WORLDWIDE RESEARCH NETWORK
1971-

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : TA/SSS, Mr. Alex Daspit **DATE:** May 24, 1971

FROM : AFR/TAC, Marjorie S. Belcher MSB

SUBJECT: Tentative Action Program - Worldwide Network for Agricultural Research

My principal comments on the tentative action program concern the proposed three day meeting on priorities, the consultant for joint-surveys, the mini review, and the need for close coordination between this and other KPA task forces. If we get these straight, it seems to me that next steps will evolve. I am, therefore, confining my comments to part I of the program. This does not mean that I buy everything in the subsequent sections of the tentative program.

1. I agree with the discussions at the task force meeting last week that this paper, much more than most, is really setting a course of action for the agency with respect to the network for agricultural research. It is important, therefore, that the TA Executive Committee approve the approach which the paper outlines before work on the actions which it recommends gets too far along. This is of sufficient importance to justify a special meeting of the TAEC if time does not permit getting the paper to the June 9 meeting. In any case, the paper deserves TAEC discussion, not simply circulation to members.

   This need not delay getting down to work, since I agree with the outcome of the discussion last week that there needs to be a good deal of work in-house on priority areas for agricultural research before any outside group is invited to consider the problem. I agree with Jim Blume that outside groups are better for "bouncing proposals against" than for doing the initial work. (I question the formal meeting on improving agriculture curricula (II-3) for the same reason.) It seems to me that we need two actions. The first would be assigning someone to pull together everything that has been done in the recent past to list priorities for agricultural research related to LDC's and to prepare some kind of consolidated list. At the same time geographic office and TA/AGF need to be putting together their own list of agricultural problems which are urgent and researchable, preferably ranked in two or three priority groups. This is no mean task and I suspect it will be late July at the very earliest before any kind of consolidated list could be available for review by an outside group. I doubt that such a review needs three days, provided the paper is available to the outsiders in sufficient time before the meeting for careful review.

2. I am dubious about a consultant to review and assess AID experience with "joint surveys" of agricultural organization and personnel in LDC's. Perhaps this is because I do not understand what such a consultant would do. This points again to the need for considerable in-house work to identify the pieces of experience to be reviewed and develop a scope of work for a consultant or consultant team to review. I have serious reservations about stimulating invitations for such joint surveys. (Item II-3)

3. I am out of touch with preparations for the mini review of AID's contribution to research competence and strengthening of agricultural universities and ministries of agriculture, beyond the fact that such a review is planned.

   If this job is to be done adequately, it seems to me major rather than mini and I would think that the KPA task force need to be involved in preparations. I suspect that the reasons for successes and failures are largely country specific and that it will take a good deal of effort to distill principles which can provide general guidance. Much of this should be done prior to the review if the review itself is to be valuable.

4. We talked at the meeting last week about the importance of tying the work of this KPA task force to that of the other task forces in agriculture. There are also definite connections between this and what the Education people are doing with respect to the role of universities in development. Moreover a good deal of the work in Science and Technology gets back to agriculture, since this is the main area in which science and technology have the most "relevance" for most LDC's. Coordination with other groups as work progresses is even more essential in this area than in some others.

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Memorandum

TO : TA/SSS, Mr. Alex Daspit

DATE: May 24, 1971

FROM : AFR/TAC, Marjorie S. Belcher

SUBJECT: Your Paper on the Worldwide Network for Agricultural Research

This memorandum gives my comments on your paper and the abstract of it. It does not cover some of the more fundamental points discussed at the meeting on May 20. My comments on the proposed work program will follow as soon as possible.

(1) The multidisciplinary approach should be emphasized throughout. For example, I would broaden the phrase "various disciplines of agricultural science" in the first paragraph on page one. The same applies to the references to agricultural scientists on page five, para A-1.

(2) The concept of the full network including LDC institutions and getting information to farmers should also be constantly stressed. A.I.D. has a role in this beyond participation in the consultative group. I would modify the last sentence of the first paragraph on page three accordingly.

(3) I agree with Jim Blume's additions to the criteria on page seven of "Can you state and define the problem" and "Is the problem researchable?"

(4) The references to LDCs becoming equal or almost equal partners bothers me. It is okay as a long term goal but in the shorter run, I suspect they should become partners, although, perhaps not quite equal. Spelling out the LDC primary functions in the partnership along the lines discussed at the meeting might solve this problem (adaptation and field trials, getting results to farmers, marketing, pricing and other economic questions). Training also deserves emphasis here. (Page eight, para two).

(5) The comments on training under para one, page 12 seem to me a little rigid. It will be years before many LDCs can provide undergraduate university training for agricultural scientists, much less MS level. This may be as good a point as any to suggest that the idea of groups of LDCs and cooperation among LDCs needs to be built in. BAs agricultural training in a neighboring LDC rather than in a developed country is a foreseeable and desirable goal.

(6) Para three, page three. While accepting Hill's point in the quotation contained in that paragraph, there is much more to management of agricultural research than the question of selecting priority problems for attention. The need for training in research management is real. (Incidentally, doesn't Hill fall into the trap of equating agriculture and food production?)

(7) If a review of A.I.D.'s experience in building, training and research capacity is to be undertaken, at least three points need to be remembered: (a) research capacity need not necessarily be in universities. This is the U.S. pattern but need not be that of an LDC, (b) training must cover more than university level - research technicians and lab assistants could be products of non-university post secondary education or even less and (c) other parts of TAB (EHR, OST) are undertaking related exercises. Coordination is needed.

(8) I question the desirability of the joint survey proposed in para four, page 15. If it is decided to undertake it, the points made above apply, particularly to 4b. I am doubtful that A.I.D. can do much (except in selected countries and in country situation) to recommend or undertake measures to meet personnel requirements for in-country research. LDC cooperation mentioned in point five applies here.

(9) I would avoid identifying countries in point five, page 15. Application will depend on the situation at the time conclusions are available.

(10) The suggestion of stimulating requests for joint surveys (point six, page 15) raises a fundamental issue of relationship of KPA activities to country program priorities. At a minimum, I would add "where this is an appropriate element of the A.I.D. program in the particular country."

(11) I wonder if international conferences should be quite as clearly designated as the best means of encouraging cooperation. The NAS workshops sponsored by TA/OST are another (although limited to single countries). AAASA is another, international research institute workshops are still a third; there are others.

(12) Para V, page 17. Has it really been a "minimum investment of money and manpower". I suspect that it has been substantial.

