, the subregional network based at the Caribbean Documentation Centre in Trinidad, will both be consolidated during second-phase activity, and will enlist the participation of as many countries as possible in their regions. All of the principal institutions participating in DEVSIS-type activities intended to collect and organize the information needed for socioeconomic planning were brought together at a meeting in Ottawa. At this meeting, common methodologies were worked out and agreed upon so that, in the future, it will be possible for these institutions to exchange records in machine-readable form and to interrogate each other's files with maximum ease.



The Agricultural Information Bank for Asia: part of the global AGRIS network.

In the past year, the division has continued its support for AGRIS, the global agricultural information system coordinated by the Food and Agriculture Organization of the United Nations, by helping to apply a multilingual thesaurus to the system and to train user institutions in its application. This controlled vocabulary of indexing terms, known as AGROVOC, enables AGRIS participants to describe, or index, their agricultural documents by subject in more detail and to retrieve documents with greater precision. During the past year, another project has been approved not only to continue this work, but also to shift the emphasis of the IDRC support to the production of microthesauri to meet the needs of specialized agricultural information analysis centres. Support for these centres, another major area of project activity for the division, has been studied in depth this year by the Centre's Office of Planning and Evaluation. It is described in more detail later in this chapter.

The division also supports participation in AGRIS through projects at the national and

regional levels. A number of new projects are underway in Latin America and the Caribbean — in Costa Rica, Chile, the Dominican Republic, and Jamaica — aimed at helping countries better contribute to and benefit from AGRINTER, the regional agricultural information network that the division helped to establish, which is now using an IDRC grant to make agricultural documents available in the form of microfiche. The division supports a similar regional project in Southeast Asia, where it approved a second grant to the Thai national participating centre. National agricultural information projects were also approved for Sri Lanka and for Egypt, which will enable those countries to keep track of the agricultural literature they produce.

At the International Council for Research in Agroforestry (ICRAF), based in Kenya, a novel approach is being tried to provide an information service in this diffuse field of agricultural activity. Instead of collecting literature in anticipation of demand as is done in many crop-specific information centres, ICRAF will draw upon sources of information around the world to meet the requests of its own scientists and the scientists engaged in research projects coordinated by ICRAF. In this way, a specialized file of requests, sources drawn upon, and responses given will be accumulated as the basic resource for the future service. Another unusual information service is operated in Ivory Coast by the African Institute for Economic and Social Development (INADES). This uses bibliographies, photocopies, and travelling "book boxes" to serve animateurs in remote rural areas. In a second phase, several branch collections of documents on microfiche, together with microfiche readers, are being set up to complement the present service and to place the basic resource material closer to the users.

In the field of cartography, the division has for some years supported a series of projects that are helping developing countries to make use of data collected by remote-sensing satellites. Although the satellites themselves are expensive, the data collected by those already in orbit can be used by developing countries for production of maps that would be too expensive to produce by conventional ground surveys. The most recent grant, to the Regional Remote Sensing Centre (CRTO) in Ouagadougou, Upper Volta, will assist in the training of African research workers in natural resource studies, and in the development of appropriate applications for remote-sensing technology.

In the past few years, satellites have contributed to tremendous advances in telecommunications technology, one of the results of which has been to make telecommunications costs far less dependent upon distance than in the past. This has enabled novel forms of information exchange to be devised, which could be developed to the benefit or to the detriment of the Third World. One of these, computer-based message systems or computer conferencing, was the subject of a meeting called by IDRC to consider how developing countries might take advantage of this technology. It is likely to be followed by projects studying the technology in action.

Putting Information to Work

What do cassava, water buffalo, and ferrocement have in common? Just one thing: they are all important subjects of research for which specialized information analysis centres have been established to serve scientists of the Third World.

Access to information is often crucial to the success of a research project. It is essential not only to enable scientists to carry out their work and to keep abreast of latest developments, but also to help them avoid duplication of effort and waste of time. Two groups of researchers may be working on related projects in different countries, or even in different parts of the same country. Each may be able to contribute to the other's work, but only if they are aware of what is happening elsewhere.

Water buffalo: important enough to have their own information centre.

Developed-country scientists, who already have access to large libraries and highly sophisticated information systems, keep in touch with each other through a complex network of communication — the so-called invisible college, which includes publications, visits, conferences, telephone calls, and letters to the editors of prestigious journals. But developing-country scientists, with limited foreign exchange and few contacts, are at a disadvantage in trying to join this college. The international cooperative information systems are intended to redress this imbalance. The prime example is probably AGRIS, the FAO's system for the agricultural sciences.

