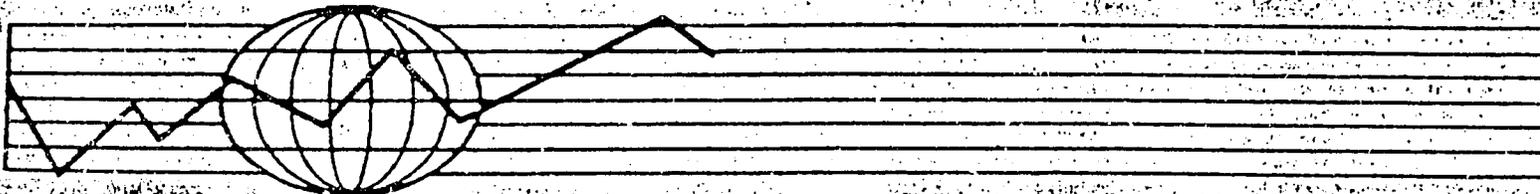


ECONOMIC DEVELOPMENT CENTER



**REFORMING THE GLOBAL AGRICULTURAL
RESEARCH SUPPORT SYSTEM**

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by

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But the perspective presented in this paper is not confined to agricultural research. Both the analysis and the suggestions for reform have implications for other development assistance activities in support of agricultural production and rural development.

The needed reforms are so substantial that, until they are made, increases in the transfer of resources to poor countries as advocated in the reports such as the Brandt Commission and the Presidential Commission on World Hunger, would be largely counter-productive. The reforms are imperative because development of national agricultural research capacity is one of the most effective ways to remove the most serious constraints on the ability of poor countries to meet their basic needs and to sustain other agricultural and general development activities.

REFORMING THE GLOBAL AGRICULTURAL RESEARCH SYSTEM

The architects of the post World War II set of global institutions included the problems of meeting world food needs and reducing poverty in rural areas as essential elements of their vision of a world community that could assure all people of freedom from want and insecurity. They sought to achieve this vision by the creation of a set of global bureaucracies--the U.N. specialized agencies.

The establishment of a U.N. Food and Agriculture Organization (FAO), headquartered in Rome, was the major institutional response to the concern for freedom from hunger and the reduction in rural poverty (Hambridge). The explosion in the number of new nation states associated with the decolonization of the 1950's and 1960's placed new demands for assistance on the FAO system which the FAO bureaucracy was unprepared to accept and which the FAO governing council was unwilling to support. The result has been the emergence of a welter of bilateral and multilateral agricultural programs designed to support or coordinate agricultural development efforts in poor countries. The effect, by the late 1970's, was to create a "tower of babel" in which competition among and between assistance agencies and assistance recipients is more characteristic than is cooperation.

It is again time to give serious thought to the structure of international assistance for agricultural development. In this note I first describe the changing structure of international support for agricultural development. I then turn to a discussion of some specific problems in the area with which I am most familiar--financial and technical assistance for strengthening national agricultural research capacity. I then turn to an attempt to suggest some of the reforms in the support for agricultural research that should be considered.

Institutions to Support Agricultural Development^{1/}

In this section I review and assess recent trends in the capacities of the national and bilateral assistance agencies.

The National Aid Agencies

Bilateral technical assistance to agricultural development during the post war period has been dominated by three major national programs-- those of the United States, the United Kingdom and France. More recently Germany has become an actor of major significance. A number of other nations--Canada, Australia, Sweden, Holland, Belgium, Switzerland and Japan--occupy smaller and more specialized roles.

In recent years most bilateral programs have run into increasing problems stemming from weakened domestic support, declining professional capacity and difficulty in adapting their style of operations to the changing political and professional environments in the countries in which they work. The bilateral programs have also been weakened by their tendency to let political objectives subvert program content.