(13) I would substantially revise the last part of the middle paragraph on page 18. The French would rightly insist that the various institutes in francophone Africa are not "field staff" but cooperating country owned stations in a network. The U.K. has

much more research on tropical agriculture that the Tropical Products Institute, e.g. the center for desert locusts.

(14) I would avoid the phase "modeled on those already existing" para five on page 20 since I think the international institutes are and should be varied in structure and the structure of any one should evolve our time as functions change.

(15) I think you overstate the scope of NAS study of agricultural research in Africa. It is intended to provide guidelines both as to priorities for research and the research system. It will by no means "rationalize" the research efforts in Africa, nor does it make any assumption on available external resources.

Turning to the abstract:

(1) Page two, para four last sentence. Shouldn't this sentence include the idea that LDCs individually and collectively are short on some of these ingredients.

(2) Page six, top of page. Again the "equal partners" idea. See point four above.

(3) Page seven. Need cooperation in research be cooperative only among continguous countries? Others, in addition to FAO and the institutes can facilitate cooperation. Again seminars are not the only route.

May I reiterate that I think the paper and the abstract are very close to being acceptable as a guideline for Agency policy in this difficult area.

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Memorandum

TO : TA/SSS, Mr. Alex Daspit DATE: May 24, 1971

FROM : NESA/TECH, James M. Blume JMB

SUBJECT: Proposed June-July meeting of advisors on agricultural research priorities

This memorandum deals with the first item on your Tentative Action Program distributed on May 20 and is a continuation of my remarks in the Key Problem Area meeting.

To repeat my earlier remarks, I believe a panel of outside experts is most useful when it is asked to consider and advise on well defined problems and proposals. I think RAC is a good example of how useful this kind of referral can be. I don't believe you get nearly as much return from the experts if you refer to them general problems or ill-defined problems.

It is true that the former processing requires more in-house staff work prior to use of the consultants, but I don't think the requirements are insurmountable. It seems to me that AID needs to place before this panel two types of information:

1. Criteria for research project selection.

   You have already made a good start on this one.

2. A listing and description of the various lines of research activity which are being proposed for priority status.

   (a) This should start with the major lines of research already being supported by AID, the foundations, other donors, etc. I would do this on a subject matter basis; rice, corn, land tenure, etc. It will not need elaborate descriptions but it should provide some estimate of importance.

   (b) List and describe the new activities proposed through the Bellagio conferences.

   (c) List and describe all other new activities which are seriously being proposed by anyone within AID.

In my judgment, the activity descriptions proposed for (b) and (c) should describe the specific problems addressed and should contain the

arguments as to why the subject enjoys research priority. One way to structure the presentation would be to address the criteria in your paper (or some modification of that particular list). It seems to me that in dealing with the questions of whether a problem was researchable, how long it would take, cost/benefit estimates, etc., the presentation would flush out some very useful advice from the panel on how to structure a project, in addition to the advice we want on priorities.

cc: AA/TA, SButterfield
AFR/TAC, MBelcher
EA/TECH, FLeBeau
TA/AG, LWitt
TA/AGF, MLCox

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UNITED STATES GOVERNMENT

Memorandum

Cof

TO : TA/SSS A. B. Daspit DATE: 5/17/71

FROM : TA/AGF L. W. Witt LWW

SUBJECT: KPA Task Force on World Wide Research Network

Since a conflicting meeting will limit my participation in the meeting of May 20, these notes are sent to you.

In general this is a fine paper, much more pointed in its action phases, and with an appropriate broad perspective. I suggest a few changes, which will indicate a couple points of differences in shades of view.

On page two last paragraph, in line 2 change three to four. Rewrite c and add d as follows: c) some scientists of the advanced countries work on problems relevant to the developing countries, and d) linkages whereby people associated with b) and c) work with a) the scientists of the developing countries in joint development of data, materials and insights.

On page 3 last sentence of the first paragraph gives too much initiative away, in my view. Rewrite. But the Agency's role in the formal linkages will not be primary; the initiative now lies with the World Bank, and, to a lesser extent, the FAO. The Agency's role, however, can be very important in mobilizing resources and supporting the less formal linkages of individual scientists.

These linkages can complement the centers, provide leads for new centers or new programs for existing centers, or, most importantly, carry forward activities that will not function effectively under the center framework.

On page 6 line 5 I would suggest a more realistic and less ambitious goal, such as "a - percent increase over the present", or "a 20% increase in the number of people with an adequate nutritional balance," Even this is difficult because we know less than we should about the minimums, and the goals are unclear - sufficient to maintain life and reproductions, a population not suffering from major nutritional deficiencies, or a sprightly people filled with the "joy of living".

On page 21 line 5, add "and joint efforts to develop new knowledge and insights". This change is a little cumbersome in view of line 3.

On page 29 paragraph 2 line 7 - I believe adoptive should be adaptive.

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Memorandum

TO : TA/SSS, Mr. Alex Daspit **DATE:** February 10, 1971

FROM : AFR/TAC, Marjorie S. ~~Belcher~~ B

SUBJECT: FAO Data Bank on Agricultural Research

I talked briefly about the FAO's plans for a worldwide data bank on agricultural research with Devred of the FAO Agricultural Research Unit on Friday. This proposal is not new, but has been proposed by Devred and others in FAO for at least five years. Devred promised to send me the latest version of the proposal which is contained in a paper which O. Wells presented to Bellagio III about a year ago. It is also mentioned briefly in Devred's paper for the Abidjan Conference on Agricultural Research Priorities in Africa in 1968 and in the paper on agricultural research prepared by FAO for the FAO African Regional Conference in Algiers in the fall of 1970.

As I understand it, Devred wants to computerize current research in agricultural problems and in the first phase to collect information on the subject of research, name of the principal researcher, location of the work, whether the results have been published and where they are available, and some material about the ecological conditions in which the research is being done. He would hope to bring this information up to date about every three years. In a second phase, he would hope to include more data in the index. He plans to concentrate upon present projects. Past research will be included only as it turns up in collecting data on what is now going on.

Incidentally, Devred says that he has in his office the published research works from INEAC in the Congo and that he has sent a microfilm of the full set to Albrecht at IITA. He is concerned at what is happening to the material collected by the old CCTA and turned over to the OAU (STRC) Publications Bureau which has now closed its doors leaving the material to gather dust.