For the developing-country scientist engaged in a new research project, lists of documents that may be relevant, but are also costly and time-consuming to acquire and read, are only a partial solution to the information problem. Very often what is needed is something a good deal more sophisticated; a centre that can interact with

the research team and actually play a part in the problem-solving process; a specialized information analysis centre that can not only evaluate information and save a vast amount of literature searching and reading by individuals, but one that can also act as a communication mechanism to make the invisible college more visible and to enable developing-country scientists to join it.

By bringing scientists into contact, the specialized information analysis centre can thus bring about a "cross-fertilization" of ideas, so that all groups make greater progress than would have been the case if they had continued to work in isolation. A system such as AGRIS, which handles tens of thousands of documents every year, could not possibly operate in such a fashion.

When a researcher contacts a specialized centre, it is not usually just to request a specific document. The enquiry is more likely to be: "here is my problem; what can you tell me that will help me solve it?" To provide this level of service, the librarians and documentalists who staff such centres should ideally themselves be authorities on their subject matter, and they must work closely with the scientists.

Fernando Monge, the Information Sciences Division's representative in Latin America, says scientific information and communications services should never be divorced from the research process. On the contrary, he says, they should be used as a means of interconnecting the elements of the scientific research system "to make it work as a system, and not as a heap of unconnected and disorganized parts."

Dr Monge is an information scientist who also holds degrees in agriculture and plant genetics. He speaks from experience, having helped establish one of the earliest specialized information analysis centres supported by IDRC in a developing country — the information centre dealing with cassava, at CIAT (International Centre for Tropical Agriculture) in Colombia. Initially, he says, the idea was simply to collect all the documents available on cassava, and compile a bibliography based on citations. It soon became evident, however, that what was needed was a range of services far beyond the traditional librarian's approach. The emphasis was placed on satisfying the scientist's needs, rather than on "creating paper towers," as he puts it.

So successful was the cassava information centre that it became a model for the others that have followed. Over the years, IDRC has made grants available to help establish more than a dozen such centres, all of them based at existing research centres, to foster close cooperation between scientists and information specialists. Because of their narrow focus, most of these centres are small and relatively inexpensive to operate compared with the cost of generating the information they handle.

After the initial IDRC funding, the costs of some are now being absorbed into the core budgets of the international research centres where they are located, and thus receive long-term support from donors through such mechanisms as CGIAR. Another approach to the funding problem is that taken by AIT (the Asian Institute of Technology) in Thailand, which hosts several such centres — on ferrocement, geotechnical engineering, environmental sanitation, and renewable energy – enabling them to benefit from the reduced costs of shared services, while still maintaining charges that developing-country scientists can afford.

Because IDRC is one of the few development agencies with a separate information sciences program, and because of its experience in this field, it receives many requests for assistance in establishing such centres. In addition to the topics already mentioned, IDRC has also provided support for centres on tropical grain legumes, sorghums and millets, irrigation science and technology, cartography, and packaging technology. Topics under discussion for possible future centres include diarrheal diseases, aquaculture, potatoes, bananas, and South American camelids.

This trend is likely to continue as the "information explosion" makes the scientists' task of sifting through the available data more and more complex.

Social Sciences Program

The Centre is fundamentally concerned with supporting research aimed at better meeting people's essential needs, particularly those people living in the rural areas of developing countries. In the broadest terms, the role of the Social Sciences Division is to help societies gain, through research, deeper understanding of the processes of development and their effects on people and social institutions. As such understanding grows, problems and solutions can be more clearly identified, and effective policies formulated to contain them.

In recent years, the division's style of

Village in Indonesia: understanding the impact of rural development.

operation has changed somewhat, moving away from large-scale projects and extensive networks, towards smaller grants for more projects. In the 1980s, the division sees the need particularly to support and strengthen fragile new research structures, especially in the poorer countries. Increasing attention is also being paid to the development of social science research capacity in the more remote countries, and in

relatively underprivileged areas within countries.

In operational terms, the division is the second largest of the program divisions, accounting for about 29 percent of the total project budget. During 1981, the division initiated 100 new projects totaling some $9.0 million.

The division's research support is focused in four sectors:

- Economics and rural modernization, concentrating particularly on economic policy and its impact on development, agricultural development, impact studies, labour supply and employment, and regional development studies;
- Science and technology policy, concerning issues such as national technology choices, the effects of technical change, the diffusion of technology, and markets for technology as they relate both to industrialization and to rural development needs;
- Population and development policies, including research into population redistribution, determinants of fertility and mortality, and studies of family-planning programs;
- Education, including research related to the basic cycle of education, studies on the transition from school to work, and encouragement and utilization of educational research.