In 1973 the U.S. Congress mandated, under its new directions legislation, that U.S. development assistance be targeted at meeting the basic needs of the poorest people in the developing countries. Yet during the 1970's the USAID budget for bilateral development assistance has declined in real purchasing power. It has also declined relative to the budget for bilateral security assistance (Table A1). The result has been a decline in USAID resources allocated to countries where technical and institutional development needs are most severe and an increase in resources allocated to countries

^{1/} The perspective presented in this section draws heavily on a recent review of the literature on development assistance prepared for the U.S. Agency for

considered politically sensitive.^{2/} In many countries the U.S. programs of assistance for agricultural and rural development have been reduced to filling in the technical assistance, research and training gaps resulting from over-ambitious World Bank projects. On the positive side a larger share of U.S. development assistance has been allocated to the agricultural sector and within the agricultural sector a larger share has apparently been devoted to research in food crops.

The Peace Corps should also be mentioned. The Peace Corps has played a major role in educating young Americans to realities of village and urban life in developing countries. The education has come at a stage in the life of most Peace Corps volunteers when they were highly receptive to such learning experiences. Many returned Peace Corps volunteers who have gone on to acquire the graduate education necessary to help them to understand and interpret the significance of their experience are now highly skilled AID staff members, productive scholars, and citizens who have an acute sensitivity to international affairs. But investment in the Peace Corp (and in the youth volunteer agencies in other countries) should be charged against the nation's education budget rather than its foreign assistance budget.

The Development Banks

The World Bank has become an increasingly important source of funding for agricultural development. During its early years support for agricultural development was largely a by-product of major multi-purpose infrastructure investments in hydroelectric, transportation and related development areas. Over time project funding for agricultural resource development achieved increased emphasis. Beginning in the mid-1960's the World Bank

^{2/} In recent years over 80 percent of the Economic Support Fund has been allocated to three countries--Israel, Egypt and Jordan.

began making loans for the development of agricultural research and training institutions.

As lending for agricultural development has increased the World Bank has rapidly expanded its project lending and management staff capacity. As the World Bank's emphasis on agricultural research, extension and education projects has expanded, its effectiveness has declined. A concern with the transfer of resources has increasingly dominated the capacity of the recipient country to implement and manage bank-funded projects. In the area of agricultural research Bank support for facilities development has often outrun the development of capacity to manage and staff the new research facilities. The result is resource dissipation rather than resource transfer (Cardwell, Moomaw and Ruttan).

These observations also apply, but with somewhat less force, to the regional development banks for Latin America, Asia and Africa. Because of their more limited financial resources their lending is more likely to match the scale that is appropriate in the smaller countries in their region. But their staff capacity for analysis and monitoring tends to be weaker than that of the World Bank.

The International Agricultural Research System

Since the mid-1960's, a new system of international agricultural research institutes emerged as perhaps the most dynamic component of the global agricultural support system. The initial units in the system, the International Rice Research Institute (IRRI), the International Wheat and Maize Research Center (CIMMYT), the International Center for Tropical Agriculture (CIAT), and the International Institute for Tropical Agriculture (IITA) were initially funded by the privately endowed Rockefeller and Ford Foundations. The further expansion of the institute system was made possible

organized as the Consultative Group on International Agricultural Research (CGIAR). The governance of the system is characterized by a highly innovative system of funding and management. While system funding and planning are centrally coordinated, research management is decentralized to the individual institute level (Ruttan, 1982, pp. 116-146).

The new technologies developed by the institutes have contributed to significant expansion in commodity production, particularly in wheat and rice in a number of poor countries. The effectiveness of the CGIAR system is, however, constrained by the lack of capacity of most national research systems to make effective use of the new knowledge and prototype technology that the CGIAR system of institutes is capable of producing. It is also increasingly recognized that some of the dramatic contributions of the institutes was the result of the ability to exploit lags in the application of scientific and technical knowledge. There is currently a perception that the easy gains have been realized and that the institutes themselves have begun to lag in their capacity to take advantage of recent advances in biological science and technology in their crop and livestock development programs.

