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**Information Systems for Development:
IDRC's Information Sciences Programs in the Third World**

by

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for

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I. Mandate and Information Sciences

The International Development Research Centre was created by an Act of the Canadian Parliament in 1970 "to initiate, encourage, support and conduct research into the problems of the developing regions of the world and into the means for applying scientific, technical and other knowledge to the economic and social advancement of those regions". In fulfilling its mandate, the Centre has distinguished itself on numerous occasions and in many ways. IDRC is indeed perhaps the Canadian institution most widely known among governments and research institutions in developing countries (where 75% of the world's population live) and among donor and international agencies in developed countries.

Quite deliberately, the Centre has concentrated its funding on direct support to research in and by Third World countries while limiting the proportion of resources devoted to support of research in Canada and within IDRC.

There are a few donor agencies in other countries, for example the Swedish SAREC created in the mid-1970's, whose aid programs to Third World research partially parallel those of IDRC in the agricultural, health and social sciences. However, none of these national agencies have programs which compare with the Information Sciences programs of IDRC.

The very first power endowed upon the Centre by the Act is the power "to establish, maintain and operate information and data centres and facilities for research and other activities relevant to its objects". The Centre responded to this mandate by establishing the Information Sciences Division and its programs as one of the four foundation program divisions.

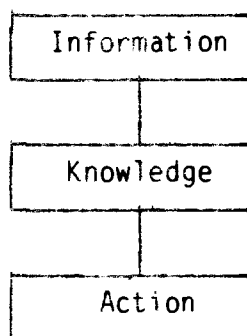
Like the research programs of the Centre, the information programs have been targeted primarily towards funding Third World institutions. Since its inception in 1971, the Division has supported 257 projects in 67 countries with a total value of \$50 million. A detailed breakdown of distribution by IDRC Regional Office and country is presented in Annex 1. These activities comprise some 13% of Centre funding to Third World countries. In addition, there have been 6 collaborative projects, involving links between developing country and Canadian institutions, supported since 1981/82 when IDRC introduced its Cooperative Programs. Five of these projects were initiated in 1984/85.

II. Information Sciences and Development

The most fundamental resources which countries possess to forge their destiny and to achieve maximum socio-economic benefits over the long-term for their people are the human and natural resources of the country. The principal value components of the human resource are knowledge and work which combine to affect or create secondary resources (food, economic, information, political, spiritual, infrastructure, etc.) that together constitute development and contribute to the achievement of satisfactory human conditions for the populace. Food is the most essential and immediate daily need in many developing countries. However, both in the short- and long-term, this need can only be met by using information and applying knowledge. Thus information and knowledge are key ingredients in the development process that can be used for immediate action, can be duplicated, can be stored for later use, can be lost or can even be destroyed. These are also the ingredients of the information sciences.

In its most elemental form, information is data. Knowledge is communicated and stored outside the human mind in the form of information or data. Our understanding of information and our capabilities for managing it have evolved very rapidly in the past few decades, particularly in the developed countries. "Information Science" is, therefore, not an established discipline, but rather a mission-oriented activity which draws upon many related fields such as library science, computer science, statistics, and communications. Information sciences, which are as much arts as sciences, concern themselves with the many facets of management of information and data for the communication of existing knowledge and the creation of new knowledge.

While the focus of information sciences is largely upon the inter-relationships between information and knowledge, the ultimate objective is action.



III. Information Sciences Program of IDRC

The breadth of the information sciences, and certainly in the context of the developing world, is enormous. Therefore, choices have been made in defining the information programs at IDRC. However, the lines are neither sharp nor completely fixed. This is because the need of the developing country predominates. If IDRC is approached with a proposal for support from a developing country which is meaningful and within the means of IDRC, it will be given due consideration. Nevertheless the program does consist of several main lines which can perhaps best be presented as a matrix. This pragmatic matrix can be used to broadly classify the projects of the Division.

<u>Aspect</u>				
National Information				
Information Networks				
Information Technology				
Research on Information				
	<u>Subject</u>	Science & Technology	Socio-Economic Topics	Information Tools & Methods

Firstly, it is important to note that the Division supports information about research far more often than research about information. This is a matter of Third World priorities. When one's access to information is very limited on account of limited resources and yet the potential impact of more information is tremendous, one

chooses to use resources to increase the flow of information rather than carry out fundamental research. Unlike many developed countries where information overload and noise are the problems, information scarcity and inaccessibility are still the principal problems in most of the world.