During the past year, energy policy and urban policy have also emerged as distinct areas of program support.

The director of the Social Sciences Division, David W. Steedman, was appointed in 1978.

The Year in Brief — The question of how development programs affect the social structures of rural life continues to be a focus of the division's economics and rural modernization program. In Indonesia, researchers are studying three villages in an effort to understand better the impact of development programs and, in the remote Mustang region of Nepal, the division is supporting a study that will be used to formulate effective development programs for this unique mountainous area.

Improving living standards also requires more comprehensive agrarian policies. In Brazil, a new project examining agricultural improvement programs will help in the development of policies at both the state and the national level. In neighbouring Bolivia, researchers are concentrating on analysis and improvement of present production and marketing policies. And in Uruguay to the south, a study is being made of the impact on small farmers of the country's "open-door" trade policy.

Trade policies have a major effect on all sectors of the economy. In Korea and Thailand, the division is supporting studies that will help these two countries reassess their commercial and tariff policies in the light of rapid industrial development. In Latin America, there is support for a series of research studies into the macroeconomic policies of countries in the region. In Ivory Coast, the division is supporting a program designed to meet the growing demand for highly trained research economists as the country's economy enters an important transitional stage.

The demographic impact of rural development efforts is a principal concern of the division's population and development research program. There were several grants during the year for projects to study the effects of government policies on rural employment. In Brazil, researchers are examining the causes and effects of internal migrations, particularly the impact on local labour markets. A study in Argentina is concerned with the effect of population on fertility and family structure.

International migrations also affect many countries. An increasing number of workers are leaving the Philippines for contract work in the Middle East. The division is supporting a socioeconomic study of these migrant workers, with their families and their communities, to gain a better understanding of the many consequences of this phenomenon. A Centre-supported study in the islands of the eastern Caribbean will assess the impact of long-term emigration patterns on the islands' economies. Similar studies in Guyana and Surinam on the South American mainland will also help government to formulate policies to cope with the problem.

Rural–urban migration is also the subject of a number of studies. In Colombia and Sri

Lanka, researchers are studying programs to upgrade squatter and slum communities. A four-country project in Southeast Asia is evaluating self-help programs in low-income urban communities. And, in Pakistan, a study is attempting to measure the impact of a government-sponsored program on basic needs.

The division's science and technology program is supporting several studies of both modern and traditional technologies — in Ethiopia, Ghana, and Paraguay — with a view to developing local capacity to generate technological solutions. At the industrial level, the program is supporting a study of local consulting engineering capacity in Peru, a review of the technological capacity of the chemical industry in Bangladesh, and an examination of how technological change affects small industries in Colombia. A major new project, involving six countries of Africa, Asia, and Latin America, is examining the significance of national development banks and their role in technological development — an area that until now has received little research attention.

In the energy field, several new projects were begun during the year dealing with energy policy and use. These are described in more detail later in this chapter.

The division's education program supports research into education at all levels — from an evaluation of preschool education in Thailand, to an analysis of adult-education policies in Ethiopia, India, Tanzania, and Turkey, based on a research model developed in Canada. In Mali, a Centre grant enables researchers to develop techniques for teaching basic arithmetic to illiterate farmers. In Upper Volta, researchers are evaluating a training program for village artisans that it is hoped will bring about the rapid spread of new agricultural implements.

The program also supports research into educational issues. Another project in Upper Volta is studying the relationship between formal education and productive work and, in neighbouring Zaire, researchers are studying ways to improve links between the technical education system and employers. In Chile, researchers are examining the relationship between higher education and the country's economic development.

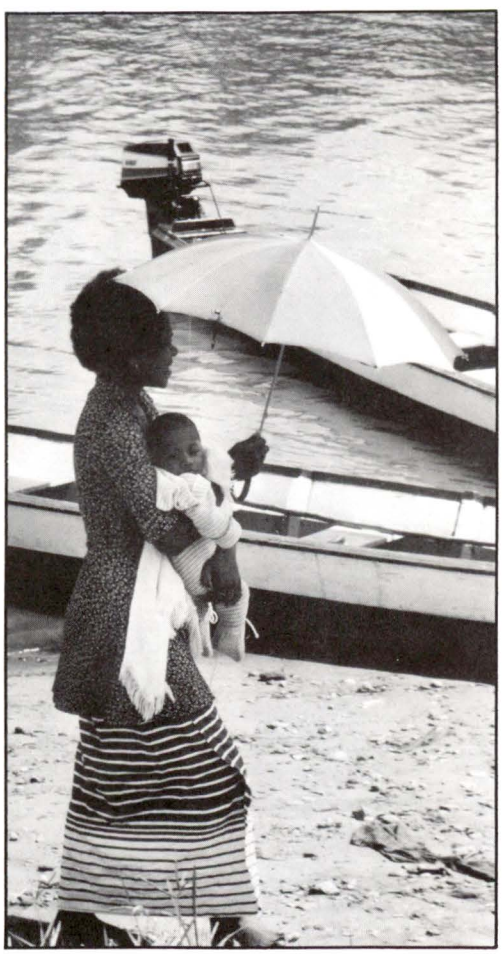
Women in adult education: problems and priorities for the developing world.

