Consultative Group on International Agricultural Research

Report of the Task Force on International Assistance for Strengthening National Agricultural Research

August 1978

Washington, D.C.
August 1, 1978

Mr. Warren C. Baum
Chairman, Consultative Group on International
Agricultural Research
The World Bank
Washington, D.C. 20433

Dear Mr. Baum:

I take pleasure in transmitting to you herewith the report of the Task Force on International Assistance for Strengthening National Agricultural Research. The Task Force recommends that a new international Service be established, under the aegis of the CGIAR, with a mandate to help developing countries, upon request, to increase their agricultural research capacities. As instructed by its Terms of Reference, the Task Force has included in the report recommendations with respect to the functions, financing, staffing, governance, operations and headquarters location of the proposed Service.

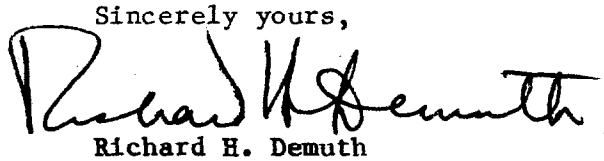
While the members of the Task Force served in their individual capacities, they included officials of several development assistance agencies, research administrators from several developing countries in varying stages of development, and the Directors General of two international agricultural research Centers. All members of the group participated actively in the discussions. Although there were initial differences of view among the members of the Task Force on many issues, and although not every member would necessarily endorse every statement in the attached report, the conclusions and recommendations were unanimously agreed by all members of the Task Force.

If the recommendations of the Task Force are approved by the CGIAR the next step would, I believe, be for the CGIAR to establish an appropriate subcommittee with responsibility for creating the proposed Service. This subcommittee would presumably agree on a basic charter, make a final determination as to the location of the headquarters of the Service and negotiate an appropriate agreement with the host country. It would also presumably conduct discussions with the International Agricultural Development Service (IADS), as recommended on page 19 of the report. It might also be made responsible, on behalf of the CGIAR, for electing an initial Board of Trustees of the Service, on the basis of nominations solicited from members of the CGIAR and other sources. The Board of Trustees so selected would, in turn, be responsible for selecting a Director for the Service and for approving an initial budget for submission to the CGIAR. Presumably, the CGIAR will wish to designate some organization to serve as executing agency to assist the subcommittee, and subsequently the Board of Trustees, in carrying out the foregoing tasks.

The Task Force has requested me to acknowledge its debt of gratitude to the Study Group, headed by Mr. Nathan Koffsky, which undertook the laboring oar in collecting and analyzing the information needed by the Task Force and in drafting the attached report.

It was a pleasure to have presided over the deliberations of the Task Force and to have participated in the work of the Study Group and I am honored to have been afforded that opportunity.

Sincerely yours,



Richard H. Demuth

Chairman, Task Force on
International Assistance
for Strengthening National
Agricultural Research

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SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. The Task Force finds a clear and urgent need for additional assistance to strengthen national agricultural research capabilities in developing countries. The concern is to strengthen the national research system as a whole in order to generate and adapt technology suitable to local farming conditions for commodities important to national development objectives, including but not limited to the food commodities covered by the international agricultural research Centers.

2. Research needs vary widely among developing countries, depending on their agricultural potential and the stage of development of their research capabilities. A few with an adequate supply of skilled scientists and well managed systems may need only financial help to build facilities. Others with totally inadequate research resources need expatriate scientists and technicians, in addition to facilities, to initiate even limited research programs. Most developing countries fall in between.

3. At the root of the problem in most countries is the need to plan, organize and manage research more effectively. This involves establishing research priorities in accordance with national development objectives, resource potentials and farmers' needs; developing research programs and projects; organizing and managing the research system to use research resources (including external assistance) more effectively; creating effective means for transferring new technology to the extension service and thus ultimately to the farmers; developing training plans to provide the skilled scientists and technicians needed for a balanced system; arranging for the facilities and other support that will enable scientists to work effectively; and establishing links with other research institutions, particularly the international Centers.

4. It takes many years to build an effective research system. Unless the national systems are strengthened in their planning, organization and management so as to enable them to undertake more productive research, the research establishments will continue to have difficulty in enlisting the commitment of their governments to provide adequate long-term support. In the absence of such improvements, they are also likely to continue to have difficulty in attracting necessary financing from external assistance agencies. Most external agencies would be willing to increase support if suitable programs or projects were presented to them.

5. Development assistance agencies--international and bilateral--have contributed much to improving national research capabilities, largely through training substantial numbers of research scientists and providing financial assistance and expatriate technical expertise for specific research operations. But much more remains to be done in these respects. Moreover, relatively few countries are receiving long-term assistance at the level of overall research planning, organization and management. Traditional assistance agencies are limited in their ability to fill this need for a variety of reasons, such as the difficulty of providing highly qualified personnel for the long periods required to build research systems, budgetary and operating constraints that attend most of the larger organizations, and political sensitivities and fluctuations in political relationships which hamper long-term bilateral assistance at a policy level.

6. The Task Force has concluded that existing agencies, multilateral and bilateral, cannot meet the pervasive needs of national agricultural research systems in full, that additional assistance is needed, and that it can best be organized as an extension of the activities of the Consultative Group on International Agricultural Research (CGIAR). The Task Force therefore recommends that a new Service for strengthening national research capacities be created under the aegis of the CGIAR, with the functions--particularly the provision of assistance in research planning, organization and management--spelled out in Section V. Such a new Service, in the view of the Task Force, would be a logical expansion of CGIAR's concern to assure that the benefits of improved technology are made widely available to increase global agricultural production.

7. The Service should have characteristics that would enable it to operate with maximum effectiveness, i.e.: it should be autonomous and non-political in management, staffing, and operations; it should be a "center of excellence" whose sole business is helping to strengthen national research systems, normally by providing assistance over long periods, and with a career staff of the same high quality as the staffs of the international agricultural research Centers; it should be a relatively small organization capable of quick response to requests from developing countries; and it should have sufficient stature to be able to assist the countries it serves to obtain external finance for support of their research systems.

8. The Service would provide assistance to a country only at the country's request. Its efforts would concentrate largely on planning, organizational and management issues. It would seek to encourage the utilization of other sources of assistance, to the fullest possible extent, in the actual implementation of research programs and projects. However, the Service would be authorized to help governments to carry out operational tasks throughout the whole scope of national research systems, provided that, in the case of long-term projects, the costs of the Service are fully funded from sources other than through the CGIAR.

9. There are perhaps 50-70 countries that have need of assistance at the planning, organization and management level. Some countries may well prefer to arrange for such assistance from existing international and bilateral agencies. But the Bellagio Conference of national agricultural research directors from 17 developing countries affirmed that there is scope for a new service of the type proposed, provided that it is complementary to the ongoing activities of existing international agencies, and the Task Force concurs.

10. The Service, as envisaged by the Task Force, should have neither the objective nor the capacity to supplant other sources of technical assistance. On the contrary, one of its principal functions should be to help governments of client countries to find and use such sources more effectively, and to enable assistance agencies to provide support within the framework of a comprehensive program for the development of the national research system. Thus it is intended that the Service would not only be complementary to the activities of other assistance agencies but also be helpful to them.

11. The Task Force also believes that the Service would be helpful to the international Centers. It is clear that the Centers must work directly with national organizations to validate their research findings and in other matters related to Center programs, and the Task Force does not intend that the Service should in any way interfere with such cooperative activies. But the Centers have come under considerable pressure to provide assistance to national agricultural research programs which exceeds their own mandates and proper interests but which they find difficult to refuse because of the urgency of the needs. If the Service is established, developing countries could turn to it rather than to the Centers for such assistance. To the extent that the Service is successful in contributing to stronger national research systems, it would facilitate and make more effective the cooperative programs of the Centers. Conversely, the Service would find it important to be able to call on Centers on behalf of its client countries for training and for specialist expertise which the Centers are able and willing to provide within their mandates.

12. The Task Force finds that the Service will meet felt needs of developing countries and that the demand for the Service will be large. This likelihood is enhanced by the close relationship of the Service to donor members of the CGIAR. The limiting factor is likely to be the capacity of the Service's staff to respond to all requests. To do its work well, the staff must be highly qualified and experienced. Such people are in short supply. However, the Task Force is convinced that, by providing career opportunities in important work, the supply can be enlarged. The success of the international Centers in attracting scientists of outstanding quality for long-term service in the developing countries provides an encouraging example.

13. The Task Force recommends that the Service be established as an integral part of the CGIAR system, with full participation in the benefits and the responsibilities accompanying that position. It further recommends that the CGIAR should undertake to assure the minimum basic financial requirements of the Service for an agreed initial period of six years (five years following a start-up year), a period long enough to test the effectiveness of the Service. The Service's policies, programs, budget and performance would be examined by the CGIAR/TAC in much the same manner as is done in the case of the international Centers.

14. For reasons spelled out in Section IX, the Task Force believes that the Service should be assured a minimum level of financial resources adequate to enable it to make an appreciable impact on the state of agricultural research systems in the developing countries. It estimates this level to be $1.5 million for the start-up year and $3 million per year for the ensuing five year period, a level of financing which would enable the Service to employ a professional staff of about 20, plus several consultants. The Task Force recommends that the members of the CGIAR provide an assurance of financing enabling the Service to begin at that base line and to grow as demand, performance and results justify. Since the major cost of providing long-term assistance in individual countries would be met by funding outside

the CGIAR budget process, assured financing of $3 million per year from CGIAR members should enable the Service to provide assistance costing considerably more.

15. In the view of the Task Force, the Service should be established as an international legal entity to enable it to be most effective in its policy advisory activities, to participate fully in the CGIAR, and to qualify broadly as a contractor under bilateral financing. While there are various means to accomplish this, the Task Force finds that the most practical way is to have the Service created by an instrument signed by two or more governments and/or international organizations acting on behalf of the CGIAR, with the host government agreeing to recognize the Service's legal personality and international character.

16. The charter of the Service should provide for a Board of Trustees of from 14 to 17 members to carry out the functions usually performed by Boards in the CGIAR system. The Task Force recommends that the initial selection of Trustees should be made by a subcommittee of the CGIAR, and that vacancies thereafter should be filled by the Board itself with the concurrence of the CGIAR. The Trustees should serve in their individual capacities, but the composition of the Board should be broadly representative of the viewpoints and experience of developed countries, of developing countries at different levels of research capacity, and of different geographical regions. The Director of the Service should be a member of the Board ex officio.

17. Section XII sets forth the factors which the Task Force believes should be weighed in selecting a headquarters for the Service. On balance the Task Force considers that the location to be preferred is Rome or Washington, at least for an initial period.

I. INTRODUCTION

1. In April 1977, representatives of a number of development assistance organizations which are members of the Consultative Group on International Agricultural Research (GCIAR) met informally in Munich to consider means of assisting developing countries to strengthen their national agricultural research systems. The consensus of the Munich meeting (attached as Annex A) was that the CGIAR should establish a service for this purpose as part of the CGIAR system. The Technical Advisory Committee (TAC) of the CGIAR endorsed the idea in principle but recommended that a Task Force be created by the CGIAR to study the matter in detail. The CGIAR, in September 1977, accepted TAC's recommendation and authorized the Chairman of the CGIAR to designate the members of the Task Force and to propose its terms of reference.

2. The Terms of Reference for the Task Force are contained in Annex B. The assignment given to the Task Force in those Terms of Reference was "(a) to identify the constraints on the availability and application of external assistance to strengthen national agricultural research capabilities in developing countries; (b) to consider the feasibility and desirability of alternative means of overcoming these constraints, including the creation of an international service or other appropriate entity; and (c) if the Task Force concludes that some new initiative by the CGIAR is desirable and feasible, to prepare a specific action proposal for consideration by the CGIAR."

3. The Task Force (listed in Annex C) was selected to be representative of the major interests of donors and recipients. The members held two meetings: on January 18, 19 and 20, 1978 in Washington, and on June 1 and 2 in Nairobi. Observers from FAO, UNDP, the World Bank, CGIAR and TAC participated.

4. The Task Force did not believe it worth while to collect new information concerning national agricultural research systems. Rather, the Study Group assisting the Task Force was instructed to survey and synthesize the voluminous information concerning national research activity already available from many sources: from the documentation of FAO and TAC, for example, and from project reports and sector studies prepared by development assistance agencies for more than 50 developing countries. The views of many development-assistance agencies were directly obtained, and the staffs of the international agricultural research Centers provided valuable insights into the state of the agricultural research systems with which they are familiar. Additionally, the individual members of the Task Force, selected for their knowledge of the subject matter and representative of the various interests involved, brought their experience to bear. The findings of this report are based on the consensus of judgments from all these sources; they proved to be quite consistent in their evaluations, one with the other.

5. Most developing countries need both technical assistance and capital assistance to help them strengthen their national agricultural research systems. The concern of the Task Force focuses substantially on

technical assistance to help countries plan, organize and manage their research systems for more effective use of resources. The Task Force also recognizes, however, that capital investment in equipment, buildings and land will be an indispensable component of most programs to improve national agricultural research capacity. Although no reliable data are available on which to base an estimate of the capital funds that might be needed, the Task Force believes that developing countries need considerable assistance in this regard.

6. The Task Force also concluded that the scope of its inquiry should be the strengthening of national agricultural research systems and the closely related activities of training skilled scientists and research administrators and of establishing appropriate research-extension links. There are, of course, other factors that impede progress in improving agricultural productivity and that also require attention. These include weak agricultural extension services, inadequate credit, unavailability of supplies such as fertilizers and seeds, and limited market outlets and/or inappropriate price policies that do not provide incentives to producers to adopt new or improved technology. But unless the technology is forthcoming, alleviating these other constraints would not avail much. While there are institutions, particularly FAO, the World Bank and the regional development banks, that are concerned with the wide array of activities related to national agricultural development, including agricultural research, the Task Force has come to the conclusion that, because of the overriding importance of generating new technology properly adapted to local conditions, strengthening national research capabilities warrants special attention.

II. AGRICULTURAL RESEARCH NEEDS OF DEVELOPING COUNTRIES

7. The need to improve agricultural productivity in developing countries has been well documented. FAO, the World Food Conference and, more recently, the International Food Policy Research Institute, have brought to worldwide attention the precarious food situation in most developing countries and the prospect that, unless performance in agriculture is greatly improved, the numbers of poor and hungry people will continue to rise with no end in sight. This disturbing prospect is most apparent among developing countries with low per capita incomes and limited alternatives for development except in agriculture. Most such countries are in South and Southeast Asia and Sub-Sahara Africa, although the same situation characterizes a number of the non-OPEC countries of North Africa/Middle East, Central America/Caribbean and the Andean group in Latin America.

8. The capacity of national agricultural research systems to generate and adapt technology is a critical element (although far from the only one) in advancing productivity at the farm level. This has been demonstrated by advances in yields of various food and cash crops in those countries that have been in a position to develop modern technology or to exploit the technology made available by others, and particularly by the international agricultural research Centers. The CGIAR and TAC, since their beginnings, have been concerned about the inadequacies in most national research systems that have vitiated much of the potential contributions of the international Centers. Furthermore, the need to improve productivity is not limited to those food commodities that fall within the mandates of the Centers; it includes a broad range of commodities important to national development objectives in individual countries. This underscores the need to develop in-country capacity to do independent research

9. It is difficult to describe with precision the current state of agricultural research activities in developing countries. The CARIS project under way at FAO provides useful information about research activities and research personnel in those developing countries which are providing information, but it is still incomplete in coverage of countries and of institutions and personnel within some of the countries that have reported. Such data as are available from various sources on the number of research scientists in each country are assembled in Table 1. The differences among the several series illustrate the unsatisfactory state of the statistics.

10. The main facts, nevertheless, are not in dispute: agricultural research in developing countries is seriously understaffed and under-financed. In most of these countries, for instance, the size of the research establishment for major crops, on the face of it, is too small to permit significant research (Table 2); and low-income countries, where the lag in agricultural production is most pronounced, spend only one-fourth as much on research in relation to the value of production as do developed countries (Table 3).

11. According to estimates of the World Food Conference, to make it possible for developing countries to do the research necessary to attain an

TABLE 1

NUMBER OF RESEARCH SCIENTISTS AND RESEARCH INSTITUTES BY DEVELOPING COUNTRY

Country	Number of Research Institutes		Number of Research Institutes with Less Than 6 Scientists	NUMBER OF RESEARCH SCIENTISTS				
				CARIS				
	Caris	FAO Report[1]	FAO Report[1]	Total	Nationals	Total Expatriates	Developing Country Expatriates	Boyce & Evenson[2] 1974
United Arab Emirates	7	NA	NA	17	1	16	11	NA
Afghanistan	14	NA	NA	33	31	2	2	NA
Argentina	NA	40	15	NA	NA	NA	NA	880
Bangladesh	100	NA	NA	447	442	5	0	190
Benin	NA	16	16	NA	NA	NA	NA	16
Bolivia	17	16	14	86	86	0	0	50
Brazil	318	46	9	2,442	2,316	126	68	2,000
Burma	NA	8	7	NA	NA	NA	NA	NA
Burundi	NA	9	9	NA	NA	NA	NA	28
Cameroon	NA	24	18	NA	NA	NA	NA	96
Chad	1	8	3	NA	NA	NA	NA	30
Chile	20	12	7	NA	NA	NA	NA	192
Colombia	18	23	11	100	100	0	0	870
Congo	6	4	1	NA	NA	NA	NA	NA
Costa Rica	48	5	2	134	114	20	8	71
Cyprus	10	1	0	57	57	0	0	52
Ecuador	6	5	1	146	145	1	0	200
Egypt	38	44	3	101	101	0	0	800
El Salvador	3	5	3	14	11	3	0	85
Ethiopia	14	6	3	40	30	10	1	65
Fiji	7	NA	NA	24	16	8	2	NA
Gabon	NA	4	2	NA	NA	NA	NA	5
Gambia	NA	4	4	NA	NA	NA	NA	5
Ghana	24	28	17	119	113	6	2	140
Guatemala	10	10	10	22	20	2	0	NA
Haiti	7	NA	NA	2	2	0	0	NA
Honduras	9	13	9	34	16	18	7	72
India	NA	108	58	NA	NA	NA	NA	2,150
Indonesia	47	2	1	211	202	9	7	380
Iran	89	37	23	401	399	2	1	500
Iraq	18	24	14	75	75	0	0	NA
Ivory Coast	NA	30	19	NA	NA	NA	NA	110
Jamaica	8	NA	NA	50	40	10	1	NA
Jordan	10	NA	NA	85	80	5	5	NA
Kenya	NA	49	21	NA	NA	NA	NA	280
Korea (Republic)	41	9	1	948	948	0	0	650
Liberia	8	4	2	22	14	8	5	16
Libya	12	16	14	80	40	40	33	NA
Madagascar	5	26	18	20	16	4	0	80
Malaysia	20	12	8	251	239	12	11	240
Malawi	NA	9	2	NA	NA	NA	NA	75
Mali	3	17	16	4	4	0	0	35
Mexico	NA	9	0	NA	NA	NA	NA	1,000
Morocco	65	5	0	200	133	67	2	65
Mauritius	12	6	1	65	60	5	1	65
Nepal	23	NA	NA	94	93	1	0	NA
Nicaragua	NA	3	2	NA	NA	NA	NA	34
Niger	-	13	11	NA	NA	NA	NA	NA
Nigeria	47	41	20	476	364	112	38	300
Oman	4	5	4	13	1	12	3	NA
Pakistan	2	29	1	18	0	18	0	280
Panama	2	14	12	41	41	0	0	NA
Papua New Guinea	28	NA	NA	70	16	54	1	NA
Paraguay	NA	3	1	NA	NA	NA	NA	131
Peru	17	20	14	307	303	4	1	220
Philippines	131	8	0	712	711	1	0	620
Rwanda	7	5	4	12	6	6	1	18
Senegal	21	28	24	146	49	97	2	160
Sierra Leone	NA	5	4	NA	NA	NA	NA	36
Somalia	6	4	3	9	9	0	0	NA
Sri Lanka	23	3	2	112	112	0	0	130
Sudan	10	19	11	74	73	1	0	140
Swaziland, Botswana, Lesotho	4	2,8,2	0,8,2	8	1	7	0	12,16,10
Syria	23	14	7	81	81	0	0	540
Tanzania	3	20	6	9	7	2	2	145
Thailand	309	60	51	968	960	8	0	725
Tunisia	63	20	9	164	127	37	1	NA
Turkey	2	NA	NA	51	51	0	0	580
Uganda	6	31	25	31	31	0	0	80
Upper Volta	7	13	13	8	8	0	0	11
Uruguay	NA	7	0	NA	NA	NA	NA	100
Venezuela	79	16	9	40	28	12	6	160
Zaire	9	10	4	51	42	9	1	85
Zambia	30	33	24	78	14	64	11	NA

1/ FAO Report: "Needs and Opportunities for Strengthening National Research Systems as Seen by FAO," Tables 1-4, Sixth Bellagio Meeting 19-22 March 1974. The data for Latin America, Africa and the Near East is based on surveys conducted between 1970-73: data for Asia and the Far East Region is based on a survey carried out by FAO in 1962-63.

2/ Agricultural Research and Extension Programs, James K. Boyce and Robert E. Evenson, Agricultural Development Council, 1975.

TABLE 2

NUMBER OF RESEARCH SCIENTISTS PER MAJOR CROP[1/] BY DEVELOPING COUNTRY

Single Crop Over 100,000 ha	0-10 Scientists Per Major Crop	11-20 Scientists Per Major Crop	21-50 Scientists Per Major Crop	More Than 50 Scientists Per Major Crop
Country	Country	Country	Country	Country
Brunei	Afghanistan	Botswana	Indonesia	Bangladesh
Cyprus	Chad	Benin	Nepal	India
E. Timor	Ethiopia	Cameroon	Sri Lanka	Rep. Korea
Hongkong	Gambia	Liberia	Iraq	Malaysia
Kuwait	Mali	Madagascar	Morocco	Philippines
Lebanon	Mauretania	Zaire	Pakistan	Thailand
Maldives	Niger	Angola	Nigeria	Egypt
Oman	Somalia	Tanzania	Sudan	Jordan
Sikkim	Upper Volta		Congo	Iran
Yemen PDR	Burundi		Ghana	Libya
Cape Verde	Central African Empire		Ivory Coast	Syria
Comeros	Rwanda		Sierra Leone	Tunisia
Gabon	Togo		Malawi	Turkey
Guinea Bissau	Uganda		El Salvador	Senegal
Mauritius	Lesotho		Honduras	Kenya
Reunion	Mozambique		Nicaragua	Zambia
Swaziland	Haiti		Bolivia	Mexico
Fr. Guyana			Ecuador	Argentina
Barbados			Paraguay	Brazil
Belize			Peru	Chile
Costa Rica			Venezuela	Colombia
Dominica			Uruguay	
Grenada				
Guadeloupe				
Jamaica				
Montserrat				
Neth. Antilles				
Panama				
St. Lucia				
St. Vincent				
Trinidad				
Oceania Islands				

FOOTNOTE

1/ A major crop is defined as one with an area exceeding 100,000 ha. This derives from P. A. Oram's paper, "Training Requirements for Research and Its Application--An Overview," (CGIAR 1977). Oram suggests that a major crop commodity research program would require about 44 research scientists.

Sources: (a) Number of Scientists

Research and Extension Programs: James K. Boyce and Robert E. Evenson. Agricultural Research Council, 1975.
CARIS, FAO, 1978.
Les Depenses de Recherches Agricole dans 34 Pays d'Afrique Tropicale: Samuel Kassapu, Centre de Developpement de l'OCDE, Paris, 1976.
Various project reports from the World Bank, the IDB, and country studies by FAO.