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Memorandum

TO : TA/SSS, Mr. Alex Daspit

DATE: March 3, 1971

FROM : AFR/TAC, Marjorie S. Belcher MSB

SUBJECT: Linkages in Agricultural Research

"Linkage" is rapidly becoming another of those words which is used too frequently and means different things to different people. We might better talk about cooperation and collaboration in the planning and execution of research. The objective should be that each research project belongs to an institution in the developing country (university, government or other) to a sufficient extent that they will see the results as their own, use them in future planning and be left with a nucleus to carry on and keep up to date the work undertaken in the research project. This requires much more than an individual research worker in an LDC cooperating with an individual or institution in the U.S. or another developed country. It makes research projects harder to develop and carry out, but the pay off is much higher. It is essential that this approach be adopted if research is to continue in the current situation in which (as least in Africa) developing countries are no longer willing to be the laboratories of researchers from developed countries. While the need for such an approach is most urgent with respect to social science research, the principles should apply to physical science research as well.

There are many ways of accomplishing this kind of cooperation and collaboration. Association with a university or research institution on one or more developing countries is one. The work of IITA in assembling African agricultural scientists concerned with a particular research problem in the early stages of the operation of the institute in order to plan the work which needs to be done centrally and relate it to what other research workers and institutes are doing is another. The stress on a collaborative research program for the proposed Livestock Development Institute in Tropical Africa is another example. The important thing is that the collaboration begin with the planning of the research program and NOT consist solely, or even primarily, of a series of field laboratories and testing plots.

This approach to "linkages" would lead, it seems to me, to a reorganization of your outline of a strategy for approaching the KPA of agricultural research by starting with the LDCs, going on to the international institutes (which are in themselves a type of linkage) and then discussing research in the U.S. It leads, I think, to the fact that the development of such linkages and the various approaches to the cooperation and collaboration which is sought is one of the major tasks which must be undertaken in this KPA.

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The need for linkages among agricultural research workers and institutions in LDCs (both within a country, in a geographic region and between regions) is another piece of this KPA which need much more work. While the cooperation and collaboration which I have suggested above will contribute to the strengthening of the research capacity of individual LDCs and the linkages among them, it is not enough. Regional organizations, institutions and associations in LDCs is another piece of the puzzle and I would welcome some work in this area, beginning perhaps with a simple compilation of the various ways in which LDC research workers in a particular subject exchange results of their research. The subject matter workshops and conferences of the international research institutes are one approach. The periodic conferences sponsored by FAO and others are another which I suspect are less effective but I would welcome being proved wrong on this point. Professional associations either of institutions or individuals are another and one which experience with the Association for the Advancement of Agricultural Science in Africa has proved to be fraught with difficulties. The FAO's plans for a documentation center in agricultural research comes in this context but I very much doubt that circulation of printed information can ever be as effective as face-to-face meetings.

There are two distinct types of regional projects both of which have a role in providing linkages. There are those which are regional only because the outside organization works in two or more countries. These are convenient, and in themselves provide for some exchange of information but should, I believe, be thought of primarily as a device and not something to be encouraged. Genuine cooperation by one or more countries in approaching a particular problem with or without external assistance leads to a very different type of regional project and one which should be encouraged even though success is hard to accomplish. The East African agricultural research organizations are one example, the institutes in Francophone West and Central Africa are another, which may turn out to be a success story as the links between stations of the same organization become more lateral and less through Paris. Attacks on a problem which does not respect national boundaries (rinderpest, locusts) lead to another type of regional cooperation and one which has thus far been the most successful and in which the genuine cooperation among neighboring countries should not be overshadowed by the extent of external encouragement in the early stages.

The expansion and clarification of the points raised in this memorandum and others which I am sure will emerge in discussions of redrafts of the paper are I believe an important job for this task force.

Has always been indispensable

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Memorandum

TO : TA/SSS, Mr. Alex Daspit DATE: March 2, 1971

FROM : NESA/TECH, James M. Blume

SUBJECT: Linkages in Agricultural Research

I have had an opportunity to read Marjorie Belcher's memo in draft and wish to associate myself with her comments.

In addition, I would like to see a bit more attention paid to the development of linkages among scientists and institutions within an LDC and among LDC's. There are various in which donors can encourage and assist this kind of linkage. For example, donors can:

(a) Provide support for workshops and other meetings.

(b) Provide support for standardized research activities, including compilation and distribution of data.

(c) Provide support for travel (Asian travelling seminar).

cc: AFR/TAC, MBelcher

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UNITED STATES GOVERNMENT

Memorandum

TO : TA/SSS Alex Daspit DATE: 3/24/71

FROM : TA/AGF Lawrence Witt L. W.

SUBJECT: Linkages - the short statement requested at our March 1 meeting.

this is not the case.

I assume that any non-fraudulent use of the term "linkages" means intellectual interaction with professional colleagues abroad and through them with institutions which have direct and continuing interest in the research under consideration. It means that there must be enough interaction so that the several people involved develop mutual respect, common interests, and a desire to work collaboratively. Such characteristics will develop more easily if each national party or group has some independent funding to contribute to the joint effort. But even more important, interaction must begin with the planning of the research program - the specifics of the problem that is being studied, the research hypotheses that are to be tested, and the division of labor among the several parties.

should lead to a successful linkage if necessary

strictly academic

In fact, the interaction should begin long before the problem and the projects are identified, in seminars, friendly discussions, in classrooms, as participants in regional or international conferences. These interactions may ripen into friendships. In any case some of these interactions should lead to a desire to work together on a problem, and are likely to lead to collaborative effort with enthusiam and pride in a joint product (and probably certain individual products on both sides).

However, current procedures do not facilitate this process. Most international conferences are tightly scheduled, and frequently do not bring together the people likely to have common research interests. AID funded research generally requires specification of methodologically sound procedures prior to funding - which requires that the senior American scholar put together something he can sell both to AID and to prospective counterparts. Unless he is very skillful and already experienced in the area he tends to be forced to find a customer or seduce his prospective colleagues into accepting the agreed upon priorities.

The 211(d) grant can contribute to a more deliberative and joint proposal, provided the funding of the grant is sufficiently large, or, alternatively, the fact of the grant does not constitute a

reason for not making a contract. The ADC seminars can make a contribution, under the proposed amendment to support international travel for host country professionals, but if the above purpose is to be served the schedule should be more leisurely. In any case the ADC seminars have a primary focus upon the rural social scientists. Another possible procedure would be the use of pre-project planning grants, say $5,000 to $10,000, to support exploratory discussions, and joint planning of research projects when and if a proposal is made which appears relevant and important. The pre-planning grant would lead to a project only when certain specifications were satisfied, such as a joint project, financial support in the host country, competent staff on both sides, host country and mission enthusiastic concurrence.

There are roles in this process for international agencies, regional organizations, host country participation in setting priorities, assistance in funding, etc. If we are serious about linkages, AID also must be prepared with some fairly simple procedures to facilitate the development of such linkages.