In Zimbabwe, an unusual project is examining the role of women in resettlement programs, and the best means of helping them resume their education, interrupted by the war in that country. The division is also supporting a large-scale study by the International Council for Adult Education on the educational participation of adult women. The study will identify problems and priorities in seven geographic regions of the developing world.

Energy: Who Needs It?

The World Bank has called on the oil-importing, developing countries to integrate energy use into their development strategies. It adds that the domestic energy production of these countries "can and should" be doubled in the 1980s — at a cost of perhaps $50 billion a year.

Laudable objectives, but to come up with such strategies and production programs, these countries need first to better define energy-use patterns and projected needs. They need policy-oriented research on energy for domestic and industrial requirements, so that their decisions can be made on the basis of information, not speculation.



Rural Fiji: no energy shortage — yet.

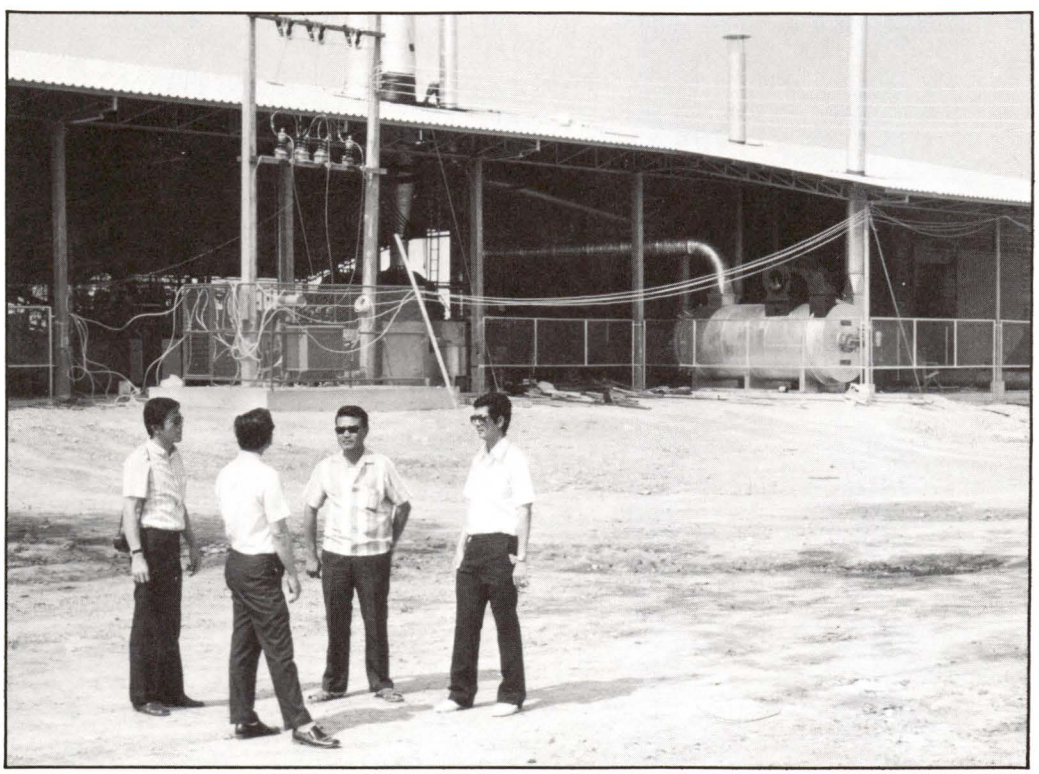
The results of one such research project were published by the Centre during 1981: a study of domestic rural energy use and potential in Fiji. The study, carried out by the University of the South Pacific's Centre for Applied Studies in Development, with the aid of an IDRC grant, showed that rural Fijians are far better off than their counterparts in many other countries. All the eight villages surveyed have plentiful supplies of firewood, and 92 percent of the homes used wood for cooking. But the study revealed that, in some areas, supplies will become critical within 10 years and it recommended that the government begin at once to investigate fast-growing fuelwood species and to encourage the integration of fuelwood cultivation into existing agricultural systems.