(b) Crop Area

FAO Production Yearbook, 1976.

TABLE 3

EXPENDITURES ON RESEARCH AND EXTENSION AS
PERCENT OF VALUE OF AGRICULTURAL PRODUCT, 1974

Country Per Capita Income 1971	Percent on Research	Percent on Extension
Over $1750	2.55	.60
1001 - 1750	2.34	.31
401 - 1000	1.16	.40
150 - 400	1.01	1.59
Below 150	.67	1.82

Source: Research and Extension Programs, James K. Boyce and Robert E. Evenson: Agricultural Development Council, 1975.

annual increase of 4 percent a year in production (a target commensurate with their needs), as compared with the historical rate of 2-1/2 percent, expenditures for national agricultural research would need to be increased 3-1/2 times. At the same time, the Conference estimated that external financial support for national research would need to be doubled. This would mean financing of about $1.4 billion (in 1977 dollars) annually by 1985 from domestic sources and about $400 million from external sources.

12. The research manpower requirements for the kind of expanded national research efforts considered necessary by the World Food Conference would also be very large. There are perhaps 20,000 agricultural research scientists in developing countries today (excluding the People's Republic of China), almost double the number of ten years ago. This increase has been achieved with considerable assistance from external agencies, which are providing education and training in research for about 3,000 developing-country nationals each year. At the same time, the build-up of agricultural universities in some developing countries has provided these countries with the capacity to educate and train more of their own scientists. Even so, there will still be need for increased (largely external) support, particularly for advanced training in the more developed countries, perhaps to the level of 5,000-6,000 research scientists annually within the next decade. 1/ In addition, training will be needed for a greatly increased number of technicians.

13. Apparently, there has been a resurgence of interest in investment in agricultural research by the governments of some developing, as well as of some donor, countries, and by international development assistance agencies since the World Food Conference met in 1974, a time of food crisis. In some other countries, however, observers familiar with the scene believe that government support of research has continued to decline and that national research capabilities have been reduced.

14. The Task Force concludes that most developing countries must make a much stronger long-term commitment to build and strengthen their agricultural research systems. This will not come about unless donor governments and development assistance agencies make a similar commitment to help them do so.

Major Improvements Needed

15. There is a great diversity among individual countries in their needs to strengthen agricultural research, depending on the stage of development of their research systems. Some countries such as Brazil, India, Korea, Malaysia, Mexico and the Philippines have the capability to undertake substantial and significant research programs on their own, whereas most of the smaller countries in western and central Africa have little or no independent research capacity and, to the extent that they have research programs, depend substantially on expatriates to carry them out. The situation in most developing countries is somewhere in between.

1/ This target was noted in "Training Requirements for Research and Its Application--An Overview," prepared by Peter A. Oram for the CGIAR meeting of September 1977.

16. There is widespread agreement, nevertheless, on the major improvements needed in order to strengthen agricultural research systems, although the emphasis varies among individual countries. It is agreed that

(a) Agricultural research must be given higher priority in the development programs of developing countries and in the concerns of development assistance agencies.

In the past, agricultural research in many countries has been too feeble to produce worthwhile results; and in the absence of results national authorities and external agencies have been reluctant to give the support needed. It must be brought home to policy-makers and planners in the upper reaches of governments in developing countries that they can expect agricultural research to be productive if, but only if, it is conducted through an integrated plan and well prepared projects and given needed budget and policy support.

(b) Developing countries must make more efficient use of research resources through improved planning, organization and management.

There is a widespread need among developing countries to establish an appropriate organization and processes whereby research priorities can be determined and systematically pursued, so that research reflects national development priorities and is responsive to the problems encountered at the farm level. Few developing countries are experienced in this regard. Consequently, scarce research resources are frequently misdirected and misused. This is especially the case where agricultural research is organized so that responsibilities are scattered among a number of agencies, each operating independently and with no coordination among them. External assistance to research by numerous agencies frequently takes on a similarly fragmented pattern which may not relate well to priority needs and often diverts scarce research scientists from more productive work. Unless these difficulties at the over-all policy and administrative level are resolved, investment in agricultural research will likely have low returns.

(c) Developing countries must increase the supply and upgrade the skills of national research personnel (administrators and biological, physical and social scientists).

This is a pervasive need in developing countries (India is a notable exception), but there is little over-all manpower planning to provide the numbers and the balance of disciplines needed for an effective research establishment. Indeed, many national research institutions have an inadequate supply of scientists to do meaningful research.

In those countries which have attained a relatively high level of technology, a wide array and considerable depth of disciplines may be necessary to cope with problems such as new plant diseases or insects. On the other hand, for countries where there are few research resources, the prime need may be to establish as a first step a central research program for a few crops, designed to transfer and adapt external technology to local conditions. Even for such countries, the training requirements for managing and conducting research programs would include:

(i) Research managers.

(ii) Specialists in the biological and social sciences; such staff should have education to MSc or PhD level, plus training in the application of their discipline to a given crop or animal.

(iii) Agronomists (including crop specialists) who can design and execute experiments on experiment stations and farmers' fields, aimed at developing a particular technology or package of practices.

(iv) Plant pathologists, entomologists, soil scientists and other such specialists able to diagnose technical problems at the farm level and to advise both the research and extension services on the remedies to be sought.

(v) Subdegree-level support staff for laboratory and field experimental work.

There is a particular lack of trained research administrators and managers at all levels, from policy and program overview to managers of experimental farms; and there are only a few institutions that offer such training, most notably SEARCA in the Philippines and a new initiative financed by UNDP at CIAT in Colombia to train managers of experiment stations. There are no institutions geared to this purpose in Africa where the need may well be greatest.

(d) The research establishment must be provided with the support necessary to attract and retain skilled scientific personnel and to enable them to work effectively.

In part, this has to do with the basic facilities needed to conduct research, such as laboratories, equipment, libraries, experiment stations, communications, transport, supplies of water and electricity, etc., all of which are usually in short supply. It also relates to the needs for adequate compensation

for the staff, for opportunities for contact with other research communities, national and international, and for the amenities of life, such as housing, educational facilities for children, etc. Few developing-country governments provide the conditions for research establishments to function well. This reflects partly a lack of funds, partly the low priority given to research, and partly government regulations relating to salary scales and benefits.

(e) Linkages forward and backward between research and extension must be strengthened.

There is need to facilitate the flow of technology to the cultivator and to provide essential feedback to the researcher on problems encountered at the farm level. The dictum that "research must start with the farmer and end with the farmer" is often neglected. Extension activities in developing countries frequently are organizationally separate from, and only loosely linked with, research. Similarly, researchers often have little opportunity to validate their findings in on-farm tests. Goverments also tend to give a higher priority to funding extension activities than to funding research although the effectiveness of extension depends on the research base (Table 3). This is not to suggest that extension activities do not need to be strengthened but rather that more attention to research and the research-extension link would greatly increase extension effectiveness.

(f) Linkages of national agricultural research systems with other elements of the global research establishment must be strengthened.

National systems have much to gain from close relations with research in other developing countries, in developed countries, and in the international and regional research institutes; and the benefits from such linkages would be reciprocal. The international Centers have already accomplished much, with their training programs and cooperative activities, to create close working relationships within the research community; and those developing countries that have attained a capability to do independent research have benefited substantially. But adequate linkages have not yet been developed between the global system and small countries where research resources are few, the area in individual crops is too small to warrant full-scale research programs, and the problem is developing a capacity to do adaptive research. Yet these are countries for which links with research elsewhere are most necessary.

Variety in Research Needs

17. The Study Group has classified developing countries into four different categories according to the adequacy of their research systems, and has prepared case studies illustrating all these categories except for the one (Category A below) comprising countries whose systems are most highly developed. These case studies appear as Annex D.

18. Category A consists of countries with generally adequate levels of manpower, skilled in both the management and conduct of research, which have developed or have taken substantial steps toward developing a well organized research infrastructure, and which have effective linkages with research institutions in the developed countries and with the international Centers. The national research establishments of these countries are largely self-supporting and have little need for external technical assistance at either the planning or operational levels. Such countries may be short of foreign exchange for equipment or key personnel in specialized areas of research but they are likely to have sufficient contacts with multilateral and bilateral donors, and with the international Centers, to be able to obtain whatever technical and financial help they need. They may well be a source of expertise for countries in other categories. Brazil, India and Mexico are examples of the relatively small group of countries (perhaps six in all) falling within Category A.

19. Category B consists of countries which have generally adequate levels of manpower, but whose research activities are fragmented, uncoordinated and isolated from the development process. Countries in this category need assistance in reorganizing the research structure, in research management and in several key scientific or support areas. There are perhaps 10 countries in this category, including Bangladesh, Ecuador, Egypt and Sudan.

20. Case Study 1 represents a Latin American country which has a potentially effective research system but needs to strengthen the research-extension link. Case Study 2 describes an Asian country which is receiving help from many external agencies; it has a substantial number of skilled scientists but it lacks organization and management for effective use of resources and coordination of activities. Case Study 3 sets forth the situation in a Middle Eastern low-income country where the main needs are for external assistance at the organizational and management level but where there are also needs for research scientists in specialized fields and disciplines.

21. Category C is composed of countries large enough to require a balanced agricultural research system, including programs for varietal improvement, but lacking essential research infrastructure and usually having only a few crop research programs of limited scope. The needs of these countries are generally twofold: to develop effective organization and management at the top, and to build the scientific manpower to conduct research programs. In the beginning, it may be necessary to demonstrate the contribution research can make in one or two crops in order to gain government support for the research system as a whole. This category contains the largest group of developing countries, perhaps about 40.

22. Case Studies 4, 5 and 6 are illustrative of countries in Category C. Case Study 4 is of a low-income country in eastern Africa suffering from a multiplicity of research institutes and activities that need to be centralized and coordinated. There are also a large number of external agencies providing assistance. Research on food crops has been neglected relative to industrial crops. The number of research scientists needs to be

increased from 72 to 600. Case Study 5 is of a South Asian low income country where the major constraint is the shortage of trained manpower. Research activities have been centralized but the ability to plan and establish priorities for research needs to be strengthened. Case Study 6 is also of a South Asian country that lacks facilities and trained manpower, and needs reorganization of the research structure and operations. Establishment of research stations for adaptive research is also a priority need.

23. Category D consists of about 35 small countries with very limited resources and not enough area in any single crop to warrant a complete research system. In these countries, the main need is to develop research capability, largely of an adaptive nature, for a few important commodities, including the necessary physical facilities. This category is illustrated in Case Studies 7, 8 and 9.

24. Case Study 7 is of a low-income country in eastern Africa where the prime need is to develop adaptive research capability for sorghum and maize, the main food crops. None of the 19 nationals in the research institute has had post graduate training. There is need to build up the numbers and training of manpower, improve physical facilities, especially in the four regional stations, and provide operational funds for research. Case Study 8 is of a Sahelian country where there are only a few national research scientists and research is largely done by expatriates. To build adequate domestic research capability is likely to take 10-20 years, a large program of education and training for nationals outside the country, and substantial capital investment in buildings and equipment. Until qualified national research scientists become available, a continuing contingent of expatriate experts will be required. Case Study 9 is of a country in Central America where the major need is for research on maize, rice and beans, the main products of small subsistence farmers. (There is adequate research on plantation crops by private companies.) There is a shortage of trained professional manpower both for scientific research and research management. The government has not made effective use of technical assistance provided by a number of donors--indeed, its capacity has been strained even to provide counterparts--nor has it taken advantage of available training fellowships. Many kinds of help are needed by this country: expatriate research managers to help plan and organize an appropriate research program; expatriate scientists to help carry out the research program; support for improved facilities; experts to help upgrade the quality of training at the national university; and assistance in formulating and executing a program of advanced training overseas.

III. ASSISTANCE TO NATIONAL RESEARCH BY MULTILATERAL AND BILATERAL AGENCIES

25. Although it is not possible from the information at hand to develop a full picture of the extent and scope of the assistance now being provided to national agricultural research by external agencies, there is evidence of increasing interest by these agencies in supporting research projects. A description of the activities of a number of multilateral, bilateral and other agencies is given in Annex E. The World Bank has increased annual financial commitments for national agricultural research projects to an estimated $75-80 million. USAID is also financing such projects at an annual level of about $75 million. Increases have been noted as well for the IDB. Financial commitments by all donors are probably about $200 million a year, perhaps double the level in 1970; but inflation in prices has negated somewhat more than half the increase. Many donors, apparently ready to do much more, are unable to do so because of the lack of suitable, well-prepared projects. This is largely because there is no well thought out plan for research in most countries, and local expertise to formulate such plans and prepare projects to implement them is generally inadequate. Indeed, some donors may not have expressed sufficient interest in supporting research to encourage the submission of research projects.

26. Reports of the assistance agencies show that they participate in a great number of agricultural research projects in developing countries. Many of these are very useful. Some of them, however, are too small to have much of an impact. In the case of some others, although the projects themselves may be of medium or long-term duration, they are staffed by short-term experts who are in place for too short a time to work with full effectiveness. It should be noted, too, that many so-called research projects are in reality agricultural development schemes of which a research element is only a part. While the research element may be important to the success of the development project, it may not contribute much towards, and may even detract from, building a well integrated national research system.

27. At present, FAO is engaged in close to 300 projects related to national agricultural research in developing countries. Among these are major projects in Ethiopia, Libya, Mexico, Somalia, Vietnam and the People's Democratic Republic of Yemen designed to strengthen the national agricultural research system or important parts of it; projects of scope comparable to these six are under discussion or negotiation in three other countries. Of the 300 total, research components in development projects, and smaller projects providing specific research skills, account for roughly two-thirds.

28. Most technical assistance in research by bilateral agencies is also primarily oriented toward providing specialized research disciplines for specific research objectives. This is true, for example, of the U.K. Overseas Development Ministry and Japan's Tropical Agriculture Research Institute. However, France's ORSTOM and GERDAT, and USAID, are involved in some instances in assistance at the policy, planning and management levels. With few exceptions, most notably ORSTOM and GERDAT, the bilateral assistance organizations recruit field personnel on the basis of limited-term contracts.

29. Outreach programs of the international Centers are providing increasing support to national programs in building capacity to test, adapt and disseminate technology developed by the Centers. Some Centers, CIMMYT for example, have developed quite large regional programs for this purpose. Because Centers have highly skilled staff, they are under pressure by developing countries to become involved beyond their areas of responsibility and expertise.

30. Private foundations also have made significant contributions to national research. With few operating constraints, they are able to respond rapidly to requests from developing countries. They have provided technical assistance to some countries, such as Sudan, in developing comprehensive research plans for consideration by potential donors. Recently, The Rockefeller Foundation has established an International Agricultural Development Service (IADS) with a mandate to provide technical assistance in agricultural research and development; IADS is now assisting research programs in nine countries (see Annex E). However, the assistance that private organizations can provide is limited by lack of resources.

31. A large number of expatriates are involved in national research projects, although the Study Group has been unable to determine the exact number. FAO states that it currently has 375 research experts posted in developing countries. The French assistance agencies have well over 600 expatriate research experts at work in developing countries, mostly in francophone countries. Off-campus staff of the international Centers approaches 200. Preliminary data from CARIS for the 60 countries that have reported so far indicate that almost 10 percent of all research scientists in those developing countries are expatriates. In some Western African countries, the expatriates outnumber the nationals. To increase national research capabilities in most countries will require, in the short run, a considerable increase in expatriate managers, scientists, and technicians, and, for the longer run, much larger programs to train nationals to take the place of these expatriates as soon as possible.

32. In recent years, the World Bank and USAID have also given increased emphasis to assistance in strengthening national agricultural research systems as a whole, particularly in over-all policy, planning and administration as well as in research operations. Among the countries receiving such assistance are Bangladesh and Indonesia, which have selected the IADS to provide the technical assistance. USAID plans a substantial expansion of support to research under Title XII of the Foreign Assistance Act, which contemplates a major role for U.S. Land Grant State Universities in providing technical support. A large research project in Brazil supported by the World Bank uses the Inter-American Institute of Agricultural Sciences (IICA) to engage technical assistance personnel.

33. However difficult it may be to document the over-all record, it is plain that, with the help of external assistance agencies, considerable progress has been made by many developing countries in increasing the number

of qualified research personnel and in improving research facilities. It is equally plain, however, that what has been accomplished has still left most developing countries with weak or inadequate research capacity. Many more countries need help, and on a larger scale than heretofore. And even in those relatively fortunate countries that may now have considerable trained manpower and facilities, much remains to be done in building or providing the blocks that make up a complete research system. Indeed, in many countries where FAO, the international Centers, bilateral donors and private foundations have succeeded in helping the government to increase the number of its qualified research scientists, the need for a comprehensive, well-articulated and well-managed national research effort has become the more urgent, in order to enable those scientists to work productively on matters of importance to their countries.

IV. NEED FOR A SERVICE

34. A basic need in many countries is for assistance in planning, organizing and managing research more effectively. This involves: establishing research priorities in accordance with national development objectives, resource potentials and farmers' needs; developing research programs and projects; organizing and managing the research system to use research resources (including external assistance) more effectively; creating effective means for transferring new technology to the extension service and thus ultimately to the farmers; developing training plans to provide the skilled national scientists and technicians needed for a balanced system; arranging for the facilities and other support that will enable scientists to work effectively; and establishing links with other research institutions, particularly the international Centers. Indeed, it is at the level of research planning, organization and management that a government makes the critical decisions that normally determine whether or not a research system is effective, is oriented to the needs of the country, and makes good use of the resources available.

35. Traditional development assistance agencies -- international and bilateral -- are limited in their ability to provide assistance on these problems for a variety of reasons: the difficulty of providing highly qualified personnel for the long periods required to build research systems; budgetary and operating constraints that attend most of the larger organizations and make it difficult for them to respond promptly to urgent requests from developing countries; and the existence of political sensitivities or, particularly in the case of bilateral sources, the fluctuations in political relations that often impede assistance at policy-making levels. Moreover, few of the traditional development assistance agencies, multilateral or bilateral, have any substantial number of experienced staff working in the complex and specialized field of research planning, organization and management.

36. In the view of the Task Force an organization designed to strengthen national agricultural research capacities, and particularly one which will be providing assistance at the top policy and management levels, should, to be fully effective, have the following characteristics:

(a) It should be an autonomous agency, international in character and independent of outside political influence in its management, staffing and operations.

(b) It should be flexible and capable of quick response to requests from developing countries.

(c) Its staff must be of high quality, comparable to that of the international Centers; in order to attract such a staff, the assistance organization must be able to offer long-term career prospects.

(d) It should be able to provide assistance on a long-term basis commensurate with the length of time needed to build research capacity appropriate to a country's needs.

(e) It should have sufficient stature to enable it to help persuade sources of external finance to support research systems in the countries it serves.

(f) It must be a center of excellence in considering and advising on how most effectively to develop national agricultural research systems. This requires that the improvement of national agricultural research systems should be its sole business.

37. The Task Force considered various alternative ways of using existing institutions to meet the foregoing criteria. None of them was considered to offer the best solution to finding an additional and effective approach to strengthening national agricultural research capacity.

(a) The Task Force welcomed, as an expression of the willingness of FAO to do more, the proposal by the Director-General of FAO (set forth in Annex F) to establish a Research Development Programme in FAO on the condition that the CGIAR could assure that 75 percent of the costs of the Programme would be met by donor commitments. The Task Force recognizes the importance of the contribution that FAO is making toward training research personnel, in assisting agricultural development in the broadest sense, and in helping to improve national agricultural research systems, and hopes that FAO will increase its efforts still further. The long experience of FAO, its close relationship with many governments and its many contacts with agricultural communities throughout the world are valuable assets in this respect.

The Task Force has noted the encouragement given by the FAO Conference in November 1977 to FAO activities for helping "in building strong national research capabilities and ensuring application of research results through extension and field delivery services" and the conclusion of the Conference that FAO is "fully experienced and equipped to provide assistance to national agricultural research." The Task Force also noted the concern of the Conference about the CGIAR's consideration of the proposal to establish an international service for national agricultural research and its caution that the CGIAR, in its consideration of this proposal, "should take full account of FAO's role and capacity."

The Task Force has concluded, however, that the establishment of a Research Development Programme in FAO, as proposed by the Director-General, would not meet the criteria listed in paragraph 36 above for several reasons, and would therefore not be the most effective means for providing additional assistance for national agricultural research. First, such a Programme within FAO would necessarily be subject to the governing bodies and executive management of FAO and therefore could not be considered non-political in its governance or autonomous in its operations. Second, the addition of such a Programme to the already large and complex set of responsibilities entrusted to FAO would not, in the view of the Task Force, achieve the degree of specialized and concentrated effort in the area of strengthening national research capacity which the Task Force believes to be necessary. Finally, the Task Force believes it likely that recruitment and maintenance of the kind of experienced career staff contemplated for the Service would involve extensive, and probably unacceptable, exceptions to FAO's existing personnel and administrative regulations. At the request of the Task Force, the Chairman communicated these views to the Director-General of FAO; the Chairman's letter and the Director-General's reply appear in Annex G.

(b) The Task Force also discussed a suggestion that the CGIAR Secretariat could be expanded to carry out the functions envisaged. This would make the formal establishment of a new organization unnecessary, would simplify some of the administrative tasks involved in organizing and conducting the Service, and would enlist the experience of a unit already conversant with donor organizations and with some aspects of agricultural research. In the opinion of the Task Force, however, entrusting the Secretariat with these additional responsibilities would require a profound alteration in the character of that unit which would risk serious impairment of its effectiveness. It also would give rise to a conflict of interest, since the Secretariat, at the same time it was seeking to ensure effective operation of, and arrange appropriate support for, all elements of the international research network, would itself be a claimant on donor funds.

(c) The Task Force also considered the possibility of adding assistance for strengthening national research to the responsibilities of the international Centers, and felt this to be undesirable. The Centers have many of the attributes of organization, staff and legal personality considered to be necessary. They

have also helped to strengthen national research capabilities through training and outreach programs. But their mandates and their expertise are centered on research designed to develop technology for specified commodities and for farming systems appropriate for specific ecological conditions. They are not specifically qualified to provide advice on the full range of issues involved in national research policy, planning, organization and management. To charge them with responsibility for providing such advice for national research systems would, in the view of the Task Force, divert their attention from, and thus jeopardize, their central mission of developing on-farm technology to raise food production.

(d) The Task Force also considered the IADS. IADS has a small career staff highly experienced in agricultural research, it concentrates strongly (although not entirely) on assistance to national agricultural research systems, it is autonomous, and it is non-political. In these respects, it is closer than any existing organization to the Service envisaged by the Task Force. In other respects, however, IADS departs from the specifications set forth in paragraph 36: It is a dependency of a U.S. private foundation; it was created under New York law as a domestic corporation, and it is not perceived by donors as international in character; its Board of Trustees, although including highly qualified individuals who are nationals of a number of different countries, does not have the kind of composition which the Task Force envisages as appropriate for the Service, and the Trustees are not chosen pursuant to any internationally agreed procedures; and its mandate runs beyond research to agricultural development generally. IADS also is a young and largely untried organization. The Task Force believes, however, that if the CGIAR decides to establish a service for strengthening national agricultural research, it should enter into discussions with IADS as to the relationship which might be established between that organization and the new Service, with a view to determining whether and how the experience and expertise already acquired by IADS might be availed of by the Service. The possibilities range from simple operational cooperation to possible amalgamation in one form or another, perhaps through transfer of some IADS operations and staff to the new Service, possibly through transformation of IADS itself to meet the specifications of the CGIAR for the new Service.