Foundations and Private Voluntary Agencies

From the mid-1950's to the late 1970's the two major U.S. foundations, Ford and Rockefeller, were major innovators and supporters of agricultural development. The Rockefeller Foundation provided much of the entrepreneurial and professional leadership for the new agricultural research institutes. The Ford Foundation field offices attracted some of the best intellectual capacity of American universities to their very substantial agricultural and rural development programs. By 1980, as a result of the effect of inflation on the value of endowment portfolios and conscious decisions to reorient

program activities, neither Foundation was playing more than a marginal role in agricultural development.

A number of private voluntary agencies that have been active in the food aid and agricultural development field have expanded their programs in the 1970's. In the U.S. this expansion has occurred primarily with government support. Some of the PVO's have been a source of imaginative program initiatives. As their public support has risen, however, their relationship to the USAID has increasingly tended to evolve into a patron-client mode (more than 75 percent of the CARE and Catholic Relief budgets comes from public sources). In turn they have often taken on a major role in mobilizing political support for the AID programs.

Toward a Reform of Agricultural Research Support

What can be done to replace the deficiencies that characterizes support for agricultural research, extension and rural development programs in poor countries? In my judgement the basic thrust of the reform that is needed is to move away from primary reliance on the project approach. In supporting agricultural research the project system should be largely replaced by a "formula funding" or "revenue sharing" approach.

There have been many criticisms of the project approach followed by the major bilateral and multilateral development assistance agencies. The criticism most frequently heard is that the assistance agencies exert undue influence on the content of national development programs.^{3/} This criticism is partly correct. It is not too difficult to identify cases where close patron-client bonds have been established between particular officers in the aid agencies and the leadership of favored national program agencies. Such relationships have often appeared to give particular national programs a degree of stability and continuity that would be difficult to achieve in the unstable political environments that characterize many developing countries.

The criticisms that focus on selectivity in program support and bias in the direction of program activity are not, however, my major concern. My concern is that the project support approach to agricultural development assistance has rarely been effective in contributing to the development of viable national agricultural development institutions. It might be argued, in contrast to this assertion, that the project system has, in a

^{3/} See Faaland (1982). For an example of the lack of congruence between national and donor agricultural research priorities see Salmon (1983).

number of countries, contributed to the rapid development of professional capacity and facilities (Judd, Boyce and Evenson). But the period of rapid development has too often been followed by the erosion or collapse of program capacity when external project support has declined (Ardila, Trigo and Pineiro).

In my judgement cycles of development and erosion are inherent in the traditional project approach. The reason for this inherent contradiction is that external assistance provides an alternative to the development of internal political support. National research system directors have frequently found that the generation of external support requires less intensive entrepreneurial effort than the cultivation of domestic political support. Domestic budget support required by donors is often achieved by creative manipulation of budget categories rather than by increments in real program support - particularly when donor representatives are under pressure from assistance agency management to "move resources." Most existing project systems thus have built in incentives for national research system leadership to direct entrepreneurial effort toward the donor community rather than toward the domestic political system.

Any effective alternative should attempt to reverse the perverse incentives that characterize existing development assistance instruments. The system should be reformed to provide incentives for national research system directors to redirect their entrepreneurial efforts toward building domestic political and economic support for agricultural development.

I am increasingly convinced that the long term viability of agricultural research systems depends on the emergence of organized producer groups who are effective in bringing their interests to bear on legislative and executive budgetary processes. The support of finance and planning ministries for

with perceived severity of food crises and foreign exchange demands. Where, for example, will the political support necessary to assure financial support for EMBRAPA (Brazil), PCARR (Philippines), and PARC (Pakistan) come from when donor resources are phased out? Such support requires a long term political development effort on the part of national research program leaders and program beneficiaries.