This was just one of a series of recommendations by the researchers dealing with every aspect of rural energy, from the dangers of cheap kerosene heaters, to the health hazards of cooking over an open fire, to the use of energy alternatives such as biogas. The report has been welcomed by the government's Central Planning Office, which is attempting to develop effective energy policies that will minimize the need for costly, imported, petroleum products.

As in rural Fiji, so in rural Thailand: remarkably little is known about the energy-use patterns of the 80 percent of the population who live outside the cities. They, too,

depend predominantly on wood, but it is feared the forests cannot long sustain the present rate of consumption and the government, although committed to reducing oil imports, lacks the information on which to base rural energy policies.

Here the division's science and technology policy unit is supporting a much larger-scale study. Researchers will survey households in 24 villages in eight regions. To ensure that they get the most accurate data possible, many of the research assistants are actually living in the villages during the year-long survey. In this way, they will gain a unique insight into the seasonal pattern of energy use and its relationship to socioeconomic factors and local conditions.



New factory at Khon Kaen, Thailand: coping with the energy crisis.

The project is being carried out by researchers at the Thailand Institute of Scientific and Technical Research (TISTR) by researchers who, two years earlier, undertook an IDRC-supported study of the economic and social aspects of rural biogas-energy systems. Subsequently, they developed the proposal and methodology for the present, much broader project, which they felt was needed to understand the rural

energy economy as a whole. During 1982, the results of the field work will be comprehensively analyzed, and the data condensed into a report and a set of policy guidelines for the development of renewable energy resources, for rural areas, which will be presented to the government's newly formed National Energy Administration (NEA).

Another project with TISTR, begun this year, was developed by a young Thai electrical engineer who became involved in this field through the biogas study mentioned earlier, and subsequently received training in energy-policy research through an IDRC-sponsored workshop program. This project is concerned with urban problems of industrial energy. Its main purpose is to examine the technical changes that have come about as the fast-growing Thai manufacturing industry has learned to cope with dramatic changes in the price and availability of commercial fuels.

This pioneering study should go a long way towards suggesting what policy action is needed by the NEA to ensure that industry responds efficiently to changing energy markets. Such action could be of major importance to the economy as Thailand struggles to improve its balance-of-payments situation.

The government of Sierra Leone is also concerned about the cost of foreign oil, which accounts for more than 50 percent of the country's import bill. Yet oil is thought to satisfy only 50 percent of urban demand and 10 percent of rural demand for energy. Like many developing countries, however, this West African nation has only sketchy information on the present use of energy and probable future demand.

As a first step to establishing a rational energy policy, an IDRC-supported study is gathering preliminary data on current energy consumption, likely demand, and possible indigenous energy sources. The researchers' report, which should be available early in 1983, will be channeled directly into the government policy-making process through the Ministry of Energy and Power, which has shown considerable interest in the research. The project will also help greatly to develop much-needed local capability in energy policy research.

Cooperative Programs

Established in October 1980 in response to the need for greater access to research expressed by the developing countries at the UN Conference on Science and Technology for Development, the Cooperative Programs Unit adds a new dimension to the Centre's project-support capability.

The main aim of this new program is to promote collaboration between research groups in the developing countries and their counterparts in the Canadian scientific community, whether academic, governmental, or private. By providing increased opportunities to work with Canadian research institutions, the program will strengthen the scientific and technological capacity of the participating Third World institutions. By establishing channels of communication among scientists, it is designed to improve the transfer of research results and the experience gained by the Canadian participants should influence the Canadian scientific community toward a greater concern for the problems of the developing countries.

University of Alexandria campus: studying business enterprises.

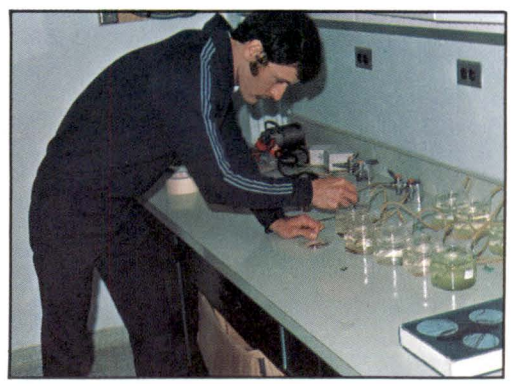
The program does not focus on any particular discipline or field of research. It can provide support for specific research activities in any field that is of demonstrated importance to developing countries, and in which there is recognized Canadian expertise. The program supports collaboration among institutions, however, not individual researchers. It also supports training for

developing-country researchers, where this is directly related to other approved research activity.