(e) The Task Force likewise considered the possibility that the Inter-American Institute of Agricultural Sciences (IICA: see Annex E) could fill the role foreseen for the new Service. IICA already is engaged in helping to prepare research projects and in facilitating the employment of expatriate agricultural research scientists for the benefit of national research systems; and it enjoys a high degree of acceptance by governments in its own region. The Task Force feels, however, that the Institute is not suitable for undertaking the functions of a global service: while it is beginning to undertake projects outside the Americas, it nevertheless is a regional organization -- an official adjunct of the Organization of American States. Its governance is not what the Task Force envisages for the Service, its mandate extends well beyond agricultural research, and it has only a limited number of staff with actual scientific research experience.

38. Expansion of bilateral programs is certainly to be hoped for and encouraged. The Task Force, however, believes that such expansion will not of itself provide a full answer to some of the most pressing needs of national systems. For the reasons of political sensitivity already mentioned, bilateral agencies may be reluctant to operate at the higest policy levels; and while developing countries welcome bilateral support generally, many are less receptive to a dominant or exclusive relationship with a bilateral agency in policy and planning matters.

39. The Task Force has come to the conclusion that existing agencies, multilateral and bilateral, cannot fully satisfy the urgent need to strengthen agricultural research capacities, that additional assistance is required to supplement the ongoing national programs of those agencies, and that it can best be provided through an extension of the activities of the CGIAR. The Task Force therefore recommends that a new Service for strengthening national agricultural research capacities, with the functions set forth in Section V, be created under the aegis of the CGIAR. Such a new Service, in the view of the Task Force, would be a logical expansion of CGIAR's concern to assure that the benefits of improved technology are made widely available to increase global agricultural production.

40. This conclusion is reinforced by the views of agricultural research directors from 17 countries containing two-thirds of the population of the developing world (excluding the People's Republic of China), as expressed in a meeting at Bellagio in October 1977:

> "There is scope for such Service if it performs the following functions in a manner which will be complementary to the on-going program of FAO, UNDP, and the regional agencies and banks:

(a) help to generate additional resources for supporting national research systems

(b) help to fill the major gaps in national research systems on the basis of an analysis of the felt needs of the country concerned for achieving national food security and agrarian and rural prosperity

(c) assist countries in deriving full benefit from the results of the research work of IARC's by meeting the total needs of major farming systems (in several cases, the work of more than one international institute will be relevant to a farming system)

(d) assist the national research systems by organizing training programs in the area of management of agricultural research

(e) arrange for periodic meetings of leaders of national research systems of developing countries

(f) respond speedily to specific requests from time to time

(g) the headquarters of such a Service should be in a developing country."

V. FUNCTIONS OF THE SERVICE

41. The basic objective of the Service would be to strengthen the capacity of developing countries to plan and carry out agricultural research. It would do so by providing technical assistance to national agricultural research systems, or important components of those systems, concentrating largely on matters of research policy, planning, organization and management, but, subject to the principles set forth in paragraph 42, prepared to assist across the board on any important aspect of the research system.

Basic Principles

42. In pursuit of the foregoing objective, the Service would be required to observe the following principles:

(a) It would provide assistance to an individual country only upon the request of the government of that country.

(b) It would seek to complement, and not compete with, the many other sources of technical assistance, such as FAO, bilateral agencies and private organizations. It would determine its priorities and frame its programs in such a way as to encourage full utilization of technical expertise from other qualified sources acceptable to the government being assisted.

(c) It would be authorized to help governments deal with important problems throughout the whole scope of their agricultural research systems, from helping to organize the training of national personnel to meet research manpower needs, at one end, to assisting in the establishment of secure research/extension links at the other. The concern is to strengthen each national research system as a whole in order to generate technology suitable to local production conditions for commodities important to national development objectives, including but not limited to the food commodities covered by the international agricultural research Centers. The Service would be expected to concentrate its assistance largely on program, policy, organizational and management issues; but, subject to the provisions of sub-paragraphs (b) and (e), it would also be able to help governments deal with important problems at operational and project levels.

(d) It would work closely with the nationals of each assisted country with a view to enabling that country to become self-sufficient in the planning and implementation of agricultural research as soon as possible. It would be prepared to undertake a long-term commitment to work with a government to improve research capacity; but would do so only when the government was prepared to undertake a comparable long-term commitment.

(e) It would normally commit itself to provide assistance on a long-term basis only when the costs of the Service's assistance are fully funded by a source other than the CGIAR, on terms precluding the possibility of any future claim by the Service on the CGIAR. Such full funding would be a necessary condition for the Service to provide long-term assistance for the implementation of specific research programs or projects.

Assistance to Individual Countries

43. The Task Force considers that the following types of assistance, provided in accordance with the foregoing principles, would be appropriate for the Service when requested and needed by the developing country concerned:

(a) Helping to identify the needs of the country (or of a substantial region or of an important agricultural subsector) for planning and carrying out agricultural research, together with associated training and links to extension.

(b) Helping the government to determine its research priorities and to formulate an appropriate research strategy.

(c) Helping the government to formulate or revise a program of action, expressed in terms of specific projects, to carry out its research strategy, including development or adaptation of new or improved technology, development of trained manpower, and planning and construction or installation of necessary physical facilities and equipment.

(d) Assisting in the design of the necessary organization and institutional arrangements, or changes of organization and institutional arrangements, for carrying out such program and projects.

(e) Helping the government to obtain appropriate external financial and technical support for its research program and projects.

(f) Providing one or more experts to advise on policy and management issues arising in the over-all direction of the agricultural research system or of important institutions or activities in the system. Such experts could also help research administrators to make the case for budgetary and other commitments by the national government necessary for the success of the agricultural research effort.

(g) Helping in the implementation of important research programs or projects where the government is unwilling or unable to obtain the requisite assistance from other sources and where, if the assistance is to be on a long-term basis, the costs of the Service are fully funded from sources other than the CGIAR (see paragraph 42 e).

(h) Assisting in arranging for the training of both managerial and technical personnel needed for the national research effort, including assistance in arranging for fellowships and other training abroad.

(i) Helping the government to evaluate the progress and results of its research activities.

44. Some broader functions would also be appropriate for the Service to undertake in its assistance to a country program.

(a) One of these would be to help in identifying the restraints on the adoption of research findings. The Service might call these to the attention of the government and suggest that appropriate assistance be obtained for dealing with them. For example, if price and subsidy policies appeared to be inappropriate, the International Food Policy Research Institute might be asked by government to review them. The Service might, indeed, identify situations in which weakness in research is not the key issue and where the removal of other constraints should have a higher priority.

(b) The Service might also assist the government, if requested, to establish an appropriate mechanism or procedures for coordinating external assistance for all the various aspects of its research effort.

(c) It would also be useful for the Service, when such assistance is needed, to help in the development of more effective communications between the national research system and other national, regional and international organizations carrying out related research activities.

Other Functions

45. The Service would also carry out additional functions not oriented to specific countries, in order to maintain its own effectiveness and its value to developing countries generally. Among these would be:

(a) to keep abreast of the policies, practices and capabilities of other agencies and organizations offering technical assistance services relevant to agricultural research and training;

(b) to keep generally abreast of the progress made in strengthening national agricultural research systems, and to keep CGIAR/TAC informed;

(c) to keep abreast of important technical developments in agricultural research;

(d) to evaluate the effectiveness and suitability of various forms of research organization in relation to differing situations among countries; and

(e) to organize symposia and seminars for the interchange and dissemination of ideas and information useful in the development and operation of national research systems.

46. The Service would have a strong affinity of interests with the International Federation of Agricultural Research Directors (IFARD) now being established, and should seek a cooperative relationship with this potentially important new organization.

Illustrations of Assistance to Individual Countries.

47. Section II of this Report demonstrates that countries vary in their needs and potential for developing agricultural research capacity; and Annex D presents a number of case studies of the situation of individual developing countries with respect to the state of their agricultural research systems. The activities of the Service in developing countries likewise would vary considerably, according to needs and opportunities. The following examples are meant to illustrate some of the variety that might occur.

48. The few countries in Category A have relatively well developed research systems and effective relationships with suppliers of technical and financial support. There may be occasional need for some specialized assistance, but generally there would appear to be little, if any, role for the Service in this category of countries.

49. Most of the countries in Category B could profit considerably from assistance by the Service at the over-all level of research planning, organization and management. For the most part, these countries have adequate scientific personnel, but the personnel are not being used efficiently or directed to priority research topics. In addition, as is shown particularly in Case Study 2, there may be many external assistance agencies involved in research projects and proceeding with little coordination.

50. In Case Study 2, the Service might mount a reconnaissance mission, or participate in a mission of an international agency if requested, with a view to formulating a plan for the organization and administration of the research establishment and for meeting additional needs for facilities, equipment and, occasionally, certain skilled manpower. Selected parts of the program might be submitted by the government to possible donor agencies for financing, including finance for long-term assignment of Service staff to advise on management of the program.

51. Another important need of countries in Category B is often for trained research managers. The Service could help to arrange for selected nationals to obtain management training at appropriate institutions such as SEARCA. The Service might also undertake, especially in countries like the

one described in Case Study 3, to help the government to estimate manpower requirements and obtain fellowships or other training assistance from appropriate agencies.

52. Category C contains the largest number of countries. Here the Service's scope of investigation would be much broader and the requirements likely to be identified might well include not only a need for assistance at the top management level for the research system as a whole but also, below that level, needs for help in carrying out specific research operations and for scientists with specific research disciplines. Helping to organize, plan and manage the system would clearly be within the mandate of the Service; so too would be assistance in formulating individual projects. Arranging for training at all levels also would be appropriate. However, assistance for the implementation of individual research projects and the provision of specialists in specific research disciplines might be solicited by the government from other external agencies, with the advice of the Service when requested; or if necessary it might be provided by the Service, subject to the conditions set forth in paragraph 42.

53. Comprehensive national research systems are not generally warranted in the small countries of Category D, illustrated in Case Studies 7-9. Rather, the needs of these countries are to establish links with international Centers, regional centers and institutes in other countries, and to build the capability to adapt technology developed by them for a few major commodities. These needs, though modest, are critical. The main contribution of the Service, in the case of Category D countries, would be to help the governments to identify their needs and the assistance required to meet them, and to help prepare proposals and solicit support from appropriate agencies.

54. Developing an adequate research service for such countries presents many problems. One possible approach is the formation of regional groups focusing on similar crops and similar ecological zones. Such linkages, however, are of little value if none of the countries in a group has a good national research service. Where such groups have been or could be formed--and here the multilateral agencies would have a key role--the Service might help to draw up a blueprint for regional research and work with bilateral and multilateral agencies in setting up a series of strong projects in selected locations, the results of which could be shared among the participating countries.

Relation to Other Technical Assistance

55. One of the principal functions of the Service should be to help governments of developing countries to find and use other sources of technical assistance more effectively, and to enable assistance agencies to provide support within the framework of a comprehensive program for the national research system.

56. Thus, it is intended that the Service would not only be complementary to the activities of other assistance agencies but also helpful

to them. This is underscored especially in its relation to the international agricultural research Centers. The Task Force recognizes that the Centers must work directly with national organizations to validate their research findings and in other matters related to Center programs, and it does not intend that the Service should in any way interfere with such cooperative activities. But the Centers have come under considerable pressure to provide assistance to national agricultural research programs which exceeds their own proper interests but which they find difficult to refuse because of the urgency of the needs. If the Service is established, developing countries could turn to it rather than to the Centers for such assistance.

57. To the extent that the Service is successful in contributing to stronger national research systems, it would facilitate and make more effective the cooperative programs of the Centers. Conversely, the Service would find it important to be able to call on the Centers on behalf of its client countries for training and for specialist expertise which the Centers are able and willing to provide within their mandates.

VI. POTENTIAL DEMAND FOR THE PROPOSED SERVICE

58. The effective demand for assistance from such a Service as has been described portends to be very strong. Based on the country categories described in Section II, there are perhaps 50-70 countries that could use such assistance effectively. Half a dozen countries have already availed themselves of similar services by IADS. The expansion of World Bank operations in support of national research systems alone would appear to provide a sustaining base for the Service. The pressure on international Centers by developing countries for assistance in building up national research capabilities is also indicative. Additionally, the expressions of interest by the national directors of research from developing countries at Bellagio recently, the combined judgment of the members of the Task Force, especially the members from developing countries, the felt needs expressed by authorities of several countries in interviews with Task Force and Study Group members, and the views expressed by many experts, from both developed and developing countries, in communications to or discussions with members of the Study Group, all lead to the same conclusion, that there is need for such a Service and that the demand for its assistance will be large.

59. This prospect is reinforced by the fact that the Service, if created under the aegis of the CGIAR, would be in close contact with donor agencies with financial resources available for supporting research projects.

60. It is very likely that the demand for assistance from the Service will exceed the ability of the Service to respond, even if, as may be expected, the Service gradually expands its staff resources to meet the demand. The Service may therefore need to establish a sequence of country priorities, which might well begin with low-income countries that undertake a strong commitment to build up their research systems.

VII. POTENTIAL SUPPLY OF HIGH LEVEL MANPOWER FOR THE SERVICE

61. The Task Force recognizes that there is a very limited supply of highly qualified, experienced research administrators and scientists available to work in developing countries. This is generally the result of limited tenure arrangements and the interruptions that field assignments bring to home-based careers. The experience of the Centers, however, which have assembled staffs totaling about 500 professionals for research in developing countries, argues that when career opportunities are offered, as envisioned for the Service, highly qualified people will be attracted.

62. Since it is envisaged that the Service will not have a large staff when it begins operations, a manpower constraint is not likely to be an immediate difficulty. As more manpower is needed, there is the possibility of secondments from other institutions, including those of developing countries. Of more importance, however, is the need to build up the supply of highly competent professionals to serve in the global research system. The Service could help to satisfy this need by offering younger or mid-term professionals a career in this field and training them under its senior professionals.

VIII. RELATIONSHIP OF THE SERVICE TO THE CGIAR

63. The conferees at Munich envisaged a Service that would be an integral part of the CGIAR system, and TAC endorsed this idea in principle. The Task force concurs.

64. Full participation in the CGIAR system would clearly be of marked advantage in establishing an effective service. Such participation would bring the Service quickly to the attention of developing and developed countries, would inspire the confidence of donors, would enhance the acceptability of the Service to developing countries, would facilitate its cooperation with them, with donor agencies and with other institutions (especially including the international agricultural research Centers), and would provide the Service a durable basis for its operations. In the opinion of the Task Force, these advantages could not be achieved equally well short of full participation in the CGIAR system.

65. The essence of the CGIAR relationship would be that the Service would submit its program and budget to the CGIAR, and that the CGIAR, in turn, would undertake, for an agreed initial period, to meet the minimum basic financial requirements of the Service (as described in Section IX), and would continue to do so thereafter, so long as the Service was considered to be meeting its stated objectives and providing the quality of performance expected by the CGIAR.

66. The provision of the Service's basic financial requirements by the members of the CGIAR would enable the Service to act with promptness and flexibility, especially in its first exploration of the needs of individual developing countries, and would help insulate the Service from pressure to seek projects and sign contracts simply for the sake of income to support itself. The long-term activities of the Service in individual countries, on the other hand, would for the most part be financed through bilateral or other special funding outside the CGIAR budget process, and usually would not be undertaken unless such funding were in hand or clearly in sight.

67. The CGIAR's examination of the Service's program and budget would emphasize the policies and priorities established by the Service; individual country operations would be the subject of less frequent and less detailed examination, as in the case of the outreach projects of the international agricultural research Centers. The Service's program and its estimate of minimum basic financial requirements would be reviewed on an annual or biannual basis by the CGIAR/TAC Secretariat; the review would inform the members of CGIAR concerning the quality of the management of the Service, the quality of its staff, the suitability of its choice of activities and priorities, and the justification of expenditures. As in the case of the Centers, the CGIAR would presumably wish to arrange for a periodic in-depth review of the activities of the Service.

IX. STAFFING AND BUDGET

68. Developing countries, as was observed in Section II, differ not only in their needs for agricultural research but in their research capabilities and their capacity to make use of assistance. The operations in which the Service might engage, as already suggested, would differ in size and complexity from one country to another. Even if it were possible to forecast in detail the demands for the Service's assistance, it would still be difficult to estimate the aggregate amount of time and manpower that might be needed for all the tasks the Service might undertake in a given period.

69. In the circumstances, the Task Force believes that the most that can be attempted is a projection of some minimum level of resources that would appear adequate to enable the Service to make an appreciable impact on the state of agricultural research systems in developing countries: the Service should begin at that base line and should grow as demand, performance and results justify.

70. The Task Force also believes that, while any estimate of the size of the Service's initial program must in some degree be arbitrary, the Service could make a substantial contribution to the improvement of national agricultural research capacity if it were able in the course of a year (a) to investigate the merits of all requests for assistance received by the Service which appear prima facie meritorious; (b) to mount missions to six or eight countries (or regions) for purposes of identifying research needs, participating in planning a research organization or program, or for similar purposes, with the Service providing the leader and a majority of the members of each mission from its own staff; and (c) to negotiate the arrangements for, organize, staff and backstop several long-term resident advisory missions. As noted below, the establishment of long-term resident advisory missions would normally be dependent on the availability of financing from resources other than through the CGIAR. The Task Force further believes that it would be reasonable to project that, as operations advanced from year to year, the Service would be maintaining key experts in long-term assignments to help a growing number of countries--perhaps as many as 20 by the end of six years--to manage and develop their national agricultural research systems. This would still leave a large number of countries which might wish to use the Service.

71. The Service could reach these levels of activity, the Task Force believes, if it were assured sufficient financing to enable it, for its first few years, to employ a staff of at least 20 senior and middle-level professionals plus six man-years of consultants, and to pay for its other necessary operating expenses. The Task Force believes that financing of $3 million per year, in 1978 dollars, for an initial period of five years, after an appropriate start-up period, should suffice for this purpose, and that the members of the Consultative Group should be prepared to assure financing for this time and in this amount.

72. As explained in more detail below, it should be expected that the initial staff of the Service would gradually expand, and that the Service's

budget would increase, as the Service undertakes technical assistance assignments financed by loans or grants from multilateral or bilateral sources, but this should not, in the view of the Task Force, result in any increase in the basic financing needed from the CGIAR.

73. In arriving at the figure of $3 million per year for the Service's basic financial requirements, the Task Force has assumed that funds made available through the CGIAR would be used to meet the Service's running expenses, the personnel costs of about 20 professional staff plus consultants, and the costs of most, if not all, of the short-term assistance operations undertaken by the Service. It has further assumed that, except in unusual circumstances, long-term assistance operations would be financed from other sources, and that such long-term operations for the purpose of helping to implement specific research projects and programs would always be financed from other sources. The Task Force did not attempt to define "short-term" and "long-term" with precision. It agreed, however, that operations of less than six months' duration should be considered short-term, while those of two years or more should be considered long-term. Operations lasting between six months and two years were considered as falling within a gray area, with decisions on the payment of costs to be made on a case-by-case basis under policies to be established by the Board of Trustees.

74. On the foregoing assumptions, the Task Force contemplates a minimum annual budget for the Service composed somewhat as follows (based on the costs experienced by the World Bank and other organizations for similar purposes):

	(thousands of 1978 U.S. dollars)
Staff	1,860
Consultants	390
Rent and office maintenance	100
Travel	380
Communications	25
Special items (including Board of Trustees and seminars)	165
Contingencies	80
	3,000.

75. The financial provision for personnel should permit the Service to employ a professional staff of about 20, functionally allocated somewhat as follows:

Director and Deputy	2
Program group	9
Recruitment group	2
Training and manpower group	2
Research, data and information group	2
Administration group	3
	20.

The budget for staff also contemplates the employment of 12 to 15 stenographic and clerical personnel.

76. To the extent that the demands for assistance exceed the capacity of the Service's initial staff, as the Task Force expects to be the case, the Service could respond in either or both of two ways: it could augment its staff by fixed-term consultants to the extent that its resources permitted; or, since its long-term field operations will normally be conducted pursuant to contracts under which the Service's costs are met, it could increase its regular staff beyond the basic minimum covered by the CGIAR's financing. Thus the actual size of the Service's staff would be determined by the extent of the demand for its assistance; but the Service would not be in a position where it had to seek contracts in order to continue in existence. Nor would the members of the CGIAR be subject to the risk of facing open-ended demands from the Service for budgetary support: activities funded outside the CGIAR would be terminated if funds ceased to be available; and arrangements for funding would contain provisions for termination which would hold the CGIAR safe from any claims for financial support to continue or phase out the activities. When the Service's advisory activities are provided under contracts financed by bilateral or multilateral grants or loans, such contracts would doubtless provide for payment of some part of the Service's overhead costs, thus avoiding any addition to the basic minimum financial requirements to be met through the CGIAR.

77. In suggesting that the CGIAR in effect underwrite the Service's basic minimum financial requirements for a start-up year and a five-year period of operations thereafter, the Task Force has had in mind that, to help bring about a tangible improvement in the research capacity of developing countries, the Service must be prepared to undertake commitments of at least five years' duration in the countries where it works. Its ability to employ staff should be on the same time scale: the appointments of its senior staff normally should be for periods of five years, with an understanding that they will be renewed so long as the staff member performs satisfactorily and the Service continues in existence.

78. Another reason for suggesting what is in effect an assured six-year trial period for the Service is that the Service is admittedly somewhat experimental, and time will be required to judge its suitability and effectiveness. At the end of the six-year initial period, the CGIAR should be in a position to decide, on the basis of experience, whether and on what scale, if any, to continue to finance the Service.

79. The Task Force recognizes that the Service will take a year or two to reach even the minimum $3 million per year level of operations. However, to provide the Service with maximum flexibility and with stimulus to move at a pace commensurate with the urgency of the need for its assistance, the Task Force suggests that the CGIAR members assure the full $3 million per year, if required, from the second year on. For the first start-up year (i.e., after the Service is established, the Trustees are selected and the Director of the Service is appointed), assurance of finance in the amount of $1.5 million should suffice.

X. FORM AND METHOD OF ESTABLISHMENT

80. For the Service to be most effective in its policy advisory activities, and for it to be able to participate fully in CGIAR and to qualify as broadly as possible as a contractor under bilateral financing, it should clearly be established as an international entity.

81. The Service could be incorporated, for instance, under the domestic law of the host government, with several sponsoring governments and organizations acting as incorporators and thereby helping to give it international character. The early international agricultural research Centers were established in this way.

82. Since the establishment of the CGIAR, however, sponsors have preferred to set up Centers with personality and legal status established under some form of international agreement. There are several ways in which this could be done.

83. The Service could be established as an adjunct of an existing international organization. However, for reasons already stated in Section IV, the Task Force believes that the Service should be an independent entity and not an administrative appendage of any other organization, whether FAO, the World Bank, or UNDP.

84. The Service could be established by intergovernmental agreement as, for example, the United Nations and all the associated specialized agencies of the U.N. system have been. A similar method could be pursued more informally through a memorandum of understanding signed by all the sponsoring organizations and the host government, as was done in the case of the Asian Vegetable Research and Development Center. Either method, however, would be somewhat cumbersome, and the former, involving parliamentary approvals, would be particularly time-consuming.

85. The Service could be established by an instrument signed by two or more governments and/or international organizations acting on behalf of the CGIAR, with the host government agreeing to recognize the Service's legal personality and international character. This method was followed, for example, in the cases of ICRISAT, ILCA and ICARDA.

86. The participation of the CGIAR in the act of incorporation would be beneficial for a number of reasons: the informality with which action might be taken, the familiarity of most CGIAR members with the process of establishing new institutions, the acceptability of the CGIAR to donor countries as a vehicle for action, and the acceptability of an institution created by the CGIAR as a contractor under donor financing. Of the methods of incorporation mentioned above, some form of the method suggested in paragraph 85 would be the most expeditious and presumably the most acceptable to the CGIAR.