A Formula Funding Model

What alternatives to the existing system do I suggest? I do not want to be interpreted as completely negative with respect to traditional development assistance instruments. Project aid is often quite appropriate for physical infrastructure development projects. Program aid can be an effective way to provide macro-economic assistance for structural adjustment or for sector development in a country with substantial capacity for macro-economic policy analysis and program management. But neither the traditional program aid nor project aid instruments are fully effective in countries that have little financial or professional capacity for providing support for long term institution building efforts. New methods of combining the flexibility of program support, effective technical assistance, and sustained financial support for long term development efforts must be sought. One innovation that might be effectively used is for the donor community to move toward an approach in which the amount of external support is linked to growth in domestic support. This implies the development of a "formula" approach in which the size of donor contribution would be tied to the growth of domestic support. The formula should include an factor that adjusts the ratio of external to domestic support to take into account differences in domestic fiscal capacity.

An example of how such a system might work is presented in Table 1. In the model presented in the table, external donors agree to support a specific share of the national agricultural research budget. In the example the share declines from 40 percent for a country with low fiscal capacity to 10 percent for a country with high fiscal capacity. The amount of external assistance within each fiscal capacity group varies with the level of national resources that a particular country is willing to devote to agricultural research. The advantage and disadvantages of alternative models should be explored. One alternative would be a formula in which external donor support would be related to increments in national program support rather than to the absolute level of national support.

But how could such a system evolve out of the anarchy of existing bilateral and multilateral assistance programs? For such a program to be most effective it would be desirable for the donor community to put its resources in support of national agricultural research systems into a common fund to be administered by an existing international agency (World Bank, UNDP, FAO) or establish a consortium similar to the Consultative Group on International Agricultural Research to administer such a program.

Country-Level Research Support Group^{4/}

A second alternative might take its lead from the experience now accumulated with the CGIAR model. To form and operate a country-level Research Support Group (RSG) will require close liaison between the host country and aid agencies and improved levels of collaboration among donors. To function, the group will need to have available to it a relatively long-

^{4/} This section draws directly from ISNAR (1983).

TABLE 1. ILLUSTRATION OF A FUNDING MODEL FOR AGRICULTURAL RESEARCH SUPPORT

National Fiscal Capacity	Program Support and Assistance Level (in millions of U.S. \$)					
	Low		Medium		High	
	National Support	Donor Assistance	National Support	Donor Assistance	National Support	Donor Assistance
Low (40% Assistance)	20	8	50	20	100	40
Medium (20% Assistance)	20	4	50	10	100	20
High (10% Assistance)	20	2	50	5	100	10

term program for the development and operation of the national agricultural research system. To produce and continuously update this program, the national research system may require external assistance, but in general the program should be the product of indigenous experts in agricultural science and development. Its focus, to help protect the program from vagaries of political change would be on long-term agricultural research needs and goals and on the incremental steps required for implementation.

It is expected that the long-term program development and the priority setting would be done through an interactive process with the RSG. Once the program has been accepted, donor members of the KSG, it is hoped, would collectively agree with the host country to help provide the components essential to the execution of the program as a whole. The host country, in turn, would assume the responsibility from moving its national research program along the agreed upon development path. Initial commitments might be for three to five years subject to annual review and course corrections suggested by the analysis and feedback from actual experience.

Use of an institution such as a RSG has the potential of helping the country involved avoid many of the pitfalls of the project mode while retaining several of its desired attributes. Donor identity could be retained by relating grants to components of the agreed-upon over-all program. These could even be called projects if, for administrative purposes, it were so desired. Donor-recipient negotiations, most of which would take place at the group level, would have content and quality. For the RSG, like the CGIAR, would likely involve bilateral grants developed in the framework provided by the forum of multiple donors and the host country. The impersonal

process of contributing to a common fund is not envisioned. However, this would not preclude "incentive funding" of a formula type. At the same time, the danger that a single donor would dominate the priority-setting process or that essential program components would be ignored would be minimized.