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UNITED STATES GOVERNMENT

Memorandum

TO : TA/SSS, Mr. Alex B. Daspit
Room 2941 NS

DATE: March 8, 1971

FROM : EA/TECH/AGR, F. J. LeBeau
Room 3316A NS

SUBJECT: Your Request for Comment on "Linkages" in Agriculture Research

I do not have any problem with the examples of "Linkages" mentioned in the paper which we had for discussion at the Task Force meeting on February 23rd other than to reiterate an observation made at the meeting that the biological and physical sciences, as well as economics, should be considered in your items 2, 3 and 4. These are all useful, however, they do not go far enough.

As I see it research for the LDC by the developed countries can reach only the more or less fundamental problems. This research provides information, but rarely does it lead to a useful package of technology for any given locality. The latter must be developed in each specific locality (localities can be small or large--depending upon the specific element). It also follows that this must largely be done by LDC institutions themselves with or without assistance from the outside.

Since the ultimate objective is useful technology in the broadest sense, it would seem that the planning of research and development of research projects must be done within the context of research institutions in the LDC which are willing and able (ability may be dependent upon getting some outside help) to participate in the project. Active participation of these institutions in planning as well as execution of projects is also a necessary element. In this way, not only is a greater degree of relevance assured and the likelihood of eventual application of useful outcomes of research favored, but also the ability of LDC institutions to cope with the research needs of their respective countries or localities is enhanced. This can happen only if the LDC institution accepts a project as its own and is willing to commit resources to it. It will not happen if the project is of an external institution and the LDC institution simply "cooperates".

Just how to go about involving LDC institutions in this process of providing homes for the research which we recognize as being so badly needed is perhaps the most important single element of developing a strategy for AID sponsored research and should be the principal task of our task force.

cc:
NESA/TECH, James M. Blume
AFR/TAC, Marjorie S. Belcher
LA/DR, Joseph E. Walker

WORLD-WIDE NETWORK FOR AGRICULTURAL RESEARCH

(ABSTRACT)

1. There are at least five factors which food policies of and for the developing countries must take into account: 1) the continuing increase in the demand for food created by the inexorable growth of population, 2) the further increase in demand resulting from the slow but steady rise of income in these countries, 3) the need in most developing countries for a better nutritional balance in the average diet; i.e., a higher proportion of protein, 4) the LDCs scarcity of foreign exchange and the diminished availability of food on concessional terms, which together make it imperative for them to meet increased requirements from indigenous production; 5) the agricultural sector should contribute to general economic development, by producing some surplus over domestic requirements.

2. These factors taken together indicate the need for an increase of at least four percent a year in food production in most of the developing countries, and for a significantly larger proportion of proteins.

3. In the past, most increases in food production have resulted from bringing new lands under cultivation. This possibility still exists in parts of the developing world, though the process will in many cases be difficult and expensive because of the need to create infrastructure and supporting services. In others, including some of the most densely populated countries, virtually all arable land is already under cultivation, and increases in production can be achieved only by increasing yields.

4. Experience has shown that the achievement of significant continuing increases in agricultural yeilds requires a continuing flow of new agricultural technology, and this in turn requires a sophisticated research apparatus including skilled workers in the various sub-disciplines of agricultural science; an effectively organized inter-disciplinary effort under forceful and imaginative leadership, and the assurance of adequate continuing financial support. Almost all the developing countries lack some of these essential ingredients.

5. Agricultural research in the developing countries has been handicapped most of all by the lack of skilled agricultural scientists. But this deficiency has been compounded by faulty organization, poor management and indifference on the part of government leaders obsessed by the chimera of industrial development. In the past few years, there has been a noticeable shift in attitude in some of the most populous developing countries, and agricultural development is receiving greater emphasis. But the kind of research establishment needed to support continuing agricultural growth cannot be created by forced-draft measures.

6. During the second half of the decade of the sixties, it was demonstrated conclusively that these shortcomings need not be an insuperable obstacle to the adoption by the LDCs of new agricultural technology. Research institutions established, led and largely staffed by the advanced countries, bred new varieties of wheat and rice which produced double the yield of traditional varieties. They were disease resistant, photo-insensitive, could be grown at varying altitudes and latitudes. Between 1965-66 and 1969-70, the area planted to the new cereal varieties increased from 41 <u>thousand</u> to 43.9 <u>million</u> acres. Yields of the new varieties,

when accompanied by appropriate inputs, were as much as 100 percent greater than those of traditional varieties.

7. These are impressive achievements, and demonstrate the great potential of a system designed to mobilize scientific skills and resources of the developed countries in support of agricultural development in the LDCs. But the results should not be exaggerated. Success has been restricted largely to two cereals, grown, for the most part, on irrigated lands where the water supply could be controlled; moreover, only about a dozen countries have planted the new varieties on a large scale, and in these countries the record is not one of unalloyed success. Moreover, the rate of increase in production achieved by these countries seems to be slowing down, as the limits of the optimum planting areas are reached. In 1970, land planted to the new varieties amounted to only about 10 percent of the cultivated area of non-Communist Asia--the continent where diffusion has been greatest; in other continents, the percentage is much smaller. The new varieties, important though they have been in meeting food requirements where the need was most acute, have not materially improved the lot of the farmers of the less developed world.

8. Further progress will require substantial additional research--both on means to increase food production, and on the problems which increased production creates. It is reasonable to conclude that:

a) the best way to get at this will be to build from the model which has already proved its worth--that is, to supplement the presently inadequate research establishments of the LDCs by concentrating a "critical mass" of scientific skills from the developed countries for an extended period on each of the main problems. The potential of this technique has only begun to be realized. What is required for a fuller realization of potential is

i. a substantial coordinated effort on the part of donor countries,

ii. intensified attention to agricultural research and production in and on the part of the LDCs and

iii. the linking of these elements in an effective system.

9. There has been increasing recognition of this requirement over the past few years, culminating in the agreement to establish the Consultative Group for the Long-Range Support of Agricultural Research under the aegis of the World Bank, which will be supported by a Technical Advisory Committee, with a secretariat provided by the FAO. The establishment of these institutions gives official form to the international network for agricultural research which has been gradually taking shape and provides a central coordinating mechanism for the system.