87. The laws and preferences of the host government of the Service, however, would be a significant factor in determining the form of establishment and, conversely, the CGIAR's preference for a method of incorporation might have a bearing on the choice of a host country (see Section XII).

XI. BOARD OF TRUSTEES

88. Within the framework of its charter, the final authority in the affairs of the Service would be its Board of Trustees. It would carry out the functions usually performed by Boards in the CGIAR system. They would include:

a. Approval of the policies and practices of the Service;

b. Appointment of the Director;

c. Approval of staff organization and personnel policies;

d. Consultation on appointment of senior staff;

e. Approval of annual or biannual operational plan and budget;

f. Approval of annual report;

g. Appointment of auditors, independent review committees and major consultants.

89. The Board itself can be expected to determine the degree of detail in which it wishes to guide the operations of the Service. It is assumed, however, that the Board would deal principally with questions concerning the policies and management of the Service, rather than with the technical content of the Service's individual operations. The Trustees, therefore, should be individuals broadly experienced and capable of seasoned judgment especially in one or more fields in which the staff of the Service itself may not be experienced in depth. The relevant qualifications would include:

(a) Practical experience bearing on

-- operating policies of the Service (priorities, kinds of tasks to be undertaken or declined, etc.)

-- administrative and financial management of the Service

-- management of agricultural research systems

-- contractual arrangements of the Service with donors and clients

-- training

-- communications and information.

(b) Practical experience with agricultural policy, research and production in developing countries.

(c) Knowledge of development assistance organizations, their policies and resources.

Inasmuch as the Service would require careful guidance by its Board as it evolves, Trustees may be required to give more time to it than would normally be expected from Trustees of the Centers.

90. For the Service to be an independent, self-governing institution, its Trustees should serve in a personal capacity. They should not be considered, nor should they act as, official representatives of governments or organizations.

91. In a broader sense, however, the Trustees should be representative of the viewpoints and experience of the countries which the Service is intended to assist, and of the governments and organizations to which the Service will look for technical and financial cooperation and support. A substantial part of the membership of the Board therefore should be drawn from developing countries, including countries with differing research needs and with research organizations in different stages of evolution. Similarly, Trustees should include members from developed countries and institutions in or sponsored by developed countries; they might also include one or more members drawn from the international agricultural research Centers. Finally, the Board should be composed in such a way as to include members from the major geographical areas in which the Service will work or from which it expects to draw resources.

92. The Trustees should elect their Chairman from their own membership. As in the case of the other institutions sponsored by the CGIAR, the Director of the Service should be a member of the Board ex officio, with vote.

93. The Task Force considers that these requirements could be accommodated in a Board of from 14 to 17 members, not all of whom would need to be chosen at the outset. Apart from the Director, it is recommended that the initial members of the Board should be selected by a subcommittee of the CGIAR, including representatives of both developed and developing countries, and on the basis of a wide polling of CGIAR members and others for nominations to the Board.

94. It would be appropriate for the terms of elected Trustees to conform generally to those of Trustees elsewhere in the CGIAR system; that is, terms should be three years each, and no elected Trustee should serve more than two consecutive terms. Terms should be staggered so that at least four vacancies occur among the elected Trustees each year.

95. Vacancies among the elected Trustees on the Board, including any left after the initial selection of the Board, should be filled by the Board, subject to the concurrence of the CGIAR.

XII. HEADQUARTERS LOCATION

96. Unlike the international agricultural research Centers, the Service does not have to be based in any particular agro-climatic zone. The choice of location can be made on the basis of other factors. The Munich group, it will be remembered, thought that the Service should be based initially in a developed country (for the sake of getting its operation quickly under way) but that consideration should be given thereafter to moving its base to a developing country.

97. In giving further consideration to the matter, at least three sets of factors should be weighed.

(a) One set may be thought of as being psychological or political, bearing chiefly on what type of location, or specific location, would make the Service most acceptable to its clients and to the donors supporting the Service and its activities.

(b) A second set of factors consists of those bearing on the operational efficiency of the Service.

(c) A third set of factors comprises the legal conditions posed and privileges and facilities, if any, offered by the host government.

98. Up to now, most reflection on the question of location has been centered on the question of acceptance by developing countries. This was a factor which led the Munich group and the Bellagio meeting of directors of national agricultural research systems to lean in the direction of a developing-country location.

(a) To base the Service in Africa, Asia or Latin America, however, might cause developing countries to think of the Service as regional in character, intended and best placed to serve one region ahead of others. Nor is the argument persuasive that, as is sometimes asserted, to place the Service in a developing country would have the advantage of putting it in the environment in which it will work; the Service, of course, will work in many environments.

(b) On the whole, it seems likely that the location of the Service, either in a developing or in a developed country, will not be a decisive factor in determining the acceptability of the Service to developing countries generally. Much more will depend on how the Service is governed, staffed and operated.

99. The factors of location bearing on the operational efficiency of the Service include: access to developing countries, access to donors, and proximity to bases of information concerning agriculture and agricultural research in specific regions and countries.

(a) A developing-country location does not per se give easy access to other developing countries; a location in one developing region may in fact be more distant from a developing country in another region than a location in a developed country. A number of developing country locations offer good and frequent travel connections to developed countries; but telecommunications are likely to be less good, and this would be a significant handicap.

(b) Access to donors, in any case, probably should be weighed at least as heavily as access to developing countries; and from this point of view a location in a developed country is to be preferred.

(c) With respect to data bases, the most important of these are in Rome and Washington.

(d) Another consideration, although probably not of equal weight, is the advantage which the Service would have if it were located near an agricultural university, able to offer the Service's experts an atmosphere of inquiry and discussion in which to consider problems of significance to the Service. Such a study center, useful from the standpoint of research in tropical agriculture, would be difficult (although not impossible) to find in a developed country; it would be easier to find in a developing one.

100. A special aspect of operational efficiency would be the Service's ability to attract and retain staff. Among the items to be considered here are: cost and style of living; climate and health conditions; amenities (housing, medical services, schools, availability of goods and services); availability of local manpower; and privileges and immunities (especially in tax matters) accorded expatriate staff.

(a) Some metropolitan areas in developing countries are comparable in these respects to developed-country locations. Information bearing on the suitability as the Service headquarters of a number of cities in developed and developing countries (Geneva, The Hague, London, Paris, Rome, Vienna; Washington; Mexico City, Rio de Janeiro; Abidjan, Cairo, Tunis; New Delhi) is attached as Annex H.

(b) It seems likely that the chances of formally obtaining privileges and immunities for expatriate staff would be greater in a developing than in a developed country.

101. More generally, the attitude of a prospective host government toward the idea of the Service, and the willingness of a prospective host to enter into a satisfactory headquarters agreement, would be factors deserving considerable weight in the choice of a headquarters location.

102. Provided that appropriate arrangements can be made with the government concerned, the Task Force considers that the location to be preferred for the headquarters of the Service is Rome or Washington, at least for the initial period; but after five years or so, consideration should be given to moving the headquarters to a developing country.

ANNEXES

ANNEX A

A PROPOSAL TO ESTABLISH AN INTERNATIONAL SERVICE TO STRENGTHEN AGRICULTURAL RESEARCH IN THE DEVELOPING COUNTRIES

This proposal arose out of a meeting by a number of development assistance organizations in Munich in April 1977. The consensus of this meeting was as follows:

"We believe that an essential function can be performed by an international service such as the present International Agricultural Development Service, with the task and purpose of strengthening national agricultural research in developing countries. We see the service as operating in full cooperation with, and supplementary to, existing and related programs of the FAO and other organizations.

"The service we envisage would cooperate, on the request of recipient governments, in the planning and implementation of national agricultural research programs and would help to create or strengthen national research institutions by various means.

"The service would help to provide a bridge between the work of the international research network of the CGIAR and national research programs. It would facilitate the interchange and dissemination of information on agricultural research. It would aid cooperation among national research services and it would promote and assist in the training of staff for national research enterprises.

"For the purposes of such a service, agricultural research would be considered to include some elements of extension insofar as research-related activities of extension workers are involved, and inasmuch as agricultural research involves a constant dialogue and interchange between research efforts and extension efforts. In addition, it is considered essential that agricultural research includes a socioeconomic component.

"We believe that such a service could function most effectively if it were international and autonomous in character, conducting its operations according to objective professional criteria. . . .

"We believe that the best way for a service of the kind envisaged to become international is through the CGIAR, whose international character is well established. This would help establish the bona fides of the service and would facilitate practical and effective relationships between the service and agricultural research institutions, both in developing and developed countries. . . .

"We urge the CGIAR to consider, at the earliest possible opportunity, the establishment of such a service." 1/

1/ Extract from a letter dated June 1, 1977, from Dr. Werner Treitz, Federal Ministry for Economic Cooperation, Federal Republic of Germany, to Mr. Warren C. Baum, Chairman, Consultative Group on International Agricultural Research, concerning the conclusions of a meeting held in Munich, Germany, from 25-28 April 1977 on "New Approaches to Technical Assistance in Accelerating Agricultural Development."

ANNEX B

November 30, 1977

TASK FORCE ON INTERNATIONAL ASSISTANCE
FOR STRENGTHENING
NATIONAL AGRICULTURE RESEARCH

Terms of Reference

1. The CGIAR discussed at its meeting in September 1977 the need for a means to help strengthen the national agricultural research capacities of developing countries as an essential step in enabling those countries to improve the efficiency of their agriculture and thereby to increase their agricultural production, particularly of food. The discussion highlighted the importance of finding additional means to strengthen national agricultural research systems. The CGIAR therefore decided to establish a Task Force to study the merits of creating an international service or other appropriate entity for this purpose under its aegis.

2. The assignment of the Task Force is (a) to identify the constraints on the availability and application of external assistance to strengthen national agricultural research capabilities in developing countries; (b) to consider the feasibility and desirability of alternative means of overcoming these constraints, including the creation of an international service or other appropriate entity; and (c) if the Task Force concludes that some new initiative by the CGIAR is desirable and feasible, to prepare a specific action proposal for consideration by the CGIAR.

3. In carrying out the foregoing assignment, the Task Force will consider:

(a) The extent and nature of the needs of developing countries for assistance in strengthening their national agricultural research systems;

(b) The extent to which these needs are being, or could be, effectively satisfied from existing international, bilateral and private sources of assistance;

(c) If the Task Force concludes that the needs are not being effectively or adequately satisfied from existing sources of assistance, the nature of the constraints (political, institutional, financial or other), how those constraints might be most effectively alleviated, and the extent to which the creation of an international service or other entity,

either under the aegis of the CGIAR or with some other organizational association, might be expected to improve the situation.

4. If the Task Force concludes that it would be desirable to create a new international service or other entity, it will then consider:

(a) the desirable scope of the mandate of such new service or other entity with respect to the various stages in the process of technology transfer from the international agricultural research centers (IARC's) to the farmers' fields, particularly:

(i) whether its activities should be addressed primarily to strengthening agricultural research systems or should more broadly embrace assistance in:

(1) strengthening extension services insofar as related to the effective application of national research,

(2) education and training related to agricultural research, extension or other aspects of agricultural production, or

(3) policy-formulation or other activities importantly related to agricultural production and development; and

(ii) whether it should be help to mobilize and/or coordinate external technical and financial aid and resources for developing and strengthening national agricultural research and/or extension capacity.

(b) The manpower resources needed to carry out the mandate as defined above, and the extent to which resources on a scale necessary to accomplish significant results can be provided additional to those now being made available from existing sources.

(c) The financial resources needed to carry out the mandate on the scale as defined above, indicating separately financial requirements for (i) permanent headquarters staff, and (ii) staff to be assigned to specific projects. Consideration should be given to alternative means by which the services might be financed (e.g., by grants from donors or by charges to beneficiary countries). The need for complementary investments (in buildings,

laboratory and other facilities and equipment) to ensure the effectiveness of the technical assistance being provided, and the prospects that capital finance on the necessary scale will be available, should also be examined.

(d) The character and form of any new international service or other entity, taking particular note of the proposal for "An International Service for National Agricultural Research" outlined in the paper provided to the CGIAR for its information at its September meeting, but also giving careful consideration to alternative solutions.

(e) The operating relationships between any new international service and the countries it is to serve.

(f) The relationship of any new international service or other entity to other sources of technical assistance for national agricultural research, particularly the IARC's and FAO but also including other international organizations, the bilateral aid programs of donor countries (including collaborative programs with institutions such as universities in the donor countries), and activities of institutions such as foundations, universities and consulting firms. Particular attention should be given to defining the principles for an appropriate allocation of tasks between the desirable activities of the IARC's in the fields of outreach and training and those of any new service or entity.

5. If the Task Force concludes that it would be beneficial to create a new international service or other entity, it will proceed to formulate a specific proposal for the consideration of the CGIAR. The proposal will cover the entity's relation to the CGIAR, its status, mandate, governance, size, structure, location, area of expertise, manpower requirements, and financial requirements. The proposal should distinguish between a start-up phase and the time when the new international service or other entity can be expected to be fully operational and should contemplate operations over at least a period of time sufficient to discharge its initial contractual commitments. The Task Force should also make specific proposals for funding and manning the new international service or other entity and the programs for which it will be responsible.

6. The Task Force is to submit its report to the CGIAR not later than August 1, 1978.

ANNEX C

TASK FORCE ON INTERNATIONAL ASSISTANCE FOR STRENGTHENING NATIONAL AGRICULTURAL RESEARCH

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ANNEX D

CASE STUDIES ON NATIONAL AGRICULTURAL RESEARCH IN DEVELOPING COUNTRIES

The nine case studies in this annex illustrate the various kinds of assistance needed to strengthen national agricultural research in countries defined in Section II of the main report as Categories B, C and D. These are based largely on project reports of various development assistance agencies.

CASE STUDY 1

(Category B)

LATIN AMERICA - MIDDLE INCOME COUNTRY

Background

Agriculture accounts for around one-third of GNP. Farmers have been increasing production at about 2.7 percent per year since 1960. Bananas, coffee, and cocoa are the principal export crops. With the exception of these three crops, technical change is occurring at a slow rate and most of the increase in output is the result of bringing more land into production.

There is a need for a more vigorous development effort in agriculture, with emphasis being given to increased food crop production, particularly in maize, and to livestock. A World Bank agricultural sector study felt that the greater part of the development effort should go into raising yields per hectare, a first step being to multiply and distribute improved seed; the National Research Organization (NRO) is best qualified to get this under way.

Agricultural Research

The NRO is responsible for all research in agriculture. Founded in 1963 with the assistance of The Rockefeller Foundation, it has acquired a commendable reputation both in the country and abroad. Modern management methods are practiced, including long term planning. The staff of over 100 professionals is being upgraded rapidly. The NRO is making effective use of the considerable technical and financial assistance received from bilateral and multilateral sources.

There is a network of five regional stations covering the main agroecological zones. Research has emphasized food crop improvement and improved varieties for most of the annual crops have been developed.

Constraints

Although the NRO is well organized, has an adequate supply of trained and experienced professionals and has sufficient facilities to do effective research, little or no return has been received from the investment in research. The principal reasons for this are that the link between research and extension is weak, seed multiplication has not been organized and the extension service is ineffective.

Links with Extension

The extension service has been reorganized a number of times and all extension work is now the responsibility of the National Agricultural Extension Service. Steps are being taken to improve cooperation with research; an extension officer has been assigned to each of the research stations. Briefings for extension officers are being conducted and reports on experimental results go out to the extension service. Short courses for farmers are being conducted by the research service on specific problems, e.g., weed control. The extension service in turn is attempting to keep the research organization informed on farmers' problems.

The research service was responsible for both research and extension on one crop--African oil palm. The results of this dual responsibility were encouraging.

Agricultural Education

The NRO collaborates with the Faculty of Agriculture in the University. Candidates for MSc and PhD can carry out their thesis work in the NRO.

Donors

Four international organizations, two foundations and eight countries are providing technical and/or financial assistance to agriculture.

Resources

In 1978, 7.8 percent of the budget is to be allocated to agriculture (0.63 percent of the budget is for agricultural research).

Strengthening National Research

The research system is functioning well but assistance is necessary to make the delivery system to farmers effective. Linkages between research and extension need to be strengthened. Technical assistance from external agencies should be principally focused on these issues. Specialists such as agricultural engineers and experts in water management are needed to assist in setting up crop productivity programs. Assistance is also needed to expedite training for subject matter specialists and extension officers.

CASE STUDY 2

(Category B)

ASIA - LOW INCOME COUNTRY

Background to Agricultural Research

Although there has been a long history of agricultural research, it has been fragmented between numerous institutions within several ministries and has lacked coordination and central direction.

In order to achieve better coordination of the national research effort, an Agricultural Research Council (ARC) was established as an autonomous agency in 1973 under the chairmanship of the Minister of Agriculture. Other members include representatives of the Ministry of Finance, the Planning Commission, the Agricultural University, several of the major research and scientific bodies, industry, and the Directors of Agriculture for research and extension.

Its role is:

a. To identify priorities and to draw up long and short term programs of research within the framework of national agricultural policy;

b. To scrutinize and approve proposals from the research institutes;

c. To evaluate and coordinate research and to serve as the national coordinating agency for research in all sectors of agriculture;

d. To undertake periodic reviews of government institute programs, to examine and make recommendations on the adequacy of these facilities and how they are utilized, and to assist in establishing new facilities where required;

e. To prepare a master plan for manpower and to select trainees for internal and external training, fellowships, etc.;

f. To recommend measures for implementation of research results, to establish links with the relevant agencies responsible for this and to publish and disseminate information on the results of research;

g. To be responsible for international relations on research (seminars, conferences, training, external travel, and cooperative research);

h. To advise the government on matters relating to the utilization of aid for agricultural research.

The ARC embraces all agricultural research except for jute, which is the responsibility of the Jute Ministry, and for sugar cane and tea, which are included in the research program of the Ministry of Industry. Research Directors for these crops are, however, members of the Council and the research programs are under the ARC umbrella for planning but not for administration.

Agricultural Research Institutes

Agricultural research is carried out at more than 15 institutes and agencies. Two of the more important research organizations for food crops research are:

a. The Agricultural Research Institute (ARI). The Institute is responsible for research on crops other than rice, tea, jute, and sugar cane. Emphasis is being given to wheat and barley and winter crops, millets and summer cereals, pulses, and vegetables. Although ARI is not responsible for rice research, it does conduct field testing of promising rice varieties. In addition to technical research on crops at its regional stations and substations, ARI also undertakes socioeconomic research studies and trains research and extension officers in crop production technology. Other crops receiving attention are coconuts, betel nuts, oil seeds, and tree cotton.

   The ARI is an autonomous agency within the Ministry of Agriculture. New facilities are being provided for it 30 miles from the capital. The Institute has four multidisciplinary regional stations and 15 testing stations. It has a staff of about 500, of whom some 200 hold professional degrees.

b. The Rice Research Institute. This institute has an active rice cropping systems research program, carried out with the assistance of IRRI. It is also carrying out research into higher yielding varieties suited to intermediate depths of flooding (1-2 metres) and varieties suited to flooding exceeding 2 metres. A further possibility to which attention is being given is perennial rice. The Rice Research Institute was established as an autonomous organization within the Ministry of Agriculture in 1973. It has a Board of Governors under the chairmanship of the Minister of Agriculture or the officer in charge of the Ministry.

Other Food Crops

Efforts are being made to modernize research in other food crops, notably sugar cane (with the assistance of the Australian government) and tea, (possibly with the assistance of ODM); and the country is looking to FAO for assistance in upgrading coconut research.

Nonfood Crops

The most important research on nonfood crops is being carried out by the Jute Research Institute (organizationally part of the Ministry of Jute). Genetic improvement of this crop has proved to be a difficult problem, in the absence of a strong program to screen the germ plasm base. Because of the difficulties facing genetic improvement, a major effort is being devoted to improving cultivation practices. The Institute has 37 graduates - seven at PhD level - and six research substations are in operation. A new central research farm is in the process of construction.

Constraints

The lack of an organization providing overall policy guidance on the use of resources and coordination of research appears to be the major constraint to developing an effective research system. Another major constraint is the absence of a functioning institute for research on non-rice food crops. With the creation of the Agricultural Research Council and the establishment of a new center for the Agriculture Research Institute, steps have been taken to overcome these constraints, although so far progress has been rather slow. Despite its statutory powers, the ARC still lacks any real authority as it does not control a significant part of the budget of the main research institutes.

In food crops, rice research has been concentrated on finding ways to increase yields under conditions where fluctuating water depth is a serious constraint. Although a few varieties have been produced by the Rice Research Institute which have increased yields, they have not been used on any appreciable scale. Adaptive research on food crops at the regional stations and substations has been somewhat neglected and additional stations need to be developed, staffed and equipped.

There is an insufficient number of scientists trained to PhD level and a consequent lack of high level research expertise within the ARC institutes. This could be alleviated if some of the 72 overseas trained PhDs moved from the Agricultural University to the Research Institutes.

There is a shortage of production agronomists who can work at the farm level to act as a bridge between research and extension. "Train the trainer" courses are urgently needed, preferably organized on a regional or ecological zone basis.

More socioeconomic research is needed to throw light on farmers' motivations, and the reasons for adopting (or not adopting) new technology. Water management research, preferably in an integrated research and development program, is also an urgent need. On nonfood crops, jute research needs upgrading by technical assistance in pathology, soil research and plant breeding.

Opportunities for Improving Research

A number of donors are assisting in building up the institutional framework for research, as well as assisting in research programs and the provision of physical facilities. The importance of improving research on crops other than rice has been recognized; intensified cropping of commodities other than rice, and the utilization of land where rice farming is marginal or impossible, is one of the keys to significant increases in production.

The ARC is receiving substantial technical assistance (financed mainly by USAID and The Rockefeller Foundation) directed at strengthening its research programming and coordinating capabilities, including the coordination of expatriate technical assistance. IADS is providing a Senior Research Planning Advisor for a period of five years to assist the Director of the ARC in:

- formulating and coordinating national agricultural research activities;
- planning manpower development; and
- arranging for national and international seminar/ workshops on subjects of importance to the agricultural research system.

Other technical assistance provided by IADS will include an Agricultural Production Economist, a Senior Production Agronomist, a Production Agronomist, and a Station Development Specialist, assisted by an Agricultural Engineer and a Horticulturalist, all for a period of about five years.

USAID is also helping to finance the establishment of the ARI headquarters, including farm and site development equipment, residential staff quarters, and some limited equipment for one research station. The USAID project also will finance 360 man months of long term academic training and 222 months of short-term intensive practical training. The purpose of the training will be to generally upgrade ARC and ARI staff to carry on the research programs when the AID-financed technical services end.

A World Bank research and extension project has been appraised. The research element of this project (amounting to about $1.5 million) would develop a network of seven substations (to be manned by ARI staff) to conduct adaptive research in various ecological zones. Twelve man months of consultancy services would be provided to assist ARI staff in preparing research programs for the substations and in establishing links with extension. There is also a component for 30 man months of training in country and abroad.

One of the principal needs is to strengthen the links between extension and research and to make research workers more aware of the needs of the farmers and the difficulties faced by the extension service. Very little has been done in this important area to date.

Donors and Links with External Agencies

Three international organizations, three private foundations, and 10 countries are providing financial and/or technical assistance in agriculture.

Links with Extension and Development

The general level of technical competence in extension is still low and links between research and extension on the one hand and extension and farmers on the other, are tenuous at best. There are different extension services for each of the main crops and different advice may be given to the same farmer, depending on the extension services involved. Trained manpower is in short supply; at present there is only one graduate extension worker per 25,000 ha of arable land.