Secondly, the first priority of any country is to know and effectively use the resources which it already possesses, whether this be people, minerals or information. The Division has, therefore, supported activities which assist countries to organize and use their own information resources. This is normally done by putting in place an information system or an infrastructure for managing information, ensuring that it is input, stored, transmitted and output to the user community which it is intended to serve. The principle applies whether the information concerns published or unpublished documents (bibliographic); maps produced from remote sensing and other data; population data used for various planning purposes; marketing and trade information; registers of research activities, researchers or research institutions; instructions on where to get and how to apply new or old technologies; or decisions of state. All are examples of information systems supported through Division projects.

In a few cases, these information systems fit neatly into a comprehensive national information plan. This is the case with our projects in Jamaica and some of the other islands of the Caribbean. In most cases, however, there is no national information plan and the information system is aimed at a particular sector of science and technology information, such as agriculture or of socio-economic information, such as demography. Over the years, more than a third of the information projects of IDRC have involved support to agricultural information services in the Third World. More than a tenth have involved population information.

Thirdly, nations are not information islands, not even the superpowers. Information sharing is crucial for development. Whether it is the art of making paper or gunpowder, our system of counting or methods of dyeing textiles, a large part of the knowledge originated elsewhere and has been enhanced many times over by others. The information systems that are supported in Third World countries must provide rapid information conduits to the systems of other countries for information exchange. Hence, network linkages are an integral part of most IDRC projects.

A variety of network types have been supported, the selection of which depends on the requirements of each situation. For the case of information centres which specialize in the collection, analysis and dissemination of all of the world's information concerning a narrow research topic of importance to the Third World, the centralized star network is preferred. IDRC has helped to create international information centres on subjects like cassava, grain legumes, dates, camelids (alpacas, llamas, etc.), coconuts and ferrocement. A researcher anywhere in the world can access the information on the desired topic through the relevant information centre.

The decentralized star network structure has been used in cases of sectoral international and regional information networks. In the global Agris information network, each participating country reports the agricultural literature published in that country to the central database in Vienna. The information is then pooled and distributed on tape to the country nodes. IDRC's main goals have been to assist each country to deal with its own agricultural information effectively and to access the information of other countries through the outputs of the network. The experience has been mixed, with the success rate generally higher for strengthening local information handling capacity than increasing rapid accessibility to the agricultural information of other countries.

Regional information networks have been more successful in this respect. One reason for this is that often regions have more factors in common (eg underdevelopment, economic structure, trade) to bind the members. Another is that a larger proportion of the relevant literature is generated and published in the Third World countries than is the case for global networks where the developed countries overshadow their partners. Some aspects of the group dynamics are similar to those found within Canada when looking at inter-provincial relationships from the federal and regional perspectives.

IDRC generally encourages networks with an established mandate and objectives and a strong coordinating centre whether in the centre or elsewhere in the network. Some of the information networks, however, are rather loose and informal and are of the ring or web type. This is not surprising in light of the limited resources and infrastructure in the Third World. Phone calls, telexes, and travel outside the country, let alone data communications, ultimately involve foreign exchange which is at a premium. IDRC support for these costs, though not tremendous in absolute terms by Canadian standards, has a major impact on linking Third World institutions and people to each other through meetings and through telecommunications.

This type of network structure is also appropriate for situations where there is no single member institution with a regional mandate or in subject areas where the information is primarily of national or local interest. Examples of such networks supported by IDRC are RELIC (Latin American Trade Information Network) and RIALIDE (Information Network of the Latin American Association of Development Financing Institutions).

Person-to-person communication among members of informal networks or "invisible colleges" and communication at topical meetings are essential and effective means of transmitting information and knowledge directly. But for handling and exchanging information in large quantities, other media and tools are essential. Information technology may be as simple as a filing system or catalogue card, though in our current age of "high technology", one tends to think in Canada of computers and telecommunications. Information handling requires technology. The questions of importance are:

- Which technology suits my situation best?
- How do I get the technology?
- How do I make it work?
- Do the benefits of the technology yield a profit or a loss?