It also has several other potential advantages. (a) It would contribute to building a national constituency by focusing from the onset on this essential ingredient for viability. The donors, for example, might agree to increase their contributions by some fraction of the rise that occurred in the real support provided by the nation involved. Or other matching provisions might be agreed upon to provide incentives for nurturing and cultivating national constituencies. (b) It would provide reasonable continuity in support (commitments would be fairly long term; subject to review and extension well in advance of termination dates) with less risk of the excessive program fragmentation frequently associated with narrowly defined project funding. (c) It would reduce the administrative and management load on the host country through the planning and review process the RSG would follow. (d) It would place donors in a position of genuinely complementing and supplementing one another and the national program rather than needlessly competing for "good investment opportunities."

Fundamentally, success in the use of the research support group approach would require that all parties involved be open to learning by doing. The fact that such a support mode is often discussed but little used is evidence that implementation is not a simple, trouble-free task. The method is, however, being used successfully in Bangladesh and somewhat more informally, in several other countries. An important element in its success in Bangladesh is that the Development Support Group meetings are chaired by the Director

of the Bangladesh Agricultural Research Council rather than by a donor representative.

Other options should also be examined. A partial approach toward the principles suggested in this section is implicit in the World Bank practice of making project loans within the framework of a program development plan. Program reform or performance then becomes an important consideration in the negotiations for support beyond the initial loan period. At the USAID, internal discussion is focusing on the development of "common theme" regional approaches to the transfer of technology and the development of institutional capacity. One objective of the proposed approach is to achieve sufficient agreement on regional priorities to overcome the tendency for each new mission director or program officer to impose his/her personality on program priorities and objectives.

A dialogue on donor assistance to national agricultural research programs was initiated at a meeting called by the World Bank in 1981. The dialog has been continued by ISNAR in a series of meetings with directors of national agricultural research systems. It is imperative that these dialogues be continued. The issue of reform of agricultural assistance should be recognized as one of the most urgent items on the agenda.

Some Qualifications

Opposition to these or other proposed reforms in the method of supporting national agricultural development support can be expected from a number of sources.

Policy level opposition can be expected from the foreign affairs ministries of the developed countries. In the case of the U.S., the State Department could be expected to be unhappy about the loss of discretion to direct agricultural development support to or from strategically important countries--toward Egypt and Pakistan--and away from Nicaragua and India for example. This objection might be muted in the case of a formula funding experiment that included only a relatively low ticket ^{item}~~time~~ such as agricultural research rather than the total agricultural development support budget.

Bureaucratic objections to formula funding approach could be expected from the staff of the assistance agencies. Transfer of funds on a formula basis would be much less intensive in its demands on aid agency administrative and professional resources than the present system. The use of technical assistance personnel from DC universities and consulting firms would also decline as LDC agricultural development agencies substituted lower cost domestic personnel for "tied" technical assistance staff. Even in countries where technical assistance personnel outnumbered local counterparts, technical assistance personnel rarely regard their presence as counterproductive. One of the advantages of the Research Support Group (RSG) approach is that it would probably be more acceptable to the development assistance bureaucracies.

Donor legislative bodies might object that the formula funding approach looks like an "open checkbook" activity with little donor control over program level of content. A partial answer to this objection is that the program would encourage more intensive internal program review as the level of national resources devoted to the program rises. A second answer is that donor representatives should focus their attention on national research strategy and policy rather than on the details of program management. A regular schedule of reviews of policy, strategy and impact such as that proposed in the Research Support Group (RSG) approach might remove some of this criticism.

One might also expect opposition to any reform that transfers program decisions from donors to recipients from the aid constituencies in the developed countries. The aid constituencies typically have their own reform agendas which they would like to see national aid agencies impose on recipient countries.

With this kind of opposition what does the reform proposal have going for it? My response is nothing more than the development of agricultural research institutions that develop the capacity to achieve political and economic viability within their domestic political-economic system.

Table A1.