10. Before decisions can be taken concerning what additional problems the system should attack, some ordering of priorities for work in both the biological and social sciences will be ncesssary. There are multiple possibilities for research in both areas: very few crops have received the intensive, multi-disciplinary attention given wheat and rice; effective means for farming large parts of the world--e.g., the humid tropics and the rain-fed uplands-- have never been developed; there is much more to be learned about managing soils and water under varying conditions; the great bulk of the farm population of the less developed world are still untouched by the agricultural revolution; the problems of price policies, marketing, distribution, which become increasingly urgent as production mounts, have not been effectively dealt with; the social and economic problems of income distribution, employment, migration, etc., intensified

by rapid agricultural growth, have received scarce attention. All of these problems are important and could profit from research; but they cannot all be attacked simultaneously. A decision must be made as to which are most urgent and require attention first.

11. The United States, with its long experience in dealing with its own massive problems of agricultural growth and adjustment; its large body of highly trained agriculturalists and social scientists in the USDA, the Land Grant Universities, the Foundations, and in AID; plus its extensive experience with the agricultural problems of the developing countries, is qualified to develop a reasoned view as to the subjects which merit priority attention. AID should organize an effort directed toward this end as an early order of business (preferably in the summer of 1971). Experienced and highly qualified personnel of the various U.S. institutions active in LDC agriculture should be assembled for a few days and asked to seek agreement on a rough ordering of priorities. This exercise would reflect the knowledge and experience of the participants and their best judgment as to the probability that the efforts proposed would prove productive. The results of these deliberations would help guide U.S. representatives in the Consultative Group during 1971 and 1972, and help in planning AID's own program of assistance in agricultural research.

12. The operations of the research network will be useless unless the results find practical application in the developing countries. Although the network has been created in large part to help compensate for the inadequate research establishments of these countries, the LDC must have some degree of competence in order to use the knowledge and materials supplied from outside. The success of the international network

should be judged not merely by the extent to which it contributes to increasing food production in the developing countries, but also by the degree to which it succeeds in raising the research establishments of these countries to the level of equal partners in the international network.

13. There is ample room to improve cooperation among the developed countries in their work on the agricultural problems of the LDCs. Each of the donor countries has tended to conduct its LDC-oriented agricultural programs, including research, on an independent, self-contained basis. Each has inadequate knowledge of what fellow-donors have already done, or are currently doing, and none has made much of an effort to correct this situation. The FAO has formulated ambitious plans to compile a complete inventory of all agricultural research projects, but the effort is probably over-ambitious and certainly under-financed. In this area, also, it would seem that the plausible and economic procedure would be to determine the priority areas for research, and to concentrate on assembling information relevant to these priorities. There is another area in which the developed countries could cooperate to good effect. They have manpower, facilities, and resources to conduct fundamental research which provides the essential undergirding for the production-oriented efforts in which the international research institutes have specialized. As efforts of the latter sort are extended in accordance with agreed priorities, the donor countries can assist materially by cooperating in providing the fundamental research required.

14. The paragraph above has touched on cooperation or "linkages" among the developed countries. Actually, it is the links between the disparate elements involved in research on various aspects of LDC

agriculture which creates the network. There are internal links which need to be fostered in the developing countries; e.g., better communication between research workers and policy makers, and between Agricultural Universities doing research work, and the extension services responsible for getting the results of research into production. Increased cooperation in agricultural research among contiguous countries with common problems should be encouraged wherever possible, but with full recognition of the difficulty of maintaining sustained efforts which require financing by a number of LDCs. The FAO, and the international institutes for agricultural research can facilitate a degree of cooperation among such countries by conducting workshops and seminars and thus providing opportunities for scientists with similar interests to become acquainted and learn of the work others are doing in their field.

15. As noted, one of the main objectives of the international research network should be steadily to increase the research competence of the developing countries, so that they approach the status of equal partners in the system. To this end, the effort must be made to develop more trained scientists, to improve institutional competence, and to involve the developing countries increasingly in the whole range of research programs with which the network is concerned--from decisions on research priorities to the adaptation and application of results.

16. AID obviously will not attempt to dominate the international research network or control the Consultative Group. But it can play an important constructive role in the future, as it has in the past. The Agency was influential in the launching of the Consultative Group, and has helped persuade the international centers extend their "outreach" activities--an important element in the development of the network.

If the Agency utilized the substantial resources available in the United States to develop a comprehensive research strategy--what things need to be done first and what instrumentalities are best able to do them--it can reasonably expect to influence international developments and to improve the effectiveness of its own programs.

I. Elements of the International Research Network

In the years after World War II supplies of new arable land available for cultivation were virtually exhausted in some of the largest and most populous of the less developed countries while population growth rates climbed precipitously. An increase in yields of food crops was an imperative necessity, and, moreover, technically feasible, as some of the developed countries demonstrated by increasing production per hectare from 5 to 6 percent a year in the period 1940-1960. These increases were the result of improved technology; and this improved technology was the product of systematic, sustained and sophisticated research. Experience shows that research of this order is accomplished only when highly trained professionals in the various disciplines of agricultural science join in attacking defined problems, under competent direction and with assured financial support.

With a few notable exceptions, such as Israel and Taiwan, these elements were not present in adequate measure in the developing countries. If the increasingly critical food deficiency besetting some of them was to be met, it could only be from external sources. The PL 480 program provided a stop-gap solution and for a time obscured the dimensions of the problem, but by the time of the Indian crisis in 1965-67, it had become apparent that an enduring solution required a significant increase in crop yields within the developing countries. And since these countries lacked the resources of trained manpower and organization to produce for themselves the improved technology they required, and time seemed to be running out, it became imperative to find a short-cut.

The accelerated development of the international network for agricultural research is providing a response to this imperative. The work of

the Rockefeller Foundation in Mexico had demonstrated on a relatively limited scale in the 1950's that the agricultural scientists of the advanced countries could help develop agricultural technology appropriate to the LDCs. By great good fortune, two research institutions organized, administered, and financed by the Rockefeller and Ford Foundations and largely staffed by scientists of the advanced countries, had, at the time of the food crisis of 1965-67, already developed high-yielding varieties of wheat and rice which proved to be adaptable not only in India but over very wide areas of the less developed world. Dramatic increases in yields were achieved with these varieties in a number of countries--some of them with limited research capability. This demonstsration that outside skills could in considerable measure compensate for indigenous shortcomings clinched the case for the international research network.

Stated in the simplest terms the international network comprises three elements: a) some agricultural scientists and research institutions of the developing countries, b) some individual scientists and a relatively limited number of research institutions of the developed world concerned with the agricultural problems of the developing countries, (although they are located in and partly staffed by scientists of the LDCs, it seems proper to include the international institutes of agricultural research, such as IRRI and CIMMYT, in this category, since they owe their existence to the initiative of the Ford and Rockefeller Foundations and could not continue without the financial support of the Foundations and the Governments of some of the developed countries, and, probably also, the administrative leadership supplied by the Foundations), and c) linkages whereby the product of the scientists of the advanced countries are made available to individuals and institutions in the developing countries.