Many of the projects funded from the Cooperative Programs budget will complement the ongoing work of the Centre's four main program divisions and such projects will, in fact, be managed by the divisions concerned, keeping Cooperative Programs staffing requirements to a minimum. Several projects were implemented in a variety of fields during the new program's first year. These include:

- A study of the management of business enterprises in the Egyptian economy, involving the University of Alexandria and economists and management specialists from several Canadian universities with expertise in the field;
- The development, by the Technical University of Nova Scotia and the Atlantic Bridge Company, of a small-scale fish deboner for use in a project in Thailand that is encouraging the use of fish bycatch from shrimp trawlers as a new source of food;
- A project to control mosquitoes in the South Pacific islands, through a combination of biological control techniques and public health education, to be carried out by researchers from Memorial University, Newfoundland, in collaboration with the South Pacific Commission;
- Collaboration between the University of Saskatchewan and the International Centre for Agricultural Research in the Dry Areas (ICARDA) to establish an information service on lentils research;
- A training project at Dalhousie University for technicians and field supervisors involved in a network of IDRC-supported research projects on the culture of bivalves, such as oysters and mussels, in eight countries.

During 1981, Cooperative Programs appropriated grants for 10 projects, totaling some $1.1 million. The program is expected to grow rapidly in the year ahead as experience is gained and its operation becomes more widely known among research institutions in Canada and in the developing countries. There will probably be opportunities for involvement with the energy research program, enabling developing countries to benefit from Canada's considerable expertise in the energy field.



Laboratory at Memorial University: controlling mosquitoes.

The Director of the Cooperative Programs Unit is Jim Mullin, a scientist formerly with Canada's Ministry of State for Science and Technology, who joined the Centre in August.

The Centre has always placed considerable importance on the publication and dissemination of research results. IDRC's Communications Division produces a wide range of technical and scientific materials for worldwide distribution, particularly in the developing countries. It also produces more general materials, such as this review, to inform the public about the work of the Centre. A list of publications and films produced by the Centre during 1981 follows. Catalogues of all current IDRC publications and films are available on request.

IDRC Monographs

IDRC annual report 1980/1981, Rapport annuel CRDI 1980/1981. Ottawa, Ont., IDRC, 1981. 143 p. IDRC-003/81e,f

Science and technology for development: main comparative report of the Science and Technology Policy Instruments project. F. Sagasti. Ottawa, Ont., IDRC, 1981 reprint. 112 p. IDRC-109eR (Also available in French IDRC-109f and Spanish IDRC-109s)

L'impératif alimentaire — exposé du programme de cultures vivrières subventionné par le Centre de recherches pour le développement international. A.D.R. Ker. Ottawa, Ont., IDRC, 1981. 79 p. IDRC-143f

Systèmes alimentaires — description du programme « Systèmes post-production » subventionné par le Centre de recherches pour le développement international. R.S. Forrest, W. Edwardson, S. Vogel et G. Yaciuk. Ottawa, Ont., IDRC, 1981. 74 p. IDRC-146f

Rural energy in Fiji: a survey of domestic rural energy use and potential. S. Siwatibau. Ottawa, Ont., IDRC, 1981. 132 p. IDRC-157e

Nutritional status of the rural population of the Sahel: report of a working group, Paris, France, 28–29 April 1980. Ottawa, Ont., IDRC, 1981. 92 p. IDRC-160e (Also available in French IDRC-160f)

Consulting and engineering design in developing countries. A. Aráoz, editor. Ottawa, Ont., IDRC, 1981. 140 p. IDRC-161e

Priorities for science and technology policy research in Africa: report of a seminar held at the University of Ife, Ile-Ife, Nigeria, 3–6 December 1979. Ottawa, Ont., IDRC, 1981. 32 p. IDRC-162e (Also available in French IDRC-162f)

Tropical root crops — research strategies for the 1980s: proceedings of the First Triennial Root Crops Symposium of the International Society for Tropical Root Crops — Africa Branch, 8–12 September 1980, Ibadan, Nigeria. E.R. Terry, K.A. Oduro, and F. Caveness, editors. Ottawa, Ont., IDRC, 1981. 279 p. IDRC-163e

Searching: review of IDRC activities 1980 . . . and a look back at IDRC's first decade 1970–1980. Ottawa, Ont., IDRC, 1981. 40 p. IDRC-164e (Also available in French IDRC-164f and Spanish IDRC-164s)

SALUS: low-cost rural health care and health manpower training: an annotated bibliography with special emphasis on developing countries. Volume 7. Rosanna M. Bechtel, editor. Ottawa, Ont., IDRC, 1981. 142 p. IDRC-165e