Foreign Aid Budget by Category, FY 70-85
(outlays, millions of dollars)

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982¹</u>	<u>1983¹</u>	<u>1984¹</u>	<u>1985¹</u>
I. Economic and Financial Assistance																
Multilateral Assistance																
International Financial Institutions/Multilateral Development Banks	224	201	276	324	446	569	902	875	858	683	784	955	1,109	1,253	1,366	1,316
International Organizations	<u>113</u>	<u>129</u>	<u>196</u>	<u>186</u>	<u>168</u>	<u>115</u>	<u>143</u>	<u>250</u>	<u>230</u>	<u>199</u>	<u>243</u>	<u>336</u>	<u>250</u>	<u>224</u>	<u>233</u>	<u>238</u>
Subtotal: Multilateral Assistance	337	330	472	510	614	684	1,045	1,125	1,088	882	1,027	1,291	1,359	1,477	1,599	1,554
Non-Military Bilateral Assistance																
Bilateral Development Assistance																
Development Assistance (AID)	1,040	1,087	926	837	863	940	1,001	976	1,007	1,175	1,366	1,544	1,605	1,720	1,768	1,818
Public Law 480 - Food Aid	937	918	993	754	639	936	693	850	808	976	1,073	1,254	1,141	1,023	1,004	988
Peace Corps	90	89	77	74	81	86	69	87	87	94	101	99	105	95	98	98
Bilateral Strategic Assistance																
Economic Support Fund/ Security Support Assistance/Peacekeeping Operations	485	460	717	645	382	396	601	1,062	1,908	1,755	1,904	2,082	2,471	2,737	2,973	2,976
Refugee Assistance Indochina Post-War Reconstruction Assistance	--	--	--	--	43	76	42	--	75	166	466	384	465	455	436	395
Subtotal: Non-Military Bilateral Assistance	2,552	2,554	2,713	2,310	2,254	2,930	2,471	2,975	3,885	4,166	4,910	5,363	5,787	6,038	6,279	6,275
Offsetting Receipts/Other	<u>-14</u>	<u>-72</u>	<u>-7</u>	<u>-257</u>	<u>-128</u>	<u>-55</u>	<u>-301</u>	<u>-366</u>	<u>-345</u>	<u>-304</u>	<u>-311</u>	<u>-357</u>	<u>-398</u>	<u>-451</u>	<u>-476</u>	<u>-494</u>
Subtotal, Economic and Financial Assistance	2,875	2,812	3,178	2,563	2,740	3,559	3,215	3,734	4,628	4,744	5,626	6,297	6,748	7,064	7,402	7,335

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u> ¹	<u>1983</u> ¹	<u>1984</u> ¹	<u>1985</u> ¹
II. Military Assistance																
Grant Military Assistance	548	510	563	485	460	556	367	209	169	140	219	228	317	203	137	124
Foreign Military Training	--	--	--	--	--	--	--	25	22	28	26	22	40	50	51	51
Foreign Military Credit Sales	61	520	216	356	406	247	280	570	570	640	644	507	755	913	1,363	1,653
Military Assistance: South Vietnam	--	--	--	--	--	402	--	--	--	--	--	--	--	--	--	--
Emergency Security Assistance/ Relocation of Facilities: Israel	--	--	--	--	640	930	--	--	--	31	341	--	--	--	--	--
Offsetting Receipts/ Other	-16	-35	-60	24	-195	-256	454	-311	-277	-276	-355	292	-97	-67	-29	-19
Subtotal, Military Assistance	593	995	719	865	1,312	1,879	1,101	494	484	563	875	1,049	1,015	1,099	1,527	1,811
TOTAL FOREIGN AID	3,468	3,807	3,897	3,428	4,052	5,438	4,316	4,228	5,112	5,307	6,501	7,346	7,763	8,163	8,924	9,146

¹ Estimates

Source: Budget of the U.S. Government, Fiscal Year 1972-Fiscal Year 1983.