The concept of the international network, and of the important contribution that externally conducted research can make to agricultural growth in the developing countries has won acceptance and support at surprising speed and has now achieved the status of planned organization. This latter stage was signalized by the decision at the World Bank Meeting in January to proceed with the establishment of a Consultative Group and a Technical Advisory Committee to support international institutes for agricultural research. The developed countries have now resolved to cooperate in support of research on LDC food problems and the movement appears to have effective leadership and adequate monentum. AID has contributed to this development, and can continue to exert a constructive influence. But the Agency's role will not be primary; the initiative now lies with the World Bank and, to a lesser extent, the FAO.

II. Priorities in Research

The organization and method of operation of the network clearly should be a function of the job to be performed. A number of priorities have emerged as a natural outgrowth of the most obvious needs of the developing countries, and research institutions have been established specifically to deal with them. These are:

Rice	IRRI
Wheat and corn	CIMMYT
Food legumes	CIAT and IITA
Tropical root crops	CIAT and IITA
Beef and swine	CIAT

In addition, the two new tropical institutes, and particularly IITA, are working on the problems of continuous cropping systems for the humid

tropics, where the traditional pattern has limited the use of farm lands to only one year out of eight or ten, with the land going to bush for the rest of the time.

The items listed above are all fairly obvious choices for agricultural research by the international network; determining what additional priorities should be set becomes more difficult. A comprehensive list of matters meriting research was compiled by participants in the Bellagio Conference on Agricultural Development in 1970, with the caveat that the list was tentative and with no indication of relative priorities. This list is presented as Annex A.

Another comprehensive review of the research requirements of the LDCs is provided by the FAO in a paper prepared for the World Bank meeting referred to above. This paper is attached at Annex B. It is somewhat more selective in its designation of priorities for biological research, but widens the total area of concern by introducing "a problem of surpassing importance--creating additional rural employment opportunities."

The Technical Advisory Committee which will serve as an adjunct to the World Bank Consultative Group on Long Range Support for Agricultural Research is clearly intended to assess the state of knowledge of various subjects important to further agricultural growth in the developing countries, and to advise the Consultative Group concerning what additional initiatives should be undertaken. The United States has never attempted to consider this problem of priorities on a systematic basis, and yet it is clear that considering the total knowledge and experience of AID, the USDA, the Foundations and the Land Grant Universities, this country is pre-eminently qualified to do the job. Furthermore, if the United States is to participate effectively in the work of the Consultative Group, and the research programs

of the Agency and the IDI are to be efficiently designed, the job should be done.

A. Action Proposal - Research Priorities

1. It is proposed at this point that we take a preliminary rough cut at the problem, limiting the initial effort to an attempt to obtain agreement among the most knowledgable American agricultural scientists--a balanced group of biological scientists and agricultural economists--on the basis of the knowledge and experience already available to them.

2. The group will at the beginning have to decide on what criteria are appropriate to the judgement of priorities. They might well start with the acknowleged requirement of the LDCs (given official status by the FAO's Indicative World Plan.) to increase food consumption at a rate of four percent per annum over the coming years, in order to meet population increase and the anticipated rise in incomes. They would consider to what degree and in what manner the need varies among the principal geographical-ecological areas of the world. They would presumably also agree on the amount of additional protein consumption needed to provide adquate nutrition to the peoples of the less developed countries.

3. They should accept as a given the proposition that the bulk of increased requirements must be met by increased production in the LDCs themselves. This does not mean that every LDC should become self-sufficient in crop production. There will be commodity trade among the developing countries, and some imports from the developed countries will continue. But if consumption is to increase at the indicated rate, it is only realistic to conclude that most of what is needed

will have to be produced by the developing countries themselves.

4. These would be the agreed objectives: an annual increase of 4 percent in food production in the LDCs, and an increase in protein production by some agreed figure--for example, sufficient to achieve an adequate nutritional balance within the decade. The objectives once agreed, the problem then is to decide on the most efficient, and socially desirable means for achieving them. Or, to put it more precisely, what is the most effective contribution the international research network can make to these ends.

5. The point of departure of the group considering the subject might well be the assessments already made by the most competent international authorities: the tentative assessment made for Bellagio III of the state of knowledge about the most important problems of crop production in the developing countries, and the FAO studies dealing with the problem, particularly the paper prepared for the World Bank Meeting in January 1971.

6. The AID-activated group will have to agree on the criteria by which to judge priorities. For the purposes of this initial exercise, efforts at excessive refinement and precision--however desirable as ultimate objectives--should be avoided. What is needed now is an initial rough cut at the problem. A readily available approximation is clearly preferable to the vacuum which now exists or an inconclusive start which will yield scientifically precise findings two or three years from now. Once the original rough approximations have been made, these can be progressively refined as time permits.

7. The development of the criteria to be applied will obviously be for the group itself. An illustrative list of some of the factors which might be taken into account is presented below:

a) Size of area and number of people likely to be benefited; probable effect on disadvantaged farmers.

b) Probable difficulty and expense of organizing the effort.

c) Anticipated returns in relation to dimension of effort--i.e., cost-benefit ratio.

d) Effect on agricultural employment--, or more broadly, on employment in the rural sector.

e) Impact on the country's general program of economic development.

f) The odds favoring successful results of the research and the estimated time required to achieve them.

g) Receptivity of LDCs: their willingness to cooperate and the availability of the institutional competence needed to get the results applied.

h) The penalties of failing to do the job.

III. Some Guiding Principles for AID

The action proposed above obviously begins with an assessment of the situation in the LDCs--their needs and their capabilities. A number of the most immediate and obvious needs are now being met in some of the LDCs largely by their own efforts; in others, with varying degrees of assistance from external institutions; and in some cases they are not being effectively met at all. In general, it is apparent that substantial

external assistance will be required for a long time to come

The following principles should guide AID decisions concerning the types of assistance to be provided, how it should be organized, and the ends it should seek to promote:

1. It is apparent that the establishment of research priorities by AID, or by the Consultative Group on Agricultural Research, will be of little effect unless the developing countries concur in the assessment of their needs. The history of the short-strawed wheats and rice demonstrates that prior agreement is not indispensable. When benefits are so apparent, increases in yields so dramatic, and the need so great, acceptance can be rapidly won after a research program has produced its results. Increasingly, now, however, the international institutes are seeking to engage the developing countries in their projects on a continuing basis. This procedure is clearly preferable, and to the extent practicable should be applied when new initiatives are under consideration.