Devindex 1979: index to 1979 literature on economic and social development/Index de la littérature sur le développement économique et social produite en 1979. G. Morin-Labatut and Lois Fitzpatrick, editors/rédactrices. Ottawa, Ont., IDRC, 1981. 172 p. IDRC-166e,f

Rural water supply in developing countries: proceedings of a workshop on training held in Zomba, Malawi, 5–12 August 1980. Ottawa, Ont., IDRC, 1981. 144 p. IDRC-167e

Sanitation in developing countries: proceedings of a workshop on training held in Lobatse, Botswana, 14–20 August 1980. Ottawa, Ont., IDRC, 1981. 172 p. IDRC-168e

Techniques de reboisement dans les zones subdésertiques d'Afrique. Guy R. Ferlin. Ottawa, Ont., IDRC, 1981. 46 p. IDRC-169f

A decade of learning — International Development Research Centre: Agriculture, Food and Nutrition Sciences Division: the first ten years. Ottawa, Ont., IDRC, 1981. 180 p. IDRC-170e (Also available in French IDRC-170f)

SALUS: low-cost rural health care and health manpower training: an annotated bibliography with special emphasis on developing countries. Volume 8. Rosanna M. Bechtel, editor. Ottawa, Ont., IDRC, 1981. 143 p. IDRC-173e

The future of pastoral peoples: proceedings of a conference held in Nairobi, Kenya, 4–8 August 1980. John G. Galaty, Dan Aronson, Philip Carl Salzman, and Amy Chouinard, editors. Ottawa, Ont., IDRC, 1981. 396 p. IDRC-175e

Induced fish breeding in Southeast Asia: report of a workshop held in Singapore, 25–28 November 1980. F. Brian Davy and Amy Chouinard, editors. Ottawa, Ont., IDRC, 1981. 48 p. IDRC-178e

Wildlife disease research and economic development: proceedings of a workshop held in Kabete, Kenya, 8 and 9 September 1980. Lars Karstad, Barry Nestel, and Michael Graham, editors. Ottawa, Ont., IDRC, 1981. 80 p. IDRC-179e

Resource allocation to agricultural research: proceedings of a workshop held in Singapore, 8–10 June 1981. Douglas Daniels and Barry Nestel, editors. Ottawa, Ont., IDRC, 1981. 170 p. IDRC-182e

Teaching yourself in primary school: report of a seminar on self-instructional programs. Ottawa, Ont., IDRC, 1981. 108 p. IDRC-185e (Also available in French IDRC-185f)

Plantes-racines tropicales — stratégies de recherches pour les années 1980 : compte rendu du premier symposium triennal sur les plantes-racines de la Société internationale pour les plantes-racines tropicales — Direction Afrique, du 8 au 12 septembre 1980, Ibadan, Nigéria. E.R. Terry, K.A. Oduro et F. Caveness, rédacteurs. Ottawa, Ont., CRDI. IDRC-163f (in press)

Affectation des ressources à la recherche agricole : procès-verbal d'un colloque tenu à Singapour du 8 au 10 juin 1981. Douglas Daniels et Barry Nestel, rédacteurs. Ottawa, Ont., CRDI. IDRC-182f (in press)

Technical Studies

Nutritional standards and methods of evaluation for food legume breeders. J.H. Hulse, K.O. Rachie, and L.W. Billingsley. Ottawa, Ont., IDRC, 1981 reprint. 100 p. IDRC-TS7eR

Information retrieval and library management: an interactive minicomputer system. F.A. Daneliuk. Ottawa, Ont., IDRC, 1981 reprint. 16 p. IDRC-TS14eR

Science of the culture of freshwater fish species in China. Ottawa, Ont., IDRC, 1981. (Set of 17 microfiche) IDRC-TS16eM

Ostras tropicales: cultivo y métodos. D.B. Quayle. Ottawa, Ont., IDRC, 1981. 84 p. IDRC-TS17s (Also available in English IDRC-TS17e and French IDRC-TS17f)

A review of teacher effectiveness research in Africa, India, Latin America, Middle East, Malaysia, Philippines, and Thailand: synthesis of results. B. Avalos and W. Haddad. Ottawa, Ont., IDRC, 1981. 128 p. IDRC-TS23e (Also available in Spanish IDRC-TS23s)

The determinants of school achievement: a review of research for developing countries. E. Schiefelbein and J. Simmons. Ottawa, Ont., IDRC, 1981. 44 p. IDRC-TS24e (Also available in Spanish IDRC-TS24s)