However, the extension service is now being reorganized and the Training and Visit system, which has proved effective in India and Turkey, is being introduced on a countrywide basis. Extension agents will be concerned only with instruction and will have no service functions such as debt collecting, distribution of inputs, etc. The reorganized service should be in a position to forge more effective linkages with the research effort. The supply of a sufficient number of trained production agronomists to act as links between research and extension will be a critical element in the transfer process.

Agricultural Education

Two institutions provide degree education in agriculture - the Agricultural University and the Agricultural Institute. In both institutions, education up to MSc level is provided. About 200 BSc candidates graduate from the Agricultural University each year, of which a significant number continue to a higher degree; the Agricultural Institute produces a further 50 graduates annually.

There are still insufficient opportunities for education to the PhD level. The Agricultural University formerly had links with Texas A&M but these no longer exist.

The ARC has strong links with the Agricultural University and, although only about five percent of the University's total budget is allocated to research, its funds are supplemented by the ARC.

Resources Devoted to Agricultural Research

In 1976/77, thirty percent of the national budget was devoted to agriculture. The research budget was approximately 5.7 percent of the agriculture budget and 1.7 percent of the total budget. Boyce and Evenson report that in 1974, there were 190 scientists holding degrees above the B.Sc. level.

CASE STUDY 3

(Category B)

MIDDLE EAST - MIDDLE INCOME COUNTRY

Background to Agricultural Research

The agricultural sector dominates the economy and provides the livelihood for about 80 percent of the population. Agriculture comprises 40 percent of GNP, over 90 percent of exports, and about 50 percent of government revenues. Cotton is the dominant cash and export crop, accounting for 46 percent of all exports, followed by groundnuts, sesame, and gum arabic.

In the past five years, there have been large increases in wheat, maize, and groundnut production, as well as smaller increases in the output of sorghum and millet (the main staple) and in cotton. This expansion of agricultural production has been largely the result of an increase in the cultivated area under noncotton crops. Livestock, owned principally by nomadic herdsmen, is of significant importance to the economy. Expansion of production has been slow.

Although a large part of the country is desert, there is considerable potential for agricultural development; only 20 percent of the country's arable land is utilized.

The government has given priority to the agricultural sector in its Six Year Plan. One of the aims of the Plan is self-sufficiency in basic commodities.

Agricultural Research

Almost all of agricultural research is the responsibility of the Agricultural Research Council (ARC), a semi-autonomous organization within the Ministry of Agriculture, Food and Natural Resources (MAFNR). The ARC is mainly responsible for crop research and operates five regional stations and 12 substations. It has a total scientific staff of 243. Livestock research is the responsibility of the Animal Production Research Administration (APRA), also part of the MAFNR. Service departments in the MAFNR carry out socioeconomic research as well as research on pests and diseases, soil surveys, and mechanized irrigated farming.

Weaknesses in Agricultural Research

Research has been oriented towards the modern sector, in particular to cotton and the irrigated areas. The problems of rainfed agriculture have

been relatively neglected and, although research stations have been established to cover the major agro-ecological zones, these stations are understaffed and underfinanced.

Research is principally conducted on a disciplinary and subject matter basis and does not focus on the problems of increasing production. The research efforts of the ARC, APRA and the Service Departments need to be integrated on a multidisciplinary production systems basis.

Donor Agencies

There are three international agencies, two private foundations, and six countries providing financial and/or technical assistance to agriculture in the country.

Links with Extension

There are no effective linkages between the ARC and the Agriculture Extension and Education (Crops) Department (AEED). The extension staff is inadequately trained and the extension service is largely ineffective, especially in relation to the problems of the small farmers.

Agricultural Education

The faculties of Agriculture and Veterinary Medicine at the University are the principal sources of education in agriculture. These faculties have well qualified staff and about 200 BSc and 50-60 MSc students graduate each year. There is only limited collaboration in research between the university and the ARC.

There are facilities for training about 300 agricultural technicians at the Agriculture Institute.

Strengthening Agricultural Research

A combined country/IADS team comprising four senior agriculture specialists from the country and five IADS representatives carried out an extensive one-month survey of the agricultural research system. Prior to this survey, the Ford Foundation provided a total of 20 consultants who over a period of one year prepared reports on ten basic food crops, seven on specific disciplines, and four on administrative services.

The combined team made a number of recommendations for improving national agricultural research. These included:

a. Restructuring the ARC in order to develop a multi-disciplinary team approach to research;

b. Integrating crop and livestock research within the ARC;

c. Developing a network of research stations (including the upgrading of existing stations), with special attention being given to areas of the country which do not have access to improved adapted technology;

d. Developing a systematic manpower program aimed at doubling the number of scientists in the next 12-15 years;

e. Creating a socioeconomic research division in the ARC;

f. Improving links with extension through a cadre of subject matter specialists and establishing a headquarters office responsible for research advisory services;

g. Establishing a position of International Cooperation Officer at the ARC Headquarters to ensure that the ARC is fully informed about the capabilities and interests of all external support agencies and to serve as the principal contact within the ARC for these agencies;

The team made the following recommendations with respect to consultants:

a. An agricultural research scientist with demonstrated capability and experience in the organization and management of agricultural research of broad geographic scope and multidisciplinary complexity should be recruited as a consultant to assist the Director General with the overall organization and management of the ARC. This position should be filled for a minimum period of five years.

b. A scientist with experience in research program planning and organization should be recruited as a consultant to assist with the development of a program planning, budgeting and management system and of a project structure that will serve as a base also for program coordination and evaluation. This position should be filled for a minimum of five years.

c. An experienced specialist in information and publications services should be recruited as a consultant to assist with the planning of such services, including determination

of personnel, facilities and equipment required for the ARC headquarters and throughout the network of research stations. This position should be filled for a minimum period of two years.

d. An experienced agricultural librarian should be recruited as a consultant to assist with the planning of a modern library and documentation service at the ARC headquarters designed to serve the needs of the national research station network. This position should be filled for a minimum period of two years.

e. A qualified person should be recruited as a consultant to assist with the development and improvement of transport and communications services. This position should be filled for a minimum period of two years.

f. Research scientists should be obtained as consultants in specialized fields and disciplines, for short term or long term assistance, as needed. These positions would be identified as the respective research programs are strengthened.

g. An agricultural scientist with demonstrated experience and capability in leadership of multi-disciplinary research teams should be obtained as a consultant to assist with the formation and operation of such teams in the ARC. This position should be filled for a minimum period of five years.

h. A specialist in research station development operations and maintenance should be recruited to assist with the establishment of the headquarters of the ARC, the development and upgrading of facilities in the national research station network and the formulation of operation, management and maintenance procedures. This position should be filled for a minimum of five years.

The joint team therefore envisaged a total of 26 man years of consultant services to the ARC plus additional specialized assistance for various research programs as the ARC program develops.

The team recognized that strengthening the national research system would require long-term assistance and urged external assistance agencies to proceed promptly in selecting projects or components of projects aimed at strengthening the national agricultural research system. In the opinion of the team, the reorganization of the ARC and improvement of its operations and management should receive priority attention.

CASE STUDY 4

(Category B)

EAST AFRICA - MIDDLE INCOME COUNTRY

Background

Over 90 percent of the people are dependent on agriculture and 40 percent of GNP is derived from this sector. The main food crops are maize, millet and sorghum, paddy, potatoes, cocoa, bananas and beans.

Most food crop production was formerly on small holdings cultivated by hand. The government introduced a "villagization" program which it was considered would provide economies of scale in delivering inputs and social services and improve the life of the people. By 1975, about 65 percent of the people were living in villages.

Agricultural output has stagnated, with real growth in GNP in the agricultural sector falling behind population growth. The country has become increasingly dependent on imports of maize, rice and wheat.

Agricultural Research

The agricultural research branch of the Ministry of Agriculture has nine Agricultural Research Institutes and 23 Agricultural Experimental Stations covering the 18 identified ecological zones of the country. In addition, there are several parastatal organizations constituted as crop authorities, e.g., for sisal, tea, cotton, coffee and cashew, which have been established for the purpose of accelerating agricultural development.

There has been some successful adaptive research carried out; for example, several maize composites have been developed with the assistance of outposted staff from CIMMYT.

There are some 72 research scientists working in the Ministry of Agriculture research stations.

Constraints

Several attempts have been made to integrate the complex of research activities but these efforts have not been supported in terms of human, financial and material resources. The centralization and coordination of research remains one of the major constraints to be solved.

In the past, research has concentrated on industrial crops, e.g. sisal, cotton and coffee, at the expense of food crops. This balance has been in part redressed since independence by additional efforts being put into food crop research.

Trained and experienced scientists are still in short supply. The Ministry of Agriculture estimates that in order to carry out an effective research program about 600 research workers will be needed. There is a clear need for an intensive training program to meet anything near this figure.

Links with Extension

The extension service is also part of the Ministry of Agriculture. To date, the extension service has been ineffective in introducing improved techniques to farmers. The principal reasons have been lack of staff, inadequate training in modern techniques, and poor management. The research stations have tended to be isolated from the extension service and to be unaware of the practical problems faced by farmers.

Agriculture Education

In the past, most degree training has been undertaken in American and European universities. As a result, many graduates are relatively inexperienced in the problems of tropical agriculture.

Donors

Three international organizations, three foundations and 10 countries are providing technical and/or financial assistance to agriculture.

Resources

In 1973/74, 16 percent of the government budget was allocated to agriculture and of this 12 percent was to be devoted to research. Due to a combination of poor planning and shortage of staff, only 4.5 percent of the agriculture budget was spent on research. In 1976/77, 23 percent of the budget was allocated to agriculture reflecting an increased awareness of the government of the importance of this sector. The amount earmarked for research was 14.5 percent, but it is unlikely that this was expended--for the same reasons as in 1973/74.

Strengthening National Research

National research in the past has been organized largely on a commodity-by-commodity basis. For example, CIMMYT has a cooperative maize project in the country and some useful adaptive research has been done with the assistance of outposted CIMMYT staff. In general, however, research efforts have suffered from lack of coordination, shortage of staff and a paucity of links with delivery systems.

Although the first priority is clearly to strengthen the organization and management of the research system, there is no commitment to do this. Under the circumstances, individual crop improvement programs are probably the only feasible alternative and, as part of such programs, creating links with extension for the particular crop concerned. For example, in addition to outposted CIMMYT staff in the maize program, there is provision in a World Bank maize project for a Consultant Farm Management Specialist, whose job description includes:

(a) Laying out and evaluating trials and demonstrations;

(b) Crop sampling;

(c) Analysis of farm data, devising farmplans and farming systems;

(d) Liaison with agricultural research and extension.

In addition, a maize agronomy specialist will be needed for six man-months (over a period of two years) to generally review maize research recommendations, trials, and possibilities for rotation or intercropping with legumes.

A multilateral donor is now conducting discussions with the government to see if improvements can be made in the extension service, including setting up a formal procedure for linkages with research.

CASE STUDY 5

(Category C)

SOUTH ASIA - MIDDLE INCOME COUNTRY

Background to Agricultural Research

The country is basically agricultural, with agriculture accounting for about 66 percent of GNP. More than 93 percent of the total labor force is engaged in agriculture.

Soil fertility and productivity of the land are low. The increasing population is exercising heavy pressure on the limited amount of cultivated land. Very little use is made of high yielding inputs such as improved seeds and fertilizer. Only six percent of the total cultivated land is irrigated.

Agricultural Research

The Department of Agricultural Research and Education of the Ministry of Food and Agriculture is responsible for agricultural research. The Department has about 200 scientists of BSc level or higher.

Research is carried out in part on a commodity basis and in part along disciplinary lines. Commodity research includes coordinated crop development programs in rice, wheat, maize, citrus, and potatoes. Ten experimental farms have been established at different locations.

Water is a major limiting factor and in a number of regions there is a need for high-yielding varieties.

Constraints

The shortage of trained and experienced manpower is the major restraint to improvement of agricultural technology. Administrative red tape in filling vacancies compounds the problem.

On the operational side, research is not yet conducted as a multidisciplinary problem-oriented study of production problems although the necessity to develop this approach is recognized. There is a need for program planning and establishing priorities for research. A number of technical support services need to be upgraded, notably the operation and management of experiment stations, experiment design and statistical services, and information services.

Links with Extension and Development

The Department of Agriculture is responsible for research, extension and development functions, with research largely under central Department management and extension/development activities handled by four Regional Directorates. In order to ensure the flow of suitable technology there is a need for subject matter specialists trained to at least BSc level to act as the link between research and extension in the Regional Directorates.

The linkages between officials in the Department of Agriculture and the Regional Directorates do not appear to be very effective and this situation also needs to be remedied.

Agricultural Education

The Institute for Agricultural and Animal Sciences (IAAS), which is primarily engaged in vocational training, is the principal national institution for developing manpower for agriculture. The majority of agricultural scientists receive training to B.Sc. level at Indian agricultural universities. To date, 378 students have been sent for training and 50 new students are sent each year.

Donor

Three international organizations, two foundations, and eight countries are providing technical and/or financial assistance in agriculture. There are cooperative programs with IIRI in rice, CIMMYT in maize and wheat, and with CIP in potatoes.

A Rockefeller Foundation team of eight members visited the country in 1977 to carry out a study of hill agriculture. This included a review of the National Agricultural System with particular emphasis on identifying opportunities for adaptive research to improve agricultural production in the hills.

Resources Devoted to Agriculture

The government is devoting 19.5 percent of its current and development expenditures to agriculture. Of this, seven percent is being devoted to agricultural research.

Strengthening National Research

USAID is supporting a $9.3 million integrated cereal project with the aim of "generating improved production technology for the major foodgrain crops and related cropping systems and to transfer that technology to farmers in such a way as can be readily adopted."

An advisory team of seven specialists, each for a period of five years, will assist in conducting research in the national research center, at the field stations, and on state farms. Four additional agronomists will be provided by the Peace Corps. These specialits will work with country counterparts (which include the Regional Directors of Agriculture) to increase the average productivity of the cropping systems, particularly on the small hill farms.

In addition to the above assistance, provision is being made for a number of short term experts to work on processing and storage. There is a training component for 90 national research scientists and finance is being provided for equipment and buildings. The breakdown of project cost is:

Contractual services	$3,800,000
Commodities	300,000
Training	1,150,000
Equipment	200,000
Construction	487,000
Field trial kits	735,000
Social research	50,000
Regional production specialists	12,000
Counterparts	50,000
Total	$9,320,000.

Experts have been requested as needed from the international agricultural research Centers (CIMMYT, IRRI and CIP) to assist in the implementation of the project.

CASE STUDY 6

(Category C)

SOUTH ASIA - MIDDLE INCOME COUNTRY

Background to Research

Agriculture and livestock dominate the economy in terms of production, employment and export earnings. Wheat is the most important crop and is grown on about 80 percent of the cropped land; other important crops are cotton, fruits, and oilseeds. Besides being an important source of export earnings, livestock provides the primary source of agricultural draft power and is the major means of transport in rural areas.

The government has given high priority to rural development in its Ten Year Plan. Included in the strategy for agricultural development is increased use of modern agricultural imports, such as fertilizer and improved seeds, and improved animal health to promote increased livestock production.

Agricultural Research

Agricultural research is the responsibility of the Ministry of Agriculture.

Constraints

A USAID mission identified the following constraints to the development of an effective national agricultural research system:

a. The low priority given to agricultural research within the government and in the Ministry of Agriculture in particular;

b. Shortage of trained manpower;

c. The lack of satisfactory facilities - offices, laboratories, buildings and equipment - at the research stations;

d. The uncertainty of water supplies, the inadequate water distribution system and the lack of uniformity in field plots, at the research stations;

e. Poorly planned operations and inadequate management procedures.

The mission refererred particularly to restrictive administrative and management procedures - uncertain budgets, time consuming processes for procurement of supplies, materials and maintenance - and a general lack of delegated authority in operating research stations.

Agricultural Education

Although there is a Faculty of Agriculture producing graduates at B.Sc. level, there is little cooperation between the research organization and the university. The university has an agricultural research program, but there is a shortage of funds for research.

Donor Agencies

There are two international agencies and nine countries providing financial and/or technical assistance in agriculture.

Resources

Although 25 percent of the government's expenditure in its Five Year Plan is devoted to agriculture, no figures are available for expenditures on agricultural research. It is clear, however, that very little priority is given to agricultural research.

Strengthening National Research

The USAID mission evaluating the state of national agricultural research recommended that an Agricultural Research Institute be established as a semi-autonomous body operating under its own charter.

The mission recommended that there should be a national headquarters research station, seven regional research stations and three special research stations. Planning of research should be developed on an "all country" basis to make the maximum use of limited resources.

Closer cooperation should be established between the university and the agricultural research system. Subject matter specialists should be appointed to assist in disseminating research results to the extension service and to farmers.

There is a paucity of information on the level of scientific manpower and on priorities for research - or where specific projects need to be undertaken. It does, however, appear that reorganization of the existing research structure, training, and finance to create effective research stations for adaptive research are priority needs.

CASE STUDY 7

(Category D)

EAST AFRICA - MIDDLE INCOME COUNTRY

Background to Agricultural Research

The country is heavily dependent on the agricultural sector for its economic development. Although there are some commercially produced plantation crops, food crop production is mainly for subsistence. About 70 percent of the population are pastoralists, some of whom engage in subsistence cultivation; an additional 15 percent are engaged in settled agriculture, fishing, and forestry. Of the total land area, 32 percent is too arid for any form of agriculture, 55 percent is suitable for grazing, and 13 percent for settled agriculture.

Sorghum and maize are the main food crops. Fluctuations in yields and production are extreme because of the weather and the trend in yields over the last decade has not shown any noticeable increase.

There are a number of constraints which have severely limited the development of rainfed agriculture. These include poor cultural practices, inadequate extension services, poor seed quality, severe soil erosion, lack of agricultural credit, and inadequate and uneven distribution of water facilities for both human and livestock consumption.

The government has placed the highest priority on agricultural development. The Five Year Plan 1974-78 emphasizes self-sufficiency in basic food and cash crops, the production of food previously imported (rice, wheat and dates), and improvement in livestock, as well as soil and water conservation.

Agricultural Research

Research is carried out by the Ministry of Agriculture and the Ministry of Livestock, Forestry and Range. It is uncoordinated and scattered among the various technical bodies in the Ministries. There is one crop Research Institute with four regional stations. Organized research is limited to crops and there is very little livestock, forestry, wild life or fisheries research. A national research council exists on paper but it is not yet effective.

The Research Institute has 19 professional scientists (plus three expatriates) but none of the nationals has had postgraduate training.

Constraints

The main constraints are shortage of research manpower, physical facilities and operational funds.

Links with Extension

There is little coordination between extension and research. A USAID bilateral assistance project sought to establish close ties between extension and research, but in 1970 these were dissolved and are only now being reestablished.

Agricultural Education

The Faculty of Agriculture in the university offers a four-year first degree in agriculture. About 20-30 students graduate each year and are in considerable demand. There is, however, no effective research program at the university.

Donors

Three international agencies and six countries are providing financial and/or technical assistance to agriculture.

Resources for Agriculture

About 9 percent of the total government budget is devoted to agriculture. Expenditures for research by the government are not available but they are believed to be very small. Practically all the funds for research are being provided by bilateral and multilateral development assistance agencies.

Strengthening National Research

A UNDP/FAO project is underway to assist in strengthening the national research system. This project provides for three long-term and five short-term experts to be furnished through a subcontract with the Midwest Universities Consortium of International Activities (MUCIA) of the United States.

A number of agricultural projects with research components are either planned or in progress but to date there appears to have been little success in integrating these individual research thrusts and to establish a coordinated national research system.

CASE STUDY 8

(Category D)

WEST AFRICA - LOW INCOME COUNTRY

Background of Research

Before 1965, the country was self-sufficient in cereal grains--millet, sorghum, rice and corn. But, since then, grain deficits have occurred each year due to poor cultural practices, growing population, and changing dietary habits. Deterioration in food production in the Sahelian area reached a climax following six years of drought which resulted in soil erosion, reduction in livestock herds, denuding of forest lands, malnutrition, starvation, and deterioration of the economy in general. Normal rainfall returned in 1974. Since then agricultural production has improved, stimulated by intensive development operations and financial assistance by many donor agencies. Yet vulnerability to drought still exists and meagre production is still the rule. These conditions are due to low rainfall, impoverished soils, outmoded production methods, unproductive varieties, and the high cost of fertilizer, pest control chemicals, and transportation. Research directed toward solving these problems is sorely needed.

Agricultural research was initiated through the colonial agriculture service of France. Later, the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres (IRAT), the Institut de Recherches du Cotton et des Textiles Exotiques (IRCT), the Institut Francais de Recherches Fruitieres Outre-Mer (IFAC), and other autonomous institutes conducted research programs under arrangements with the Institute of Rural Economy which is responsible for research and extension (under the Ministry of Rural Development). After independence, these institutions have continued to function; expatriate directors are being replaced by nationals as the latter become trained and available. Agricultural research is also linked by cooperative arrangements with a number of the international agricultural research centres, including ICRISAT, ILCA, and IRRI, regional organizations such as WARDA, and the research establishments of other countries in the region.

The principal research programs being carried out by the three autonomous French agencies are:

IRAT - rice, maize, sorghum, millet and food legumes
IFAC - fruit
IRCT - cotton.

Research has concentrated on the agronomy of major food grains, although research on cotton and groundnuts has made a useful contribution to production of these two important export crops. There has, however,

been little or no research in forestry or fisheries, which are also potentially valuable sectors of the economy. One of the finest laboratories in Africa for basic research on animal diseases was built in the mid 1960's with major funding by USAID; this was never fully utilized and is no longer operationally effective. Good quality vegetables can be produced which have a ready export market in Europe, but there has been limited research on the production and marketing of this commodity. Research on the economics of improved cultural practices and livestock management has been meagre at best. There is no research on social and cultural problems attendant upon development.

Constraints

The major constraints to the development of a national research system are:

a. Lack of finance. Research staff are poorly paid, funds arrive too late to carry out research on schedule, staff have no means of transportation and cannot visit or conduct experiments in farmers' fields.

b. Inadequate staffing. There is a critical shortage of senior and junior level staff adequately trained in research.

c. Autonomy and physical separation of research units. The autonomy and physical separation of research units isolate the research workers, and hinder communication and exchange between scientists in different disciplines. Cooperative research is discouraged because of a lack of central direction.

d. Lack of analytical facilities. Only meagre analytical laboratory services are available to the research worker. For example, the cotton research station is sending samples overseas for analysis.

e. Lack of library facilities. Research stations have only a few books at most. Most receive no scientific journals.

Potential for Increasing Agricultural Production

Although the constraints on upgrading agricultural research are imposing, there are factors that give cause for optimism that agricultural production can be increased. Most important are:

a. Agricultural potential. The land area is large. While 60 percent of the land is unsuited for cultivation, cultivable land is not a factor limiting agricultural production. It has been estimated that 500,000 hectares for which sufficient water is available are suitable for irrigation. But the total potential for irrigation might prove to be much larger if adequate surveys were made. Vast areas of grazing lands have received essentially no research consideration.

b. Agricultural research workers. Research workers who have received training abroad are keen and enthusiastic. Ways need to be found to maintain their motivation.

c. Adaptive research. Pilot rice farmers increased yields from 1400 kg/ha with broadcast seeding and no weeding to 2500 kg/ha by planting in rows and cultivating. Improved practices in crop spacing, insect control, multiple cropping, grazing management, stockpiling feed for the dry season, and marketing could contribute to increased productivity and improve the lot of the rural poor.

d. Willingness of farmers to adopt new practices. When research has been successfully linked with operations, it has been shown that there are good prospects for improved farming practices.