It doesn't matter whether the technology is paper and pencil or magnetic disk and computer. The questions must be asked and answered. Both technologies form important components of IDRC-supported projects.

The emphasis of the Information Sciences programs with respect to information technology is upon the effective transfer and use of existing technologies to the benefit of Third World countries. Development of new technology is not a major objective, although testing, repackaging and enhancement of existing technology to meet local needs is supported. The modest resources offered by IDRC projects (the average project size is about \$200,000 over 2½ years) and the high costs of many new technologies prevent IDRC and Third World countries from being highly active in some areas of high technology. However, many examples can be given of how our support has contributed to the advancement of local information technology frontiers. One of the most prominent areas is the adaptation of computer technology to allow Third World users to operate in local languages. In South-East Asia, a project involving the production of a regional bibliography led to the introduction of technology for printing multilingual output in English, Malay and Thai (which uses

non-Roman characters). A small project is under development in Ethiopia to adapt firmware and software to handle Amharic. Activities have been supported concerning Chinese, Arabic, Aymara and several other languages.

On a limited basis, the Information Sciences program also supports computer software development in developing countries, mainly for low-cost mini- and microcomputers. However, in the great majority of cases, Third World institutions are encouraged to adopt standard software, rather than undertake new development.

One project in Africa has supported the adaptation and development of microcomputer software for the analysis of agroforestry land use systems in Third World countries. The tool is used by agricultural extension services to advise farmers on best strategies for intercropping with perennial tree crops.

In another case, we have cooperated with the Commonwealth Secretariat to jointly sponsor the development and testing of a microcomputer applications package based on standard database management software. The tool will assist small Third World countries to manage external debt information and to identify options and make projections for national financial planning.

Efforts in the field of telecommunications have so far looked primarily at the feasibility of technology application. Studies on the application of computer conferencing, on linking international agricultural research centres in Third World countries with each other through data telecommunications, and on satellite communications in developing countries have been supported.

Those projects that have research on information as the principal objective usually concern either technology enhancement or testing, as just described, or communication research. An example of the latter is a study being made of the Creole language and its role and impact in the Caribbean.

The principal goal and impact of IDRC's information programs is to build the capacity of Third World countries to develop and use information more effectively for research and problem solving. In many cases, the capacity can be measured as information output (number of answers, documents, records, transactions, decisions, etc.). In some cases, the capacity can be measured as infrastructure (computer power acquired, information collected or purchased, organizations or networks established, etc.). But the most valuable and lasting impact is upon the human resource, in enlarging the indigenous pool of skills and talents for information management and problem-solving. By

investing a fraction of the money that is consumed annually for training Canadians in information management, Canada, through IDRC, has helped to build a small cadre of information specialists in half the nations of the world. A higher degree of self-sufficiency is the long-term goal of developing regions. By creating and enriching their training infrastructure, it is possible to multiply the output in terms of human resources several fold. Therefore, where appropriate, the Division also supports efforts to establish regional training programs in information.

IV. The contributions of the Ontario community

The Canadian, and more specifically, the Ontario community, are active partners in assisting IDRC to address the information needs of the Third World countries. Many organizations have been generous in making their experienced and talented staff available to serve as consultants and experts to Third World institutions. This applies to the universities, for example, Waterloo in the field of remote sensing and cartography, Guelph in information sciences and telecommunications; to provincial agencies such as the Ontario Centre for Remote Sensing; to private industry in several fields including micro-graphics, software, and image analysis; to non-governmental agencies like CODE (the Canadian Organization for Development through Education); and to federal agencies, for example, Statistics Canada, Canadian Centre for Occupational Health and Safety, Canadian Institute for Scientific and Technical Information, Canada Centre for Remote Sensing, and Public Archives. The Universities and other institutions have provided formal and in-service training to numerous developing country recipients of our projects.

Although the cooperative links with Ontario institutions have always been strong, the number of projects involving institutional cooperation between developing country and Ontario institutions working towards common or shared objectives was small until recently. This is due partly to the fact that our projects more often involve implementation of information systems than research. Few Ontario institutions except the universities are mandated to contribute to and participate intensively in development projects in the information field. Where research is involved, for example, in the cartography and remote sensing part of our program, collaborative projects have been more readily established. Last year, more than 10% of our projects involved Canadian institutional collaboration which is in line with IDRC's current policies.