Rural water supply in China. Ottawa, Ont., IDRC, 1981. 92 p. IDRC-TS25e

Education, work, and employment: a summary review. M. Woodhall. Ottawa, Ont., IDRC, 1981. 52 p. IDRC-TS30e (Also available in Spanish IDRC-TS30s)

Connecting worlds: a survey of developments in educational research in Latin America. R.G. Myers. Ottawa, Ont., IDRC, 1981. 88 p. IDRC-TS35e (Also available in Spanish IDRC-TS35s)

Educational innovation in the Philippines: a case study of Project Impact. P.V. Flores. Ottawa, Ont., IDRC, 1981. 88 p. IDRC-TS36e

CDS/ISIS and MINISIS: a functional analysis and comparison. R.L. Valantin. Ottawa, Ont., IDRC, 1981. 88 p. IDRC-TS37e

The IDRC Reports/Le CRDI Explore/El CIID Informa

Published in three separate language editions, this is a quarterly magazine of report and comment on the work supported by IDRC and on related activities in the field of international development. Total circulation of the English, French, and Spanish editions is about 14 500 per issue, of which approximately 50 percent is to the developing countries, 40 percent within Canada, and the remainder to other countries.

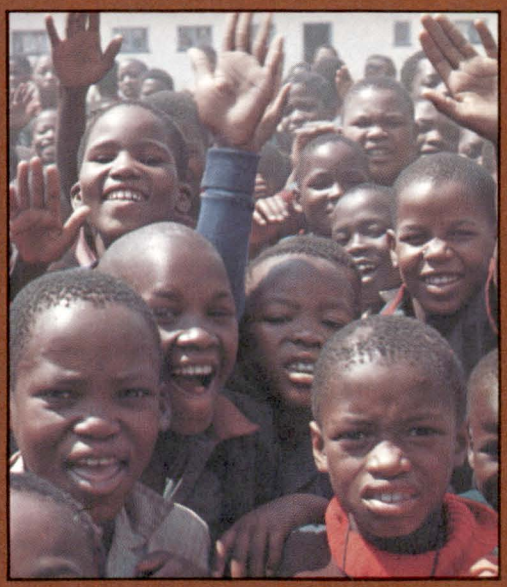
The magazine is published in January, April, July, and October; Michelle Hibler is Editor-in-chief.

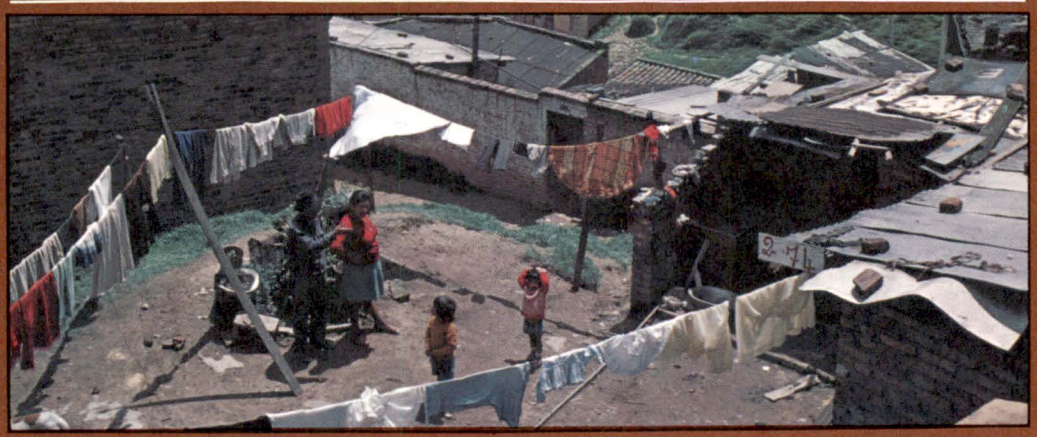
IDRC Features/ Reportages CRDI

This monthly news feature service on scientific, technical, and educational subjects related to development is provided free of charge to selected news media in the developing world. During the past year, 50 articles, many of them written by IDRC staff with others by selected contributors, were distributed in English and French to some 500 publications in 86 countries. Arrangements have also been made with several Third World-based agencies producing features services to distribute IDRC Features to an even wider audience. Clippings and comments on the materials distributed are received from editors of publications as far afield as Argentina and Zambia.

Films

Project IMPACT: The Overview — Project IMPACT is an experiment in primary education supported by IDRC in Indonesia and the Philippines. Launched in 1974 by the Regional Centre for Educational Innovation and Technology (INNOTECH), it now forms the basis for similar systems being developed in Bangladesh, Jamaica, Liberia, and Malaysia. This 16-mm colour film runs 27½ minutes, and was produced by Neill McKee for IDRC and INNOTECH.





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