2. An important ultimate objective of programs undertaken within the framework of the international research system should be to increase indigenous research capabilities, and to raise the LDC element to a level which will make them more nearly equal partners in the enterprise. To this end, the developing countries should be engaged as fully as possible in the setting of research priorities and participating in the research.

3. Wherever possible, existing facilities should be utilized to carry on the needed research. Examples of the application of this principle are the proposal to utilize existing international institutes for agricultural research for work on legumes; to organize several American Universities already engaged in work on various aspects of potato culture,

in a coordinated program--the coordination to be effected by a minimum staff located in Peru; the cooperative program of TVA and IRRI to develop the optimum fertilizer for irrigated rice, etc. The possibilities of such cooperative ventures among established institutions in both the developed and the less developed countries have not been adequately explored. Before a decision is reached to launch any new international program, the possibility of accomplishing the objective by some arrangement among already established institutions should be fully explored. To perform this task adequately, much better information about existing research organizations--their present capability and their potential--is required.

4. A corollary of the proposition stated above is that the multiplication of international research institutes is not necessarily the only, the most economical, or the most efficient way of accelerating agricultural growth in the developing countries. Generally speaking, a new international center should probably be the chosen instrument only when a) establishment of an additional institution is essential to the proper handling of the problem, and b) location of the headquarters operation in a tropical or sub-tropical area is also essential. The main burden of proof must, of course, rest on those who advocate the establishment of a new institution. However, those who resist should be able to demonstrate either that the objective the proposed institute is intended to promote does not merit priority attention, or that costs are likely to be excessive in relation to probable benefits, or that the objective can be realized by other means.

5. The possibility of rationalizing the research efforts of large geographical areas of the less developed world should be thoroughly explored. The present pioneering effort to accomplish this in Africa,

which was initiated by the African Bureau, using the National Academy as instrument, should be closely watched, and the results carefully weighed.

6. Regional programs are a potential means for strengthening the international network which have not been fully tested. Their potential utility is probably greatest in smaller countries which are notably lacking in research competence, and which occupy the same geographical-ecological area. These programs have rarely proved viable where their organization and financial support depended on several LDCs, but have had some success when conducted by institutions of the advanced countries such as USDA, CIMMYT and FAO. These successes have been promising enough to warrant further experiment.

7. The effectiveness of the U.S. contribution to the international network, and the quality of our own bilateral programs can and should be improved by a better coordinated effort to utilize the potential of AID's own staff, the USDA, and the Land Grant Universities.

8. The international institutes of agricultural research have properly emphasized practical, problem-solving, production-oriented research. The effectiveness of this type of effort has been possible because institutions engaged in these efforts were able to draw on the results of basic research performed by other institutions of the advanced countries. Some of the international institutes for agricultural research have standing arrangements with American and other Universities to support their programs by carrying on basic research in specified areas. The full potential of such arrangements should be systematically assessed and additional cooperative efforts encouraged where appropriate.

9. In the area of socio-economic implications of agricultural development the Agency must act in full awareness of two considerations which will be difficult to reconcile: a) the desirability that new agricultural technology should not reduce rural employment or increase disparities of wealth, and b) the maintenance of a low profile in the developing countries and the avoidance of any appearance of interfering in this highly sensitive area.

The application of these principles in action programs for the most part will have to await decisions concerning priorities; some, however, can begin at once or anyhow in the near future. Various actions to strengthen the international network are discussed under the component of the international system to which they relate.

IV. Improving Research and Strengthening Research Competence in the Developing Countries.

It was noted above that the international network developed, at least in part, as a response to urgent requirements for agricultural research in the LDCs which they were unable to meet themselves. Although external efforts have been important in meeting the immediate and urgent need of the developing countries, so many of the problems of food production are location specific that we cannot look to a limited number of external institutions, however excellent, to provide universally valid solutions. The LDCs' own research capability must be developed; a sustained effort must be made to overcome their deficiencies. These deficiencies can be summarized under four headings: 1) trained scientists, 2) organization, 3) management, 4) politics.

1. Trained Scientists. Though the overall deficiency has never been computed either in gross terms or by category, and adequate data are available on only a very few countries, the fact that the LDCs suffer seriously from a deficiency of trained agricultural scientists and agricultural economists is universally recognized. Training programs in the agriculturally advanced countries and at the international centers for agricultural research have made and continue to make an important contribution. However, trained observers seem to agree that the deficiency is so vast that only a small part of it can be met by the provision of training in the developed countries. The requirement is part of the general development problem and will only be adequately met as the LDCs advance to the point where their own educational establishment is capable of producing trained agricultural scientists. There is need for in-service training of middle-level research workers through participation in problem-oriented research projects and for University training to the M.S. level--most of which will have to be provided within the developing country. The relatively few Ph.D.s required to provide leadership both for the general program and the major disciplines on which the effectiveness of the general program depends, can, for the most part and for the foreseeable future, be provided training in the institutions of the developed countries.

2. Organization. The shortage of trained scientists is accentuated by the ineffectiveness of organization in most of the LDCs. Even when a developing country is relatively well endowed with trained scientists (as a few of them are), their efforts are likely to be diluted and frustrated by faulty organization. In representative countries, where the number of trained scientists is very limited, the tendency is to spread this small

number over so numerous an assortment of research institutes and experiment stations that nowhere is there an aggregate of skills capable of doing significant work on food production problems. In some countries, Universities have developed a competence to do useful agricultural research which makes no real contribution to agricultural development because they have no organic tie to the Ministries of Agriculture which administer extension services and set agricultural policy.

3. Management. Though listed separately, the ineffectiveness of management is a least a partial cause of the faulty organization described above, and cannot be separated from the political factors dealt with below. The major indictment of management is the failure to identify the crucial problems on which the research efforts of the country should be focussed, or to bring to bear on these problems a sufficient array of talent to solve them. F. F. Hill of the Ford Foundation has stated the matter as follows: "In some cases, the research in which staff members are engaged has little bearing, directly or indirectly, on the problem of finding answers to the country's food problems."

4. Politics. The principal political problem has probably been indifference. The agricultural sector, generally, did not attract attention or support of Ministers who were obsessed with the forced-draft industrialization of the country. Agricultural research suffered from this lack of interest, and from inadequate funds to purchase equipment or to attract trained scientists. They were able to accomplish little, and their efforts had as little effect on government policy as the lack of government support would suggest.