The recipients and IDRC value highly the cooperation and assistance offered by Ontario institutions and individuals, irrespective of whether the form is information, a consultancy, institutional involvement or goods. Whenever needed by our recipients in the Third World, we will continue to seek the cooperation of appropriate Canadian institutions.

V. Relationship to Workshop Themes

The themes of the workshop on "Information Systems for Development" and the questions which it addresses relate closely to various components of the Information Sciences programs.

How can information systems lead to more effective use of information, especially research information, in planning, in research, in decision-making, in development?

How can the Canadian and Ontario experiences be applied in the Third World, taking examples from health and safety information and other subject fields?

Can emerging technologies in computers and telecommunications offer solutions at manageable costs for developing countries to make quantum jumps in their information handling capabilities? Which? How?

What does the Ontario community have to offer? Want to offer?

Answers to these questions are of importance to all workshops in the seminar. It doesn't matter whether the research concerns resources and the environment, rural development, energy, disease, or some other priority topic, better information flow through better information services and systems certainly contributes to more effective research and greater impact on development.

Information Sciences T₁ World Projects
By Region/Country (1971-1984)

<u>ASRO (Southeast Asia & Pacific)</u>	<u>Number of Projects</u>	<u>Total Value</u>	<u>LARO (Cont'd.)</u>	<u>Number of Projects</u>	<u>Total Value</u>
China	2	160,810	Dominican Republic	1	68,600
Fiji	1	372,000	Ecuador	1	74,450
Hong Kong	2	136,520	Grenada	1	52,900
Indonesia	4	449,375	Guatemala	1	98,000
Malaysia	2	93,000	Haiti	1	35,250
Papua New Guinea	1	301,740	Jamaica	5	844,710
Philippines	8	2,467,505	Mexico	4	532,487
Singapore	6	3,981,356	Panama	1	161,306
South Korea	1	25,495	Peru	6	1,319,380
Taiwan	1	453,730	St. Vincent	4	1,424,862
Thailand	22	3,015,511	Uruguay	1	42,834
	<u>50</u>	<u>11,457,042</u>	Venezuela	1	105,200
				<u>80</u>	<u>16,457,581</u>
<u>EARO (East & Southern Africa)</u>			<u>MERO (Middle East)</u>		
Botswana	1	194,000	Egypt	4	397,790
Ethiopia	8	2,340,321	Iraq	1	205,700
Kenya	7	1,367,703	Israel	3	1,359,700
Malawi	1	12,000	Jordan	1	166,583
Mauritius	1	94,700	Morocco	3	648,350
Sudan	2	296,178	Pakistan	2	358,500
Tanzania	1	105,990	Syria	2	579,150
Zimbabwe	1	182,000	Tunisia	1	49,550
	<u>22</u>	<u>4,592,892</u>		<u>17</u>	<u>3,765,323</u>
<u>HEAD (International Agencies)</u>			<u>SARO (South Asia)</u>		
Canada	25	3,218,595	Bangladesh	3	799,980
France	6	445,600	India	3	1,042,875
Italy	4	265,050	Nepal	3	308,150
Switzerland	3	280,900	Sri Lanka	3	438,600
UK	6	479,731		<u>12</u>	<u>2,589,605</u>
USA	5	207,100			
	<u>49</u>	<u>4,896,976</u>	<u>WARO (West Africa)</u>		
<u>LARO (Latin America & Caribbean)</u>			Cape Verde	1	148,500
Argentina	3	337,390	Ghana	1	411,600
Barbados	3	1,101,690	Guinea	2	246,000
Bolivia	7	1,022,164	Ivory Coast	3	541,875
Brazil	7	1,200,795	Mali	5	1,478,342
Chile	14	3,769,364	Mauritania	1	94,930
Colombia	8	2,013,345	Nigeria	4	874,920
Costa Rica	11	2,252,854	Senegal	6	1,541,382
			Togo	2	240,900
			Upper Volta	1	357,500
				<u>26</u>	<u>5,935,949</u>