Donor Agencies

Agencies and institutions providing financial and/or technical assistance include USAID, FAO, ICRISAT, IRAT, IRCT, IRRI, ILCA, ILRAD, TPI, Club des Amis du Sahel, FAO, UNDP, the World Bank, the African Development Bank, and the Arab Emirates.

Links with Extension

The agricultural extension service is within the Ministry of Rural Development and in 1973-74, there were over 1900 senior, middle and junior level staff. One of the principal weaknesses of the extension service is that it is responsible for services (collecting debts from farmers, distributing seed, etc.) as well as for teaching farmers to use improved technology. The weak linkages between the autonomous research organizations and the extension service compound the problems of the extension service in providing useful findings to the farmer.

Agricultural Educational Institutions

Agricultural education is provided by the Rural Polytechnical Institute (IPR) under the Ministry of Higher Education. Ingenieurs des Sciences Appliquees receive a four-year, specialized training program in agriculture, forestry, livestock, or rural engineering. Only limited research is conducted at IPR and research personnel do minimal teaching at present. Integration of teaching and research needs to be improved.

Resources Devoted to Agricultural Research

In 1977, the total budget was $112.8 million. Three percent of the budget was allocated to agriculture. The total research budget was 1.2 percent of the total budget and 41.2 percent of the agriculture budget.

These figures should be regarded with caution. Not only are the research units underbudgeted but they seldom receive the amounts actually budgeted.

Evenson estimates that 35 man years were devoted to agricultural research in 1974. He does not give a breakdown between nationals and expatriates, but figures for the GERDAT organizations, IRAT, IFTC and IFAC, showed 14 researchers, of whom 12 were expatriates and two were nationals. On this basis, the number of national research workers would not exceed six.

The unit cost for research workers in this country has been estimated at about $45,000 per annum (which includes research support). In comparison, an expatriate research scientist employed by a bilateral organization costs about $70,000 and a scientist at an international Center about $100,000 per annum.

Strengthening National Agricultural Research

Capability to conduct effective research is clearly at such a low ebb that a realistic strategy based on long-term requirements and priorities needs to be developed.

According to a mission from USAID, a 20-year program with the following components is required if the country's research effort is to be effective:

a. A national agricultural research center needs to be established which would integrate the research activities being supported by all the various donors into a unified research program. Senior staff would be selected with research experience in the field and trained to the MSc or PhD level.

b. From five to eight regional research stations also need to be established. Research in crops, livestock, forestry, fisheries, and socioeconomic problems appropriate to the area would be combined at each station. Staff members would be given training to the MSc level. In general, the staff would be small and selected to combine the disciplines needed to solve local problems. Coordination and supervision would be from the National Agricultural Research Center, but sufficient autonomy would be given to the Regional Research Station staff to enable them to initiate and conduct experiments appropriate to the region.

c. A field research staff would be constituted to conduct innovative, adaptive research on farmers' fields. Training of these research workers would be similar to those on the research stations. Experience gained in adaptive research would qualify the Field Research Staff to assist in teaching extension workers.

As envisaged by USAID, the foregoing project would be developed in four five-year phases, at an estimated cost of $65 million (see table below). While all three components of the program would be initiated during the first phase and their implementation carried forward simultaneously, efforts would initially be concentrated on the establishment of the Regional Research Stations and on training staff for these Stations and for the Field Research Staff. Training of staff for the National Research Center would proceed more slowly, reaching its peak in the second and third phases of the project. This would permit providing education to the PhD level for superior Regional Research Station staff after they have obtained experience and have demonstrated research ability. Development of a library would start immediately and be continued throughout all four phases of the project in order to add current books and periodicals. Development of an analytical service laboratory and installation of equipment for present laboratories would start in the first phase. Development of new and upgrading of old facilities would reach a maximum during the second and third phases of the project as the staff is expanded with more highly trained and experienced personnel.

A development fund would be established within the project to pay USAID contributions to those research projects of other donors, such as WARDA or ICRISAT, which complement and contribute to the research components of the USAID project.

Technical assistance would be limited to a small staff located at the headquarters who would facilitate the selection of persons for training, assist in coordination of collaborative research at the regional research stations and by the field research staff, and assist in coordination and development at the national center. They would be assisted by short-term consultants for specific assignments as expertise in specialized fields is needed.

Project Costs

	Project Phase I year 1-5	II year 6-10	III year 11-15	IV year 16-20	Total
	(millions of dollars)				
Regional Research Stations (8 stations)					
a. Staff training (120 man years)	1.0	1.0	0.25	0.25	2.5
b. Development (buildings, equipment)	3.0	1.0			4.0
c. Operations (expendable items, transportation)	1.0	3.0	1.0		5.0
Field Research Staff					
a. Staff training (100 man years)	1.0	0.5	0.25	0.25	2.0
b. Equipment	0.5	0.3	0.2		1.0
c. Operations (expendable items, transportation)	0.5	1.3	0.5		2.0
National Agricultural Research Center					
a. Staff training (150 man years)	0.5	1.0	1.0	0.5	3.0
b. Library	2.0	1.0	1.0	1.0	5.0
c. Service laboratory	1.0	0.5	0.5		2.0
d. Development (buildings, equipment)	2.0	5.0	4.0	1.0	12.0
Development Fund	2.0	2.0	1.0	1.0	6.0
Technical Assistance					
a. Technical specialists (80 man years)	3.5	3.5	3.5	1.5	12.0
b. Short-term consultants (70 man years)	2.0	3.0	2.5	1.0	8.5
Totals	20.0	22.8	15.7	6.5	65.0

CASE STUDY 9

(Category D)

LATIN AMERICA - LOW INCOME COUNTRY

Background to Agricultural Research

Agriculture potential is limited by the rugged terrain and by a long dry season. Crop yields are generally low, improved technology is extremely limited, much of the pasture acreage is unimproved, and the majority of farms still use traditional practices. Livestock production is lower than in neighboring countries.

Agriculture accounts for 70-85 percent of merchandise export earnings, the most important export commodities being plantation crops, forest products, coffee, and beef. The agriculture sector has been given priority in the national development plan and a number of government initiatives are underway aimed at increasing production and improving the lot of the rural poor; these center on agrarian reform and on forestry.

There are a number of independent research programs. A unit of the Ministry of Natural Resources is responsible for agricultural research and extension; it has two experimental stations at which limited research on maize, rice and bean varieties is being carried out. A privately financed Agricultural School is carrying out research on feeding and breeding of beef and dairy cattle, hogs and poultry, which is designed partly to complement classroom and field instruction. The National Agrarian Institute has a research program on African oil palms and on citrus. Private companies are engaged in research on plantation crops and on sorghum and groundnuts, including variety testing, fertilization, pest control, and water management.

The general standard of government research is not high. Crop research in the government sector is effectively limited to testing imported technology and there is limited capacity for adaptive and innovative research. On the other hand, the research facilities of the private companies and the Agricultural School are good and the technical personnel are well qualified.

Constraints

The principal constraints to developing an effective national research system are:

a. Research is fragmented, uncoordinated, and lacks relevance to farmers' problems. The Ministry is apparently not prepared to establish a coordinated research system until research results justify it. The research workers themselves feel that there is little chance of building up a research program under the existing decentralized situation.

b. Salary scales for research workers are low. Scientists must either move to administrative posts or to private industry to get higher salaries. As a result, turnover of research staff is high.

c. There is a chronic shortage of trained professional manpower both for scientific research and for public administration.

d. The government has not been able to make effective use of technical assistance in agriculture, in particular, to act on recommendations, to provide counterparts or to use available training fellowships. The attention being paid to the country by international financial institutions is placing a severe strain on absorptive capacity.

Donor Agencies

There are three international institutions and five donor countries providing technical and/or financial assistance to agriculture.

Links with Extension

The fragmented nature of the research program prevents any effective linkage with extension. The extension service, lacking an effective backup either from research or from technical services, has relatively little impact. There are some 66 extension agents distributed among eight regional offices.

Agricultural Education

The principal agricultural educational institutions are:

a. A national Agricultural University which has a faculty of about 20 and offers the Ingeneiro Agronomo degree after a five-year course. In 1972, there were about 350 students enrolled.

b. A private institution financed by private foundations and interested governments which offers a high level three year post secondary nondegree course in agriculture. It has a high quality staff, good facilities and its graduates are highly valued. It has capacity for over 200 students.

The Agricultural University needs to be strengthened to upgrade the quality of training and research.

Resources Devoted to Agricultural Research

In 1977, 17.6 percent of the budget was for agriculture. Just over 1 percent of the agricultural budget was allocated to research or about 0.2 percent of the total budget.

Boyce and Evenson estimate that in 1974 about 70 scientist man years were devoted to research. In 1976, the Ministry reported that it had 27 research workers with the Ingeneiro Agronomo degree and a further 15 with three years of agricultural college training. Five workers of the research service were reported to be studying overseas. These Ministry figures are probably on the low side.

Strengthening Agricultural Research and Production

Even without the development of new technology, the wider adoption of improved practices already being used by the more progressive farmers should make it possible to increase agricultural production substantially. It is unlikely, however, that the spread of better methods can be achieved without strengthening the institutional base and expanding technical services (including research) to agriculture.

To develop an effective research system capable of accepting improved technology, adapting it to local conditions and creating the institutional base for innovative research will require substantial investment in human resources as well as in institutional development and management. The main objectives would be to:

a. Create an autonomous institution capable of adapting technology and delivering it to the extension service and farmers.

b. Establish research priorities.

c. Strengthen the Agricultural University to enable it both to train effective research workers and to carry out agricultural research itself in collaboration with the national system.

For example, research on three commodity groups (maize, beans and rice) and on farming systems would require:

a. A central research organization to provide technical services for the commodity and farming systems teams, administrative support and library facilities. There would probably be a need for a research coordinator provided under a technical assistance agreement (five man years of technical assistance).

b. A regional center for each commodity located in the zone best suited to the production of that commodity.

c. A multidisciplinary commodity group team for each research program and two advisors for each commodity group (about 36 man-years of technical assistance).

d. A network of two stations for each commodity.

e. Approximately 30 man-years of training fellowships.

The capital and operating costs for the first five years would be about $13 million, technical assistance $2 million, and training about $0.5 million. Additional technical assistance would be required to strengthen the Agricultural University, amounting to a further $2 million. To bring research into effective operation would probably take at least ten years and the total cost would be in the region of $30 million.

In the development stages, technical backstopping by such international Centers as CIMMYT and CIAT and cooperative programs with other national research organizations in the region would be essential. To avoid the turnover in staff which has impaired the efficiency of research, appropriate personnel policies would have to be developed. Linkages with research in the commercial sector should be established.

Commodity improvement programs would begin with yield trials, on-farm testing and agronomic research. As knowledge on varieties and practices is accumulated, crop production specialists should be trained to enable extension activities to be expanded.

These efforts could not proceed in isolation. They would have to be integrated with other ongoing research and with projects aimed at improving the extension capability and other delivery systems, without which the research effort might be wasted. A strong commitment to research would be needed by the government as well as the will and necessary action for institutional, personnel policy, and administrative changes.

ANNEX E

THE NATURE AND EXTENT OF ASSISTANCE TO NATIONAL RESEARCH BY MULTILATERAL, BILATERAL AND OTHER AGENCIES

The Study Group was unable to obtain comprehensive details of the assistance provided by all donor agencies to national agricultural research in the time available. The following examples illustrate the assistance provided by some of the major donors.

(a) FAO

The FAO register of activities related to agricultural research lists 536 ongoing projects in 1974, of which 319 are in developing countries or regions. A breakdown by subject and expenditure category is given in Table E1. In all, funding by multilateral and bilateral donors and from the FAO regular program provided $90 million for these projects.

FAO projects in collaboration with the International Atomic Energy Agency made up 42 percent of the number of projects and 4 percent of expenditures from donors and the FAO regular program. Donor contributions for 64 percent of the 319 projects were under $100,000.

A list of FAO's major activities 1/ to strengthen national research in developing countries and regions for projects beginning in the years 1974, 1975, 1976 and 1977 is given in Table E2. In 1974, 26 major activities were started in developing countries and regions, 15 were started in 1975, six were started in 1976, and three were started in 1977; the years were not given for the start of 11 of the activities.

By the end of 1976, 2/ FAO had 21 teams in the field assisting governments to plan and analyze agricultural development, policy and budgeting. These short- and long-term missions frequently included planning and advice on agricultural research. Twenty country perspective studies have been completed since 1972, and have been used in Iran, Iraq, Tanzania, Zambia, Pakistan, and the seven countries of the Sahel, to establish a basis for both agricultural and agricultural research planning and programming. Six of these studies had specific chapters on research priorities. In addition, several countries have received and are receiving assistance to review existing research organizations and to formulate proposals for reorganization and/or expansion.

The CARIS project is still incomplete. By May 1977, 82 developing countries had agreed to participate. CARIS consultants had visited 76 countries to assist in gathering data.

1/ FAO's Major Activities to Strengthen National Agricultural Research, (1961-77). FAO Rome 1978.

2/ FAO Service to National Agricultural Research in Developing Countries. FAO Rome 1978.

TABLE E1

FAO RESEARCH PROJECTS IN DEVELOPING COUNTRIES/REGIONS
NUMBER OF PROJECTS BY SUBJECT AND EXPENDITURE CATEGORY

	(US$000's)				Total No. of Projs.	Percentage of Total Number
	0-49	50-99	100-999	1000-		
Animal Production and Health	3	1	10	11	25	7.84
FAO/IAEA*	117	8	9	-	134	42.01
Land and Water Development	1	1	9	1	12	3.76
Plant Production and Protection	11	10	22	7	50	15.67
Agricultural Services	3	-	4	-	7	2.19
Development Department	1	1	2	-	4	1.25
Human Resources and Institutions, etc.	3	-	2	2	7	2.19
Food Policy and Nutrition	5	4	-	-	9	2.82
Fisheries	9	9	18	3	39	12.23
Forestry	9	4	9	4	26	8.15
Other	5	-	1	-	6	1.88
Total	167	38	86	28	319	
Percentage of Total	52.35	11.91	26.96	8.78		

* International Atomic Energy Agency

NOTE: These expenditure categories do not include developing countries' contributions to the projects listed.

Reference: Register of FAO Activities related to Agricultural Research, FAO, Rome, 1974.

TABLE E2

FAO MAJOR ACTIVITIES TO STRENGTHEN NATIONAL AGRICULTURAL RESEARCH, 1974-77

COUNTRY AND REGIONAL ACTIVITIES

1974		1975		1976		1977		Year Not Stated	
ntry	Project	Country	Project	Country	Project	Country	Project	Country	Project
key	Leather Research and Training Institute	Kenya	Horticulture Research and Demonstration Horticulture Production and Research	Nigeria	Investigation and Feasibility Study of an Irrigation Project South of Lake Chad--Phase II	Senegal	Organization et Programmation de la Recherche Agronomique	Kenya	Veterinary Laboratory and Clinical Centers
swana	Coordinator, Range and Animal Production Research Range Research Investigation of the Okavango Delta	Nigeria	Agricultural Institutes North Central State Streptotrichosis Research	Thailand	Expert Consultation on Buffalo Research Needs	Laos	Assistance a l'Institut National de Médicine Vétérinaire	Mozambique	Livestock Production Status Citrus Rehabilitation Trypanosomiasis and Tsetse Control Vegetable Production
iopia	Institute of Agricultural Research Project (Phase III) Agricultural Research in Drought Affected Areas	Tanzania	Crop Production Research on Selected Aspects of Semi-arid Farming Systems	Vietnam	Institute of Agriculture Sciences	Thailand	Expert Consultation on Soil-Weather-Crop Relations in Asia and the Far East	Senegal	Assistance au Centre pour de Developpement de l'Horticulture
na	Assistance to the Soil Research Institute of the CSIR Assistance to the Animal Research Institute Assistance to Strengthen Irrigation	Sudan	Research and Development of Wheat and Sorghum Products for Industrial Application	Argentina	Livestock Development			Swaziland	Strengthening of the Faculty of Agriculture
inea	Equipment de l'Institut de Recherches et de Biologie Appliquee de Kindia	Sri Lanka	Reorganization of National Research Extension and Training Resources for Agriculture Development of Rubber Research Institute Development of Tea Research Institute Development of Coconut Research Institute	Brazil	Strengthening of Technology Section of CEPED, Salvador			Tanzania	Assistance to the Faculty of Agriculture in Morogoro
iya	Dryland Farming and Research	Argentina	Animal Health in the Subtropical Region of Northwest Argentina	Ecuador	Assistance to the Faculty of Agronomy and Veterinary Research, University of Guayaquil			Upper Volta	Control of Bovine Tuberculosis
ritius	Food and Nutrition Policy, Applied Research and Education	Brazil	Research on Beef Cattle Production (Campo Grande) Dairy Products, Research and Technology					Zambia	Training and Research in Agricultural Credit Activities
rra eone	Cotton Agronomy Research	Jamaica	Agricultural Research--Reconnaissance Mission					Iraq	Assistance in the Establishment of a Training and Research Center for Food Industry
nda	Assistance to Makerere University, Faculty of Veterinary Medicine	Lesotho	Veterinary Science						
aq	Date Palm and Date Research Center	Regional							
udi Arabia	Senior Agricultural Research Advisor	Africa	Animal Trypanosomiasis Control						
ngladesh	Jute Seed Research and Production								
rma	Strengthening of Regional Agricultural Experiment Stations								
mer	Organization of Agricultural Research								
ailand	FAO/UNDP International Expert Consultation in the Use of Improved Technology for Food Production in Rainfed Areas of Tropical Asia Follow-up of Coordination of Plant Production Research								
ba	Investigation of the Different Factors Influencing Animal Reproduction of Various Domestic Species Under Subtropical Conditions								
xico	Agro-Industrial Training, Research and Extension in Arid Zones								
gional									
rica	Applied Research on *Trypanosomiasis* Onchocerciasis Control Program in Volta River Basin Agricultural Mechanization Research								

ference: *List of FAO's major activities to strengthen national agricultural research (1961-1977).* Mimeo, 14 pages, FAO, Rome, 1978.

Training is a very important element in FAO's assistance to national agricultural research and production systems. About 15 percent--over 5,000--of the 35,000 persons who received training through FAO-assisted fellowships, study tours, in-service training, and seminars in 1975 and 1976 were at the professional level; half of those trained were technicians, including extension agents. Fellowships for formal training of research workers are usually included in research support projects: some 8,000 fellowships were awarded during the period 1967-76 and about 1,200 of these were for post-graduate studies.

Identification, preparation and formulation of projects is usually carried out by specialists from the appropriate headquarters department or division in cooperation with the technical and economic divisions, by external consultants with detailed local and technical knowledge, or by public and private institutions and organizations. Project implementation is also the responsibility of the relevant headquarters unit supported by technical divisions and the Research Development Center as necessary. Selection of suitable expatriate staff for projects is arranged in consultation with recipient governments. The operational division is responsible for arranging training and fellowships of national personnel in field projects; other training is organized by the respective technical divisions.

FAO's approach to technical assistance is multifaceted. FAO staff may assume full executive functions on a research project; they may work under a national director or be seconded to the government. Technical assistance personnel can be provided on long-term contracts or as short-term consultants. Projects may be partly or fully subcontracted to national or external institutes or universities either for execution or for technical backstopping. However, there is an increasing trend towards the use of national institutions for project implementation.

FAO technical assistance can be at three levels, viz., the national policy level, the institutional level, both for institution building and for research in specific disciplines, and at the level of integrating research with production programs. Most of the FAO projects listed in the Register of FAO activities related to Agricultural Research are for five years. Others are for longer periods; for example, FAO and UNDP have been associated with the development of the Institute of Agricultural Research in Ethiopia since 1966.

In 1977, FAO had 1,406 professional staff employed in its various agricultural development field programs, including staff assigned to national research projects; the highest numbers were from the United Kingdom (206), USA (124), France (117), India (83), Belgium (78), and the Netherlands (64). Currently, FAO has 375 research experts, in the fields of agriculture, forestry and fisheries, stationed in developing countries on other agricultural development projects with research components. About 190 experts on the staff of technical divisions have had more than seven years' research experience, of whom 90 have had more than three years' experience in research management.

UNDP is the major source of donor funding for FAO research projects. Of the research projects listed in the Register of FAO Activities related to agricultural research, UNDP provided 85.8 percent of the funds, the FAO regular program 7.7 percent, and bilateral donors/trust funds 6.5 percent. In the 1978/79 biennium, UNDP's proportion had decreased to just over 50 percent of the FAO budget for research support in agriculture.

(b) Other Multilateral Agencies

(i) The World Bank

The World Bank support for national agricultural research is provided in three ways:

1. For research components within agricultural development projects

2. For projects solely in support of national research and extension

3. For research activities of agricultural universities through education projects.

Table E3 gives a breakdown of those three categories by number of projects and loans/credits for the research components in the period 1963-76.

TABLE E3

World Bank Loans/Credits for National Research 1960-76

Project Type	Number of Projects	Research/Component Loans/Credits $ Million
Agricultural development with research component	170	86
Research and extension	4	103
Education with agricultural research component	14	45
Total	188	234

Table E4 shows the consistent increase in the number of agricultural development projects with research components, during the 1963-76 period, as follows:

TABLE E4

FY Period	Number of Agricultural Development Projects (ADP)	Number of ADP with Research Components
1963-65	5	3
1966-68	13	6
1968-71	68	29
1972-74	138	55
1975-76	142	77
Total	366	170

The largest individual loans have been for the four projects specificially aimed at strengthening national research and extension, as indicated in Table E5.

TABLE E5

Research and Extension Projects in Progress in 1976

Country	Year	Total Project Cost ($000's)	Loan/Credit for Research ($000's)
Spain	1971	28,200	12,700
Malaysia	1975	30,100	28,500
Indonesia	1975	46,600	21,500
Brazil	1976	190,000	40,000
Total		294,900	102,700

The numbers of these projects are also increasing. In 1978 12 were in the pipeline and another 12 were in the planning stage.

Altogether, some 35 developing countries are receiving US$500,000 or more in loans and credits or have three or more projects in support of agricultural research either in the form of a full agricultural research and extension project or as a component of an agricultural development project.

The level of lending for agricultural research has varied considerably year by year since the early 1970's but the overall trend has been increasing; computed in 1978 dollars, the level rose from $28 million in 1971 to about $70 million in 1976. A very rough estimate indicates that lending in support of research in 1978 could be in the order of $75-80 million. This could well be an underestimate. Preliminary figures for 1978 indicate that

the Bank will be lending about $150 million--5 percent of the total lending for agriculture and rural development--for research and extension and that the research component will be substantial.

The Bank depends heavily on outside assistance for project preparation and implementation. For example, the New York based IRI Research Institute prepared the Agricultural Research and Extension Project for the government of Malaysia for funding by the World Bank. Bank staff members, assisted by a consultant, appraised the project. The Malaysian Agricultural Research and Development Institute (MARDI) was responsible, in collaboration with the Bank, for engaging the long-term internationally recruited staff needed to implement the project. IADS is providing a short-term consultant to the Director General of MARDI.

In the Bank's experience, it is particularly difficult to find experts to prepare, plan and manage a master plan for a national agricultural research program effectively linked with extension and other delivery services; it is also difficult to find program leaders capable of integrating a number of regional or area commodity research projects into a production system. Locating specialists in particular commodities or disciplines does not present comparable problems.

(ii) Inter-American Development Bank (IDB)

IDB has been providing support to agricultural research and extension since 1968. This support has been extended through loans, non-reimbursable technical assistance or a combination of both.