Foreign Aid Budget by Category; FY 70-85
(outlays, as percentage of total)

	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u> ¹	<u>1983</u> ¹	<u>1984</u> ¹	<u>1985</u> ¹
Multilateral Assistance	9.7	8.7	12.1	14.3	15.2	12.6	24.2	26.6	21.3	16.6	15.8	17.6	17.5	18.1	17.9	17.0
Non-Military Bilateral Assistance																
Development Assistance	30.0	28.6	23.8	24.4	21.3	17.3	23.2	23.1	19.7	22.1	21.0	21.0	20.7	21.1	19.8	19.6
Food Aid	27.0	24.1	25.5	22.0	15.4	17.2	16.1	20.1	15.8	18.4	16.5	17.1	14.7	12.6	11.3	10.8
Economic Support Fund	14.0	12.1	18.4	18.8	9.4	7.3	13.9	25.1	37.3	33.1	29.3	28.3	31.8	33.5	33.3	32.5
Other	2.6	2.0	2.0	2.2	9.1	12.1	4.1	2.1	3.2	4.9	8.7	6.6	7.3	6.8	6.0	3.4
Military Assistance	<u>17.1</u>	<u>26.1</u>	<u>18.5</u>	<u>25.2</u>	<u>32.4</u>	<u>34.6</u>	<u>25.5</u>	<u>11.7</u>	<u>9.5</u>	<u>10.6</u>	<u>13.5</u>	<u>14.3</u>	<u>13.1</u>	<u>13.5</u>	<u>17.1</u>	<u>19.8</u>
TOTAL ²	100.4	101.6	100.3	107.5	103.2	101.1	107.0	108.7	106.8	105.7	104.8	104.9	105.1	105.6	105.4	105.4

¹ Estimates

² Totals exceed 100% because of offsetting receipts to economic and financial assistance and because of rounding.

Source: Budget of the U.S. Government, Fiscal Year 1972-Fiscal Year 1983.

References

- Ardila, Jorge, Eduardo Trigo and Martin Pineiro, "Los Recursos Humanos in la Investigacion Agropecuaria: Tres Casos En America Latina," Desarrollo Rural in Los Americas 12 (Septembre-Diciembre, 1980): 233-258.
- Cardwell, Vernon, James C. Moomaw, and Vernon W. Ruttan, Agricultural Research in Indonesia, (St. Paul: University of Minnesota Economic Development Center Bulletin No. 81-1, March 1981).
- Faaland, Just, Aid and Influence: The Case of Bangladesh (New York: St. Martins Press, 1982).
- Hambridge, Grove, The Story of the FAO (New York: Von Nastrand, 1955).
- Independent Commission on International Development Issues (The Brandt Report), North-South: A Program for Survival (Cambridge, Massachusetts: The MIT Press, 1980).
- International Service for National Agricultural Research, ISNAR, Improving the Global System of Support for National Agricultural Research in Developing Countries (The Hague, Netherlands: September 1983, mimeo draft).
- Judd, M. Ann, James K. Boyce and Robert E. Evenson, "Investing in Agricultural Supply" (New Haven, Yale University Economic Growth Center, February 1982).
- Krueger, Anne O. and Vernon W. Ruttan (eds.), The Impact of Development Assistance (St. Paul: University of Minnesota Economic Development Center, March 1983).
- Presidential Commission on World Hunger, Overcoming World Hunger: The Challenge Ahead (Washington, D.C.: U.S. Government Printing Office, 1980).
- Ruttan, Vernon W., Agricultural Research Policy (Minneapolis: University of Minnesota Press, 1982).
- Salmon, David, Congruence of Agricultural Research in Indonesia, 1974-1978 (St. Paul: University of Minnesota Economic Development Center Bulletin No. 83-1, January 1983).

ASIAN AGRICULTURAL RESEARCH REVIEW PROJECT REPORTS

UM/EDC Bulletins

- 81-1 Vernon Cardwell, James C. Moomaw, Vernon W. Ruttan,
"Agricultural Research in Indonesia" (March 1981)
- 81-2 Vernon W. Ruttan, "The Asia Bureau Agricultural
Research Review" (March 1981)
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V. W. Ruttan, "A Rejoinder" (1982)

Other Reports

UM/EDC REPORT, Carl E. Pray, "Private Agricultural Research in
1980/82 Asia, " pp. 14-27.