Table E6 gives a breakdown of the IDB projects up to 1977 by country, amount of the loan for research and the objective of the project. Total loans for these projects amount to $116 million. The average annual amount of these loans (in 1978 dollars) is $16.8 million.

In addition, IDB has provided $1.9 million in non-reimbursable technical cooperation funds to prepare projects in research and extension, to strengthen national research centers, for training and, in recent years, to help execute pilot research and extension projects with small farmers. The Bank has also financed a study of the national agricultural research institutes of Latin America at a cost of $46,000.

Projects either approved or being examined for future financing indicate a continuing high level of IDB assistance for national research, extension and training. These include projects for national research in Nicaragua, Jamaica, Bolivia, Honduras, Costa Rica and Guatemala, and five regional cooperative research programs.

The Inter-American Institute of Agricultural Sciences (IICA) has assisted the governments of Bolivia, Nicaragua, Honduras and Costa Rica to prepare projects for IDB funding. IICA has not been engaged in project implementation on behalf of the IDB (although it has on behalf of others). Expatriate staff to assist in implementing the IDB research projects are selected with the approval of the recipient country.

TABLE E6

IDB Support of National Research

Year	Country	Research Element of Loan (US$000's)	Purpose of Program
Specific Projects			
1969	Argentina	3,800	Research and extension
	Costa Rica	968	Research and extension
1970	Ecuador	2,200	Research
1971	Colombia	6,924	Research and extension
	Honduras	1,400	Research and extension
1972	Brazil	10,000	Research
1976	Brazil	66,400	Research
1977	Ecuador	11,000	Research
Part of Integrated Projects			
1970	Brazil	1,965	Research, extension and training
	Venezuela	5,350	Research, extension and training
1971	Paraguay	1,600	Research, extension, seeds and breeding stock
1972	Dominican Republic	3,236	Research, extension, training and breeding stock
1976	Mexico	500	Research and extension
Part of Other Loans			
1973	Uruguay	432	Research and extension
	Total	115,775	

(iii) The Inter-American Institute of Agricultural Sciences (IICA)

IICA, which has its headquarters in Costa Rica, provides support for agricultural development, including agricultural research, primarily in Latin America.

Its research activities include diagnosis of research needs, preparation of project proposals, soliciting external finance for research and providing research specialists to national programs. In the past year, research projects for Bolivia, Panama, Honduras, Nicaragua and Guatemala have been prepared; expenditures for agricultural research amounted to $460,000, about 6 percent of IICA's total budget for the year.

IICA has five research specialists, out of a total of 170 permanent staff members; most of these are assigned to country or regional offices. Project preparation and implementation are done almost exclusively by contract staff; currently, IICA is involved in project implementation in Brazil and in the Dominican Republic.

IICA is seeking to establish teams of four research coordinators in each of the five regions of Latin America, Central America and the Caribbean. The objective is to promote cooperative research programs between countries with similar ecological and agricultural conditions.

Three methods are being used for recruitment of contract staff:

1. Computerized list of 1200 scientists generated by IICA field offices in each country (25 in all);

2. Agreements with a consortia of universities in North America (IICA has signed an agreement with the association of seven midwestern US Land Grant Universities and is negotiating with the Far West group);

3. Staff from completed IICA projects (some six from the Dominican Republic project are being offered jobs with EMBRAPA).

IICA finds staff recruitment to be extremely time-consuming even though it is engaged in only one major new project; obtaining high quality staff is also a problem.

(iv) The Asian Development Bank (ADB)

The ADB is also financing projects whose objective is to strengthen research, extension and training. The research elements of these projects concentrate on production-oriented adaptive research. Examples are given in Table E7. A number of these projects include technical assistance in research.

TABLE E7

ADB Projects with Research Components

Country	Year	Project Title
Sri Lanka	1969	Walwe Agricultural Development
Nepal	1970	Jute Development
Nepal	1971	Irrigation
Nepal	1972	Chitwan Valley Development
Indonesia	1974	Fibre Production and Processing
Bangladesh	1974	Jute Seed
Nepal	1975	Jute Development
Afghanistan	1976	Seeds
Papua New Guinea	1976	East Sepik Rural Development

(c) The International Agriculture Research Centers (IARCs)

IARC activities in support of national research programs have increased significantly in recent years. The number of outreach senior staff has increased as follows: 1/

	HQ Based	Outreach	Total
1976	310	92	402
1977	355	117	472
1978 (Projected)	412	157	569

This represents an increase of 33 percent in headquarters-based staff for the period 1976-78, compared with an increase of 71 percent in outreach staff. The numbers of outreach staff are distributed as follows:

	1976	1977	1978	
CIAT	2	6	8	
CIMMYT	29	28	34	
CIP	8	15	15	(or more)
ICRISAT	6	15	15	
IITA	20	17	31	
ILCA	7	13	17	
ILRAD	-	-	-	
IRRI	20	28	37	
Total	92	117	157	

1/ The figures are from "The Consultative Group on International Agricultural Research; an Integrative Report." CGIAR Secretariat, July 29, 1977.

The above figures should be regarded as indicative, as complete data on headquarters-based and outreach staff are not available from all centers. Some outposted staff are engaged in technical assistance; others are working on Center core programs.

There is a clear implication in this trend. The Centers appear to be making a concerted effort to ensure that national research programs are capable of accepting, testing and adapting the technology developed by the Centers. New initiatives in this area include CIP's "third dimension," IRRI's regional liaison scientists, CIMYT's regional programs and CIAT's regional cassava and bean programs. The size of these programs is also becoming significant. IRRI will have 12 staff in Indonesia in 1978; ICRISAT will have 13 in its West African sorghum program; IITA will have nine in its Nigerian national food program.

The Integrative report referred to in the footnote on the previous page points out that drawing the appropriate boundary between activities of the Centers and the needs of individual national programs has always been a major issue facing the CGIAR. It is likely to become even more important as Center outreach activities expand and international attention turns more and more towards the capacity and effectiveness of national research. The administrative problems of the Centers are also likely to increase as a result of this expansion.

The total Center outreach activities for 1978 were budgeted at $13.6 million, compared to $10.8 million in 1977, an increase of 26 percent.

(d) Bilateral Donors

The Study Group was not able to make a reliable estimate of the total annual aid flows from bilateral donors to agricultural research in the developing countries for the reasons set out in Section III of the report.

The United States Agency for International Development (USAID) is the largest bilateral donor. In 1978, USAID will be providing loans and grants amounting to $75 million, compared to $72 million in 1977; figures for earlier years are not available, but it is thought that there has been a very substantial increase since the early 1970's. In 1978, USAID plans some 98 food and nutrition projects either with research components or directed at strengthening national agricultural institutions and research programs for 39 countries and regions in the developing world; about two-thirds of these projects are principally concerned with specific research activities and one-third with strengthening research institutions.

An example of a research institution building project financed by USAID is in Bangladesh, where the objectives are to strengthen the Agricultural Research Council, the coordinating body for agricultural research, and the Agricultural Research Institute, which is responsible for research into a number of nonrice food crops. The project includes long-term technical assistance, a training component and capital works. Projects which are

directed at more specific research problems include food crops research in Tanzania, cereals research in Senegal and research on small farmer technology in Honduras. Most of these projects have technical assistance components.

Title XII--Famine Prevention and Freedom from Hunger--of the United States Foreign Assistance Act provides for increased participation by U.S. Land Grant State Universities in U.S. technical assistance to developing countries in identification, planning, and implementation of research and development projects. Case study 9 is an example of a project that is being considered for support under Title XII. USAID is also being assisted by the International Agricultural Development Service (IADS) in research projects in a number of countries, including Nepal and Bangladesh.

Most bilateral donors do not have a substantial body of career scientists in their technical cooperation agencies. France and Japan and possibly one or two others are exceptions.

Two French organizations, GERDAT (Groupement D'Etudes et de Recherches pour le Developpement et l'Agronomie Tropicale) and ORSTOM (l'Office de la Recherche Scientifique et Technique Outre-Mer), maintain research stations and a large number of scientific personnel overseas, principally, but not exclusively, in Africa.

Both GERDAT and each of its institutes have a headquarters and/or central laboratory facility in France and utilize a network of about 50 stations in developing countries, almost entirely in Africa. In some instances, a GERDAT institute may manage the station but generally stations are used according to terms of the agreement with the specific country in which they are located. According to a study on agricultural research in Africa for the OECD, 1/ GERDAT has 531 research scientists, of whom 334 are working in 15 African countries. ORSTOM has 280 research workers in agriculture. Case study 8 gives an example of the work of some of the GERDAT institutes in a low income African country. In a number of the poorer West African countries, ORSTOM and GERDAT are the principal research organizations.

The Japanese Tropical Agriculture Research Center (TARC) has 35 research scientists engaged on long-term assignments in international cooperative research programs in India, Malaysia, the Philippines, Sri Lanka, and Thailand, and in some countries in Latin America, including Brazil. These collaborative research programs are directed at specific research problems in rice and field crop agronomy, soils, plant protection, legumes, animal husbandry, forestry and production systems.

The United Kingdom Ministry of Overseas Development (ODM) 1977 report on Research and Development lists 109 UK-financed projects in which the primary research is being conducted in a developing country. The

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1/ Volume V: Supporting papers: World Food and Nutrition Study, National Academy of Sciences, Washington, D.C., 1977.

breakdown by sector is: agriculture 40, livestock production and health 20, pest control 24, forestry 10, fisheries 5, and post harvest technology 10. Over 90 U.K. project leaders are engaged in research covering a wide range of disciplines and subjects in some 35 countries. Most of the projects are for 3-4 years, and some are for longer periods. The average cost per project is about $150-170,000, although there is a wide variance. For example, the cost of a three-year livestock research project in the Sudan is $1.1 million.

(e) The International Agricultural Development Service (IADS)

The IADS was established in 1975 by The Rockefeller Foundation to provide services to developing countries wishing to strengthen and increase the productivity of their agricultural research and development programs. IADS is a private, nonprofit, nonpolitical, scientific and professional agricultural assistance organization.

According to the IADS Report for 1977 it "is concerned particularly with the rapid identification and application of effective approaches to the acceleration of agricultural productivity. It places emphasis on those crops and animal species which provide the livelihood and nutrition of large numbers of rural families, including those with small land holdings, on strengthening institutions crucial to developing technology, training personnel, and implementing production programs, and on the reorientation and synchronization of services in support of rapid development efforts."

IADS provides services at cost to individual countries. It may, however, provide advice to governments on a short-term basis without charge. It has received grants from The Rockefeller Foundation and Lilly Endowment, Inc., for its program and administrative expenses.

IADS has a board of 13 Trustees drawn from eight countries--six from the U.S. and one each from Colombia, France, Germany, Japan, Mexico, the Philippines, and the United Kingdom. In 1977, according to the IADS Annual Report, the IADS professional staff grew from seven to 26: 10 at IADS headquarters and 16 in the field. The staff comprised five members from developing countries, one each from New Zealand, the Netherlands and Norway, and 18 from the U.S. Staff are employed both directly and on secondment from The Rockefeller Foundation.

The following is a summary of current IADS country programs. Of these, six are pricipally aimed at upgrading national research, one deals with both research and extension, and the remaining two are directed at the broader problems of agricultural development.

1/ Les Depenses de Recherche Agricole dans 34 pays d'Afrique Tropicale: Samuel Kassapu, Centre de Developpement l'OCDE, Paris, 1976.

Nepal

Objective: To provide the Government of Nepal with technical and related assistance and services designed to strengthen national production-oriented agricultural research and extension activities relating to cereal crops of importance to Nepal.

The total estimated contract costs are $2,524,000 for work to be completed by September 30, 1979. IADS will provide up to 282 man-months of specialists (in residence and as consultants). The training component includes 234 man-months of advanced degree training and 360 man-months of other training.

Indonesia

Objective: To provide the Agency for Agricultural Research and Development (AARD) with technical assistance and services related to strengthening national production-oriented agricultural research on commodities of importance to Indonesia (rice, rubber, vegetables, and crops grown in rotation with rice).

The contract provides for 62 man-years of specialist services over the period of the project, October 1, 1976, to September 30, 1981. The total estimated cost of the contract is $9,935,000, of which $2,406,000 is allocated to providing 133 individuals with fellowships to cover 225 man-years of training.

Sudan

A Joint Team of Sudanese and IADS scientists completed a review of research capabilities and requirements. The Joint Team's mission was to develop a master plan for strengthening Sudan's national research capabilities, primarily through further development of the Agricultural Research Corporation. The Team also was asked to consider the strengthening of research services for the different farming regions of Sudan.

Recommendations of the Joint Team included organization of research along commodity or factor lines, development of a nationwide network of experiment stations, planning of manpower development schedules, improvement in technology transfer systems, improvement of administrative and support procedures, and relocation of headquarters of the ARC.

Botswana

IADS has helped Botswana to assess its current agricultural research establishment and to review needs in the coming years. The most significant action consisted of helping Botswana authorities to identify a research director whose services are being supplied by NORAD, the Norwegian development assistance agency.

Ecuador

IADS has assigned a representative to assist the Government of Ecuador in agricultural and rural development planning. It has also arranged for CIAT to assign a specialist to cooperate in the organization of an area development project in which rice is the principal crop.

Panama

Objective: To assist the Government of Panama in organizing an institution (IDIAP) capable of planning, coordinating and implementing an effective national agricultural research and technology transfer program particularly for the low-income producer, and in mobilizing internal and external resources for this purpose.

The contract is for one year, and provides for 16 man-months of services: 12 in key personnel, 1 in home office personnel, and 3 in consultants. Total budget for the program is $117.584.

Dominican Republic

The Dominican Government invited IADS representatives to visit the country and to discuss with local authorities approaches to resolving the country's food and agricultural problems. Recommendations which have since been actively pursued by Dominican authorities have included a national commodity program for rice, and an area production program with particular regard for small farmer problems in the mountainous parts of the country. Attention is now being turned to training in management for agricultural and rural development.

Honduras

In response to an invitation by the Minister of Natural Resources, IADS participated in a study to recommend measures to strengthen the national agricultural research organization, PNIA. The study was carried out jointly with Honduran specialists and the report has been accepted by the government as an outline which will guide its research and development plans. The proposed reorganization and reorientation of PNIA focuses on multidisciplinary research at the farm level. This research is to be related to commodity or problem-oriented research organized on a regional or national basis, making use of the existing network of six experiment stations. Linkages with the international centers and other sources of technology are being emphasized. Support for the program is being provided by an IBRD loan.

Bangladesh

Objective: To assist the Government of Bangladesh to establish a well-supported and staffed agricultural research system for non-rice crops and cropping systems through strengthening the Bangladesh Agricultural Research Institute and assisting in the growth of the

Bangladesh Agricultural Research Council. The contract is for three years and calls for IADS to supply 144 man-months of specialists (in residence, and as consultants) plus 108 man-months of junior specialists through a subcontract with a voluntary organization. The total cost of the contract, which is being financed by a USAID grant to Bangladesh, is $1.684 million.

In addition to the above, programs for Ecuador and Indonesia which will emphasize strengthening research in specific fields or in a specific region are in the pipeline.

In addition to these country programs and assistance missions, IADS has conducted a number of conferences and workshops on agricultural development and research. One of the most significant of these conferences was the one held in Bellagio in October 1977, to which reference is made on pages 20-21. IADS also has an active fellowship program connected with its country programs which is administered in cooperation with The Rockefeller Foundation.

IADS has established working relations with a number of international agricultural research Centers in connection with its country operations. In addition, after discussions with the directors of several Centers during 1977, a General Memorandum of Understanding for cooperation between Centers and the IADS was drafted. The General Memorandum outlines the following procedures for cooperation: when a developing country requests that IADS provide technical assistance in a commodity which is the responsibility of an international Center, that Center and IADS (with the concurrence of the national authorities) will develop means for providing the needed services jointly, in a way that will ensure complementarity of inputs of the two organizations and the greatest benefits for the country. Memoranda along these lines have been signed with CIP, IRRI and CIAT.

(f) Assistance from Other Sources

Many other countries, several private foundations in the United States and the IDRC in Canada are also providing substantial assistance in building up national research institutions in the developing countries.

Information from the CARIS project on the number of expatriate scientists from developed countries working in national research institutions in the developing countries is given in Table E8. This table was compiled from responses by 54 developing countries; it does not, however, indicate the total of all expatriates working in these countries and appears to understate the technical assistance efforts of a number of the donor countries listed.

TABLE E8

Expatriate Scientists by Country of Origin and Number of Countries

Country	Number of Expatriates	Number of Countries
Australia	47	5
Belgium	31	8
Canada	4	4
Denmark	2	1
France	167	9
Germany	22	7
Ireland	2	2
Italy	4	3
Japan	5	1
Luxemburg	1	1
Netherlands	31	13
New Zealand	3	2
Norway	5	1
Portugal	9	1
Spain	4	2
Switzerland	5	2
United Kingdom	135	18
United States	54	13

Source: CARIS

The CARIS register also shows that 50 developing countries have expatriate scientists working in other developing countries. The largest numbers are from India (48 in 12 countries) and from Egypt (35 in nine countries). The CARIS register lists in all 8,979 nationals and 824 expatriates engaged in research activities in the 54 countries responding to the CARIS questionnaires.

Patterns of Aid

Prior to the Bellagio VII conference in 1975, a questionnaire was distributed to 17 countries, foundations and international agencies 1/ participating in the meeting asking for information on the way in which they provided assistance to national research organizations in the developing countries.

The following is an extract from the summary of the answers to this questionnaire:

Length of Time of Support: With some exceptions, five years is about the maximum though most donors are prepared to review and extend successful projects. A few donors state that they would support longer term projects and some have a first phase of two to three years.

Supply of Experts. All donors provide expatriate scientists for projects in the host country. Some donors state that technical assistance projects must be staffed by nationals from the donor country; others do not set this condition. All donors pay salaries and allowances for the experts; some require that the host country supply housing and transport; others will supply vehicles with perhaps the host country providing servicing and fuel; housing rentals are paid by some donors, occasionally out of local nonconvertible funds. Only one donor specified that it supplies experts to fill cadre posts in developing countries, but the foundations state that staff employed by them work as part of the national research team.

Employment of Local (Host-Country) Staff. Most donors require that counterpart staff be provided. A few will pay salaries for these and one donor is prepared to give 'topping up' pay for counterparts. All donors will provide in-service training and also training, mostly academic, in the donor country. Some donors specifically exclude payment for training in third countries, others support it. Some will provide funds for attending meetings

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1/ Belgium, Canada (CIDA), Denmark (DANIDA), FAO, Ford Foundation, France (ORSTOM), Germany, International Development Research Center, Netherlands, Norway (NORAD), The Rockefeller Foundation, Sweden (SIDA), Switzerland, UNDP, United Kingdom (ODM), United States (AID), World Bank.

only in exceptional circumstances, others appear to have a more liberal policy on this.

Linkages with Scientific Centers in the Donor Country. All donors encourage such links and some appear to direct a considerable amount of their aid via this route. In some donor countries scientific institutes are encouraged to take an active role in formulating projects of a technical assistance nature and in acting as executing agents; in other countries the role of the home research institutions is more passive.

Interaction with Other Bilateral and Multilateral Donors. All donors replied that they would be prepared to collaborate with other donors. Only two donors stated that their contributions to national research would be lessened because of their donations to the international Centers through the CGIAR while other donors stated that their contribution to bilateral programs have increased since the creation of the CGIAR. Some donors specified that they could pick up parts of other, e.g., IBRD, projects.

ANNEX F

PROPOSAL OF THE DIRECTOR-GENERAL OF FAO TO INCREASE THE SERVICE TO NATIONAL AGRICULTURAL RESEARCH IN DEVELOPING COUNTRIES

1. The Director-General of FAO has noted with interest the proposal made in the CGIAR to support more intensively National Agricultural Research in developing countries. He is looking forward to the findings and conclusions of the Task Force of the CGIAR on this subject.

2. Recalling the mandate of the Organization to promote agricultural research in its member nations, the 19th FAO Conference agreed with the emphasis in FAO's programme to assist countries in building up strong national research capabilities and ensuring application of research results through extension and field delivery services. The Conference expressed concern about the proposal to set up an International Service for National Agricultural Research presented to the CGIAR and it was stressed that FAO was fully experienced and equipped to provide assistance to national agricultural research. FAO would continue to work to ensure that the essential link between research, extension and production was maintained. The Conference therefore urged the CGIAR to take full account of FAO's role and capacity in its consideration of the proposal.

3. FAO has been involved for many years and is increasingly engaged in assisting developing countries to strengthen their research capabilities as integrated elements in their development efforts. It possesses considerable experience and information on research strength and organization, gaps as well as short and long-term needs to overcome existing constraints in national research systems.

4. In supporting national agricultural research in developing countries, FAO is used to a very flexible approach depending on the nature of requests, on the diversity of needs and situations, on sources of finance and on forms of collaboration. The latter include collaboration between developing or developed country institutions, between those in developing countries, with regional or international research centres, with bi- and multilateral donors, with UNDP and with national and international investment institutions.

5. FAO operates on request of and in close contact with its member governments with whom increased links are being established through FAO Country Representatives to help ensure better coordination of technical and financial assistance in agricultural development including research.

6. In the light of constraints facing developing countries to increase their research strength necessary for future agricultural development, the Director-General of FAO is convinced that strong additional efforts are justified to assist these countries in research direction, skill and organization, accompanied by additional resources for institution building and training of research personnel.

7. If such additional resources could be mobilized he would be ready to consider the establishment of a Research Development Programme in FAO which would further stimulate requests by developing countries to seek more international assistance for strengthening or restructuring their national research capability.

8. This Research Development Programme could make use immediately of the existing Research Development Center (with five research officers at present) which could be expanded through additional resources to provide the core operation similar to the one described in the proposal presented to the CGIAR.

9. The Research Development Programme, under the leadership of a research experienced Director and under the supervision of the ADG, Agriculture Department, would operate with a similar flexibility as the Technical Cooperation Programme in FAO and would make full use of the research experience in the technical Divisions and field projects of FAO to complement its activities. Further additions would be ensured by contracts with qualified national institutions and scientists either as consultants or in the form of special service agreements. For field operations the existing research experienced staff in FAO's field programme could be expanded as financial resources would allow to enter into longer-term contracts offering career prospects.

10. For the operation of field projects, the existing operational services of the Organization would be available. The Programme would make full use of FAO's administration, logistics support, regional and country representation and all other services rendered by the Organization.

11. The Director-General would be prepared to propose to the FAO Governing Bodies appropriate Regular Programme and budgetary allocations to meet 25% of the financing of this programme if he can be assured by the CGIAR that 75% would be met by donor commitments.

12. The Director-General is prepared to provide further details of this proposal at a later stage to the Task Force. These details would include the mechanism for reporting to FAO Governing Bodies and the CGIAR, for expert advice by research leaders of developing and developed countries and for interlinks with major research organizations particularly the International Agricultural Research Centres.

Annex G

EXCHANGE OF LETTERS BETWEEN THE CHAIRMAN OF THE TASK FORCE AND THE DIRECTOR-GENERAL OF FAO

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

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June 19, 1978

The Honorable Edouard Saouma
Director-General
Food and Agriculture Organization
of the United Nations
Via della Terme di Caracella
00100 Rome ITALY

Dear Mr. Saouma:

As you doubtless know, the Task Force on International Assistance for Strengthening National Agricultural Research, established by the Consultative Group on International Agricultural Research (CGIAR), held its second meeting in Nairobi on June 1-2, 1978. Dr. Bommer represented FAO at that meeting.

The members of the Task Force unanimously agreed that there is a clear and urgent need for additional assistance to strengthen national agricultural research capabilities in developing countries. The Task Force recognized the great contribution being made in this area by existing development assistance agencies, international and bilateral, but concluded that the requirements of many developing countries for technical expertise, particularly to help them plan, organize and manage their research programs more effectively, are so pervasive that additional means for fulfilling these requirements are needed. After considerable discussion, the unanimous decision of the Task Force was to recommend that a new international Service be created for this purpose under the aegis of the CGIAR.

In reaching this conclusion, the Task Force was guided by its determination that, to operate with maximum effectiveness, the entity providing the additional technical assistance should have the following characteristics:

(1) It should be an autonomous agency, international in character and non-political in its management, staffing and operations. This was construed to mean that its governance should be vested in a Board of Trustees, the members of which would be internationally selected on the basis of their experience and qualifications and who would serve in their individual capacities, rather than in a board or other body composed of governmental representatives;

(2) It should be a "center of excellence" whose whole business is helping to strengthen national research systems, normally by providing assistance over long periods, and with a career staff of the same high quality as the staffs of the international agricultural research centers;

(3) It should be, at least initially, a relatively small organization, and it should be capable of quick response to requests from developing countries; and

(4) It should have sufficient stature to be able to assist the countries it serves to obtain technical finance for support of their research systems.

Before deciding to recommend the creation of a new international Service, the Task Force gave careful consideration to the following alternative means of providing such additional assistance: (1) expanding the mandates and providing additional resources to the international agricultural research Centers; (2) entrusting the responsibility to an enlarged CGIAR Secretariat; (3) establishing a Research Development Programme in FAO, as proposed on your behalf by Dr. Bommer at the January meeting of the Task Force; and (4) providing additional resources to the International Agricultural Development Service (IADS). The Task Force concluded that none of these alternatives would fully meet its criteria, unless possibly, as a result of negotiations with the CGIAR, the mandate and mode of governance of IADS could be so changed as to give it the essential character and characteristics of the proposed Service.

In their consideration of these alternatives, the members of the Task Force recognized the importance of the contributions already made by FAO in helping to improve national agricultural research systems, and in training research personnel, and welcomed the proposal to establish a Research Development Programme in FAO as an expression of willingness by your organization to do even more in this field. However, it was generally agreed that the establishment of the proposed Programme in FAO would not meet the criteria listed above for several reasons. First, such a Programme within FAO would necessarily be subject to the governing bodies and executive management of FAO and therefore could not be considered non-political in its governance or autonomous in its operations. Second, the addition of such a Programme to the already large and complex set of responsibilities entrusted to FAO would not, in the view of the Task Force, achieve the degree of specialized and concentrated effort in the area of strengthening national research capacity which the Task Force believes to be necessary. Finally, the Task Force felt that it was likely that recruitment and maintenance of the kind of experienced career staff contemplated for the Service would involve extensive, and probably unacceptable, exceptions to FAO's existing personnel and administrative regulations.

The Task Force specifically instructed me, as its chairman, to communicate the results of its deliberations to you and to tell you that the group, before finalizing its report, would welcome any comments which you might wish

to make on its analysis of the situation. The Task Force's report is due to be submitted to the CGIAR by August 1.

I have also been asked to express, on behalf of the Task Force, our appreciation for the valuable contributions made by Dr. Bommer to the group's deliberations. It is the sincere hope of the Task Force that, if the CGIAR approves its recommendations and a new Service to strengthen national agricultural research capacities is established under the aegis of the CGIAR, the activities of the Service will complement, and indeed stimulate an increase in, the activities of existing development agencies and thus result in substantially expanded support for well-conceived national research programs. For such an effort to be fully effective, needless to say, the participation and cooperation of FAO would be indispensable.

With kind regards,

Sincerely yours,

s/Richard H. Demuth
Chairman, Task Force on
International Assistance
for Strengthening National
Agricultural Research

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

The Director-General

PBE-DG/78-833

Rome
June 30, 1978

Dear Mr. Demuth,

Thank you for your letter of 19 June about the proposal to set up a new international service for strengthening national agricultural research under the aegis of the CGIAR.

You have kindly invited my comments on the conclusions of the Task Force that FAO should be excluded from the opportunity of meeting the needs as identified by the Task Force and that a new autonomous group should be set up.

I am tempted to take the position that since it would seem most unlikely that the Task Force would reach any other conclusion, it is superfluous for me to respond. I feel, however, that it is owed to the Member Governments of FAO, and particularly those interested in the subject matter, to give you my comments.

In the first place, I am not convinced that the first and only problem to be solved in strengthening national agricultural research systems is to ensure a supply of expatriate experts to plan, organize and manage for developing countries. This is a concept of development assistance which is increasingly out-moded. The problem can only be solved within the context of overall development needs and an integrated approach thereto, such as FAO can provide.

Mr. Richard H. Demuth
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Secondly, I do not accept the pejorative categorizations of political and non-political as set out in your letter. In the sense that Member Governments must be involved even in using such a service as you propose, everything is political. Without political will, nothing worthwhile can happen. I will say nothing about the interests, political or otherwise, of those who would supply funds for such a service. I would say, however, that the strength of FAO is in fact that it represents 145 Member Governments who, by contributing to its budget, participating in its deliberations, deciding its strategies, policies, and programmes, amply demonstrate their political will to fulfil the objectives of the Organization and to support its executive management vested in myself.

Thirdly, while ignoring the implicitly derogatory comments about FAO in your letter, I must say that I do not believe that the institution of yet another independent group in an already crowded field can possibly be of service to the interests of developing countries, whose duty it is to coordinate sources of external assistance with their national development plans, nor of those donor governments which make much in international discussions of the need for coherence and coordination.

However, I would not wish to stand in the way of any effort which will indeed provide needed and worthwhile assistance to developing countries.

The participation and cooperation of FAO referred to - I presume not as mere lip-service - in the last sentence of your letter, cannot be decided without full debate, including my own views, and decision by the Governing Bodies concerned.

Yours sincerely,

s/Edward Saouma

ANNEX H

PROFILES OF POSSIBLE CITIES FOR SERVICE HEADQUARTERS

Part A of this Annex presents brief profiles of the cities mentioned in Section XIII as possible headquarters locations of the Service. The cities are:

Abidjan	Mexico City	Tunis
Cairo	New Delhi	Vienna
Geneva	Paris	Washington
The Hague	Rio de Janeiro	
London	Rome	

Estimates of populations are given and, as one indicator of the general level of goods and services, estimates of per capita GNP. The cost-of-living index is derived from a U. N. statistical series, with New York City equaling 100.

Part B of the Annex presents some of the same information in tabular form, to facilitate comparison among cities.

Part A

1. ABIDJAN

Population: 800,000

Per capita product (national): $540

Cost-of-living index: 116

Telecommunications: Telephone instruments are scarce and local communications are fair to poor. International service, through Paris, is good.

International travel: Air connections to destinations in sub-Saharan Africa are plentiful. Direct flights to other regions are scarce: 35 a week to Europe, 3 to North Africa and the Near East, 3 to North America, none to Asia, Australia, South and Central America. Destinations in Asia, Australia and the Western Hemisphere are reached through Paris.

Climate: Hot and rainy. The average high temperature is 32°C (88° F), the average low temperature 24°C (74° F) or higher during five months of the year. Annual rainfall is about 200 cm (80 in), of which more than half occurs in May, June and July.

Health conditions: Poor. Malaria, typhoid, yellow fever and amebiasis are risks; upper respiratory infections are common. Insect pests are numerous. Drinking water must be boiled and filtered.

Medical care: Good doctors and dentists are available.

Schools: Good. Teaching in French and in English is available through Grade 12.

Housing: Scarce and expensive.

Goods and services: Fair. Food is good in quality and variety. General household supplies are available. Household equipment, toiletries and sundries are imported and expensive. Laundry, dry cleaning and shoe repairing are satisfactory.

Local staff availability: Fair in French, poor in English.
Recreational and cultural opportunities: Good.

Special factor: Abidjan is the site of the national university of the Ivory Coast; it has an agricultural faculty and conducts agricultural research in the vicinity.

2. CAIRO

Population: 8.5 million.

Per capita GNP: $260.

Cost-of-living index: 77.

Telecommunications: Poor.

International travel: Air connections to Europe are plentiful (more than 150 direct flights a week); and there are direct flights to sub-Saharan Africa (about 40 a week), Asia (about 30) and North America (about 20). Latin America and Australia must be reached through connections in other cities.

Climate: Hot and extremely dry. During five months of the year, the average daily high temperature is 32°C (90°F) or more; and the average daily high temperature throughout the year is 28°C (82°F), the low temperature 16°C (60°F). Less than five days a year have any rainfall.

Health conditions: Poor. Intestinal, respiratory and fungal infections, hepatitis and fevers of unexplained origin are endemic. Constant dust is a hazard. Drinking water must be boiled; milk and milk products are considered unsafe. Good doctors are available, and simple dental work can be done.

Schools: Good. Teaching in French, German and English is available through 12th grade. There is an American University in Cairo.

Housing: Scarce and expensive.

Local staff availability: Good.

Recreational and cultural opportunities: Good. Social life is active. Egyptians are hospitable, and there is a large expatriate community.

Special factor: There is a university faculty of agriculture and an experiment station in the vicinity of Cairo.

3. GENEVA

Population: 180,000

Per capita GNP: $8,410.

Cost-of-living index: 136.

Telecommunications: Good.

International travel: Geneva has plentiful direct air connections to European destinations and regular service to all other regions: Mid-east and North Africa (72 direct flights a week), sub-Saharan Africa (25), Asia (about 40), Latin America (12) and North America (10).

Climate: Temperate, with average daily highs of 14°C (58°F) and lows of 6°C (43°F). There is rain or snow on about 125 days a year.

Health conditions: Good.

Schools: Good. Teaching in major European languages is available through the 12th grade.

Housing: Good. Houses are not plentiful in Geneva proper, but can be found in nearby communities; and apartments are reasonably available.

Goods and services: Good.

Local staff availability: Good.

Recreational and cultural opportunities: Fair. Exceptional winter sports are available nearby.

4. HAGUE

Population: 550,000.

Per capita GNP: $5,750.

Cost-of-living index: 127.

Telecommunications: Good.

International travel: Schiphol, the airport serving both The Hague and Amsterdam, is a major communications hub. Intra-European services are frequent, and direct flights are available to all other regions: about 85 a week to North Africa and the Near East, about 20 to sub-Saharan Africa, 80 to Asia, 30 to Latin America and 50 to the United States and Canada.

Climate: Cool and wet. The annual average of daily high temperatures is 12°C (54°F); lows average 8°C (46°F). The hottest month (July) has average highs of 21°C (69°F), the coolest (January) has average lows of 1°C (34°F). There is rain or snow on more than half the days of the year (about 185) and winters are dreary.

Health conditions: Good.

Schools: English teaching is available through the 12th grade.

Housing: Fair. Availability is limited and quality is mediocre. Dutch apartments are not well equipped.

Goods and services: Good.

Local staff and availability: Good.

Recreational and cultural facilities: Good.

Special factor: The Hague is only a little more than an hour by train and car from the extensive agricultural education, training and research facilities maintained by the Dutch Government at Wageningen.

5. LONDON

Population: 7 million.

Per capita GNP: $3,780.

Cost-of-living index: 97.

Telecommunications: Good.

International travel: London is one of the greatest hubs in the world for international travel, with direct flights to a number of the major cities in North America (250 flights a week), the Middle East and North Africa (308 direct flights), sub-Saharan Africa (110 direct flights), Asia (170 direct flights), South America and Caribbean (50 direct flights), and Australia and New Zealand (50 direct flights).

Climate: Prevailing southwesterly winds make Britain's climate temperate all year round. Although weather patterns are subject to frequent change, few extremes in temperature occur; temperatures range from about 4°C (40°F) in the winter to 15°C (60°F) in the summer, occasionally falling to 7°C (20°F) in winter and rising to 32°C (90°F) in summer. Rain falls on about 164 days a year.

Health conditions: Good.

Schools: Good. Instruction in major European languages is available through 12th grade and middle schools are well equipped to prepare students for entrance to superior American and European universities.

Housing: Good, but both furnished and unfurnished accommodations are expensive in metropolitan London and unfurnished accommodation is difficult to find.

Goods and services: Good.

Local staff availability: Good.

Recreational and cultural opportunities: Good.

Special factors: Rothamsted Experimental Station, Reading University and a number of research units of the Ministry of Overseas Development are within a 30-mile radius of London. All of these institutes have had a long association with tropical agriculture.

6. MEXICO CITY

Population: 8.5 million.

Per Capita GNP: $1,050.

Cost-of-living index: 92

Telecommunications: Good.

International travel: Mexico City has plentiful connections to major destinations throughout the Western Hemisphere, poor connections to other regions. There are about 20 direct flights a week to Europe, three to Asia, one to North Africa and the Near East, none to sub-Saharan Africa or Australia.

Climate: Moderate temperatures, and quite wet. Average daily high temperatures range from 19°C (66°F) to 26°C (78°F), lows from 6°C (42°F) to 12°C (54°F). About 170 days a year have some rain; from June to October, there are two or three hours of rain virtually every day.

Health conditions: Fair to poor. Tap water must be boiled before drinking. Intestinal infections are a hazard, respiratory infections are frequent. The combined effects of Mexico City's high altitude (2300 meters, 7500 feet) and severe air pollution present a special risk to persons with a tendency to respiratory illnesses. Medical facilities are good.

Schools: Good. There are international schools teaching in French, German and English through 12th grade.

Housing: Poor. Housing is in extremely short supply; apartments often need to be re-equipped.

Goods and services: Fair. Food is in good supply at reasonable prices. There are water shortages; electric supply is uncertain during some seasons.

Local staff availability: Good.

Recreational and cultural opportunities: Good.

Special factor: The national agricultural university, at Chapingo, and CIMMYT, at El Batan, are within 30 miles or so of Mexico City.

7. NEW DELHI

Population: 4 million (with Delhi).

Per capita GNP: $140.

Cost-of-living index: 75.

International air travel: There are moderately good air connections from Delhi to other cities of Asia, to Europe (about 60 direct flights a week) and to North Africa and the Near East (about 25 flights). There are only 12 direct flights a week to North America, two to sub-Saharan Africa, and none to Latin America and Australia.

Climate: Hot and dry. The average daily high temperature throughout the year is 32°C (89°F); during seven months of the year, the daily high temperature is over 32°C (90°F), and during two of these the average high is more than 38°C (100°F). Average daily low temperatures during the year is 18°C (65°F). Rain falls on only about 35 days a year.

Health conditions: Poor. Intestinal disorders are common, and malaria is endemic. Hepatitis, typhoid and other water-borne diseases are common. Tap water must be boiled before drinking. Good doctors are available in New Delhi. Dental care is less good, hospital facilties are poor, and drugs are of uncertain quality, since adulteration is common.

Schools: Fair. International schools are available through the eighth Grade; schools offering teaching through the 12th grade exist within easy travel.

Housing: Fair. Household equipment is scarce and expensive.

Goods and services: Poor. Food is plentiful and inexpensive. Household goods are in short supply. Water pressure is low, and electric voltage fluctuates, causing problems with automatic equipment.

Local staff availability: Good.

Recreational and cultural opportunities: Fair.

Special factor: The graduate school of agriculture administered by the Agricultural Research Council is in greater New Delhi and engages in agricultural research there.

8. PARIS

Population: 4 million.

Per capita GNP: $5,440.

Cost-of-living index: 121.

Telecommunications: Good.

Climate: Climatic conditions are moderate. Annual rainfall averages only 26 inches and is spread evenly over the year. Winters are dry and not usually severe. Snowfall is light, sunshine is rare in winter and gray, raw, foggy days are frequent. Summers are quite pleasant although rainfall is heavy at times. Hot weather may occur as early as May and as late as October. Conversely, there may be cold periods in June or July. Rain or snow falls on about 162 days a year.

Health conditions: Good.

Schools: Good. Instruction in major European languages is available through 12th grade, and middle schools are well equipped to prepare students for entrance to superior American and European universities.

Local staff: Good.

Housing: Good but expensive. The availability of rental accommodation is improving but rents remain high.

Goods and services: Good.

Local staff availability: Good.

Recreational and cultural opportunities: Good.

Special factors: The Headquarters of ORSTOM is in Paris and GERDAT and each of its nine institutes has a headquarters or central laboratory in France.

9. RIO DE JANEIRO

Population: 5.5 million.

Per capita GNP: $1,030.

Cost-of-living index: 107.

Telecommunications: Fair. Telephones are scarce and service is mediocre. International and domestic telegraph service is good.

International air travel: Frequent direct flights connect Rio to destinations in Europe (about 80) and North America (about 50), but service to other regions is poor or non-existent: there are about 15 direct flights a week to sub-Saharan Africa, only three to Asia, and none to North Africa and the Near East.

Climate: Temperate and pleasant. The annual average of daily high temperatures is 23°C (73°F), of lows 21°C (69°F); four months a year (December through April) have average daily highs between 27°C (80°F) and 29°C (85°F). Rain falls on about 125 days a year.

Health conditions: Fair. All water for consumption must be boiled. Parasitic intestinal infections and viral hepatitis are risks. Hospital and medical facilities are satisfactory. Medical and dental care are good; pharmaceutical drugs are in good supply.

Housing: Fair to poor. Few detached houses are available; moderately priced apartments are in poor locations.

Goods and services: Good. Food and consumer goods are plentiful.

Local staff availability: Fair.

Recreational and cultural opportunities: Good.

Special factor: There are a university agricultural faculty and an experiment station in the vicinity of Rio.

10. ROME

Population: 3 million.

Per capita GNP: $2,810.

Cost-of-living index: 86.

Telecommunications: Good.

International air travel: Many direct flights are available from Rome to Europe and all other locations: nearly 200 a week to the Middle East and North Africa, about 55 to sub-Saharan AFrica, 75 to Asia, 25 to Latin America and 70 to North America.

Climate: Hot summers, mild winters. The annual average daily high temperature is 22°C (71°F), the low is 11°C (51°F). Four months (June-September) have average daily high temperatures between 28°C (82°F) and 31°C (88°F).

Health conditions: Good.

Schools: Good. There are many international schools teaching through Grade 12 in major European languages.

Housing: Availabilty of houses is severely limited and modern apartments are scarce.

Goods and services: Fair. Food is plentiful and various. Other goods and services are plentiful but often not of the best quality.

Local staff availability: Good.

Recreational and cultural opportunities: Good.

Special factors: Proximity to FAO, the United Nations World Food Council and the International Fund for Agricultural Development.

Strikes have frequently interrupted public utilities, air transportation and other services in recent years.

11. TUNIS

Population: 1 million.

Per capita GNP: $730.

Cost-of-living index: 113

Telecommunications: Poor.

International air travel: Tunis is part of the French air transportation network: most of the 110 direct air flights to Europe each week are to French destinations. Direct air connections to other regions are virtually non-existent.

Climate: Mediterranean, with hot summers, cool winters and moderate rainfall. The average daily high temperature throughout the year is 23°C (74°F), the average low 9°C (48°F); three months (July-September) have average daily high temperatures of more than 29°C (85°F), two months have average daily high temperatures of 16°C (60°F) or less. Rain falls on about 100 days a year.

Health conditions: Fair.

Schools: Fair. Teaching in English is available through the 8th grade; but instruction in languages other than French is not available in grades 9 through 12. Foreign students in the latter grades study in Europe or the United States.

Housing: Availability is poor and quality is low.

Goods and services: Fair to poor. Food is plentiful at reasonable prices, and pasteurized milk is available. Household goods and toiletries are in short supply. Maintenance and repairs of equipment and clothing are expensive and often of poor quality.

Local staff availability: Fair in French, poor in other languages.

Recreational and cultural opportunities: Good.

Special factor: Tunis is the site of the national university of Tunisia; it has an agricultural faculty and conducts agricultural research in the vicinity.

12. VIENNA

Population: 1.7 million.

Per capita GNP: $4,870.

Cost-of-living index: 121.

Telecommunications: Good.

International travel: Vienna has good direct air connections to destinations in Europe, the Middle East and North Africa, but service to other regions is scanty. There are three direct flights a week to sub-Saharan Africa, seven to Asia, 19 to North America, five to Australia, none to Latin America.

Climate: Cool summers, fairly mild winters. The annual average of daily high temperatures is 13°C (55°F), of lows 6°C (43°F). Temperatures do not often reach 25°C (77°F) in the summer months, and average below freezing only in December. Rain or snow falls about 100 days a year.

Health conditions: Good.

Schools: Good. English instruction is available through the 12th grade, and many foreign students study for a year or more at the University of Vienna.

Housing: Availability is poor. This is a critical problem in Vienna.

Goods and services: Good.

Local staff availability: Good.

Recreational and cultural opportunities: Good.

13. WASHINGTON

Population: 3.1 million (metropolitan area).

Per capita GNP: $7,120.

Cost-of-living index: 95.

Telecommunications: Good.

International travel: Washington has many direct flights to destinations throughout America and is well connected to Europe (more than 70 direct flights a week) and Latin America (about 35 direct flights), but direct connections are poor or lacking to sub-Saharan Africa (no direct flights), Asia (14 direct flights) and Australia (no direct flights).

Climate: Hot and humid summers, cold winters. Average daily high temperatures in the summer months (June-August) are around 30°C (86°F), and temperatures over 32°C (90°F) are frequent. Average daily low temperatures in the winter months (December-February) are below freezing. Rain or snow falls on about 125 days a year.

Health conditions: Good.

Schools: Good. Instruction in major European languages is available through 12th grade, and middle schools are well equipped to prepared students for entrance to superior American and European universities.

Housing: Good. Houses and apartments are in good supply, and the housing market is well organized.

Goods and services: Good.

Local staff availability: Good.

Recreational and cultural opportunities: Good.

Special factors: Proximity to the headquarters of the World Bank Group and of the Inter-American Development Bank, and to the Secretariat of the CGIAR.

The University of Maryland, with a large agricultural faculty, and the big U.S. agricultural experiment station at Beltsville, Maryland, are both on the outskirts of Washington.

Part B.

1. Cost of living indices (New York = 100)

Geneva	136
The Hague	127
Paris	121
Vienna	121
Abidjan	116
Tunis	113
Rio de Janeiro	105
London	97
Washington	95
Rome	86
Cairo	77
New Delhi	75
Mexico City	73.

2. International connections

	Direct Inter-Regional Flights	Telecommunications
London	954	Good
Paris	704	Good
Rome	427	Good
The Hague	275	Good
Cairo	245	Poor
Geneva	160	Good
Rio de Janeiro	150	Fair
Washington	130	Good
Tunis	110	Poor
New Delhi	100	Poor
Vienna	95	Good
Mexico City	75	Good
Abidjan	40	Fair

3. Amenities

	Health Conditions	Schools	Housing	Goods & Services	Local Staff	Recreation
Washington	Good	Good	Good	Good	Good	Good
Paris	Good	Good	Good	Good	Good	Good
London	Good	Good	Good	Good	Good	Good
Geneva	Good	Good	Good	Good	Good	Fair
The Hague	Good	Good	Fair	Good	Good	Good
Vienna	Good	Good	Poor	Good	Good	Good
Rome	Good	Good	Fair	Fair	Good	Good
Rio de Janeiro	Fair	Good	Fair	Good	Fair	Good
Mexico City	Fair	Good	Poor	Fair	Good	Good
Cairo	Poor	Good	Poor	Poor	Good	Good
Abidjan	Poor	Good	Poor	Fair	Fair	Good
Tunis	Fair	Fair	Poor	Fair	Fair	Good
Delhi	Poor	Fair	Fair	Poor	Good	Fair