This situation has changed for the better in a number of countries during the past few years. The pressure of food shortages and the

demonstrated potential of the new cereal varieties were sufficient to overcome bureaucratic rivalries and inertia, and to involve the highest levels of government in intensive food production campaigns, in which the abilities of the country's agricultural scientists were fully utilized. When Subramaniam became Minister of Agriculture in India in 1966 he immediately called in the Government's senior agricultural scientists for consultation; this act was unprecedented in Indian history and probably in the history of all LDCs. It thus had great symbolic significance: the necessary link between scientists and policy makers had begun to be forged. But most of the LDCs have still to follow the Indian example.

B. Action Proposals - Improving LDC Research Competence.

1. Explore with USDA means for making more effective use of field programs under PL 480 as a means for building research competence in the LDCs and contributing useful research results with relative speed.

2. Review AID's experience in building training and research capabilities in a few representative LDC agricultural Universities. Substantial sums and many man years of service by trained U.S. educators and scientists have been devoted to this effort, and a systematic appraisal should be made of its contribution to agricultural development and, in the context of this paper, particularly to the building of agricultural research capability--both in terms of the institution's competence and its success in training research workers for other institutions--public and private--which operate in the agricultural sector. This topic will be treated in one of the

"Mini" Spring Reviews; the review should be designed with the primary object of drawing lessions for future programs.

3. Review AID experience in attempting to improve research capabilities in Ministries of Agriculture. This topic, also, is to be treated in the review mentioned in "2", and should have the same focus.

4. Using the services of a skilled consultant, prepare a study of AID experience with the device of the "joint survey" of research organizations in the LDCs, which have sought

a) To improve the structure of research to make the most of existing resources, and to find means for making the results of research felt in national decision making.

b) To determine how Agricultural Universities can contribute most effectively to research and training of research workers.

c) To assess personnel requirements for an adequate in-country research capability and recommend measures to meet them.

The purpose of this study also should be to draw conclusions of significance for current and future operations.

5. To the extent possible, apply the conclusions of this study to current or planned joint surveys in Uganda, Guatemala, Korea, and possibly the Philippines. Reassess the validity of the conclusions in the light of experience in these countries.

6. If the assessment of the results of past efforts appears to warrant it, seek discreetly to stimulate additional LDC requests for joint surveys.

7. Although every effort must be made to increase the ability of the Agricultural Universities of the developing countries to meet the requirements of their countries for trained manpower, the advanced countries (with which we group the international institutes) will, for some time to come, have to provide most of the training needed for the top echelon of agricultural scientists--both in the biological and social fields. The Report to the President by the AID Administrator and the Secretary of Agriculture (February 19, 1970) stated the U.S. position in the following terms:

"Training in the United States should be increased and made more relevant to actual needs of academic and non-academic students from developing countries. . . .

"There is distinct need to change curricula and course materials to meet the most urgent requirements of developing country students . . . .

"AID plans to develop a pilot curriculum to meet needs of academic and non-academic students and lay a basis for development of needed course material. Subsequently it would be prepared to support institutions willing to develop such material and offer the proposed courses. . . . . "

Under the terms of a grant agreement with AID, The Agricultural Development Council is taking the lead in this effort. The initiative should be energetically pursued.

8. Encourage cooperation among the agricultural economists, public administration specialists and sociologists of the developing

countries in the several geographical regions, and between them and their counterparts in the United States. This can probably best be accomplished initially by promoting international conferences to consider topics such as the social and economic impact of agricultural development, the effect of government policies on agricultural growth, on employment and migration, creating machinery for productive interchange between research workers and government policy makers. Cooperative research enterprises involving research workers of several countries might be a second stage in this process. Development along these lines could provide a partial means of reconciling the divergent considerations listed under No. 7 of the list of guiding principles set forth in Section III.

V. The Advanced Country Component of the Network.

With a minimum investment of money and manpower the scientists of the developed countries have already made a substantial contribution to agricultural growth in the LDCs. It is a fair assumption that with some additional effort they could do much more. Essential to the success of this effort are: a) the proper establishment of priorities, and b) effective organization to cope with priority problems. AID will no doubt have significant influence on the decisions reached on these questions, but the Agency's views will not be controlling. The establishment of the World Bank consultative group (with a committee of technical advisors headquartered at FAO) in support of the international agricultural research institutes will place the UN agencies in a focal position. The consultative group is being organized by the Bank primarily to support existing centers and proposed new centers of similar type.

The question of organization can be properly addressed only after decisions have been reached concerning research priorities and more comprehensive information assembled concerning the research capabilities of established institutions. When we know what problem is to be attacked and what effectives are available to bring to bear on it, we can better judge how to proceed.

At present, however, it is doubtful that anyone knows exactly what research resources capable of working on the problems of the developing countries now exist in the advanced countries, or what the potential of known research institutions really is. We know enough to conclude that these resources are far from negligible and to suggest that if they could work cooperatively on clearly defined programs, their potential is substantial. To start at home, there are obviously important untapped resources in the USDA and our agricultural Universities. A glance at a reference book reveals what seem to be quite significant resources in other advanced countries. France has ten research centers devoted to tropical crop production, all of which have headquarters in the metropole, and field staffs stationed in the francophone countries of Africa. The United Kingdom has a Tropical Products Institute; both Germany and Belgium have several institutes of tropical agronomy; the Netherlands has an International Institute for Land Reclamation and Improvement, which has established cooperating institutes in several LDCs.

It is more than likely that there is a great deal of duplicative effort going on, and that there are many areas where the effectiveness of work of several different research institutions, would be enhanced by a planned division of labor, and a sharing of information and materials.

Quite possibly, some of AID's own agricultural research programs would be strengthened or modified, or both, if effective means of international cooperation and exchange were established.

C. Action Proposals - Contributions of Developed Countries

1. Both in attempting to influence international research arrangements and projects and in its own programs, AID should be guided by the principles set forth in Section III.

2. Following the development of a set of research priorities, by the procedures set forth in Section II above, the Agency should make these views known to the FAO and members of the Technical Advisory Committee, when this body is constituted, and should be prepared to advocate the adoption of this set by the Consultative Group, if this appears appropriate. Agency representatives should in all discussions urge the desirability of associating LDCs in the establishment of research priorities at an early stage in the process.

3. AID representatives should urge that the Consultative Group request its Technical Advisory Committee to make a systematic assessment of the competence of existing research institutions and the possibilities of increasing their effectiveness through cooperative action. It might well be that harnessing the institutions of the advanced and the developing countries in a joint attack on clearly defined problems would be a more significant achievement than establishing two or three new research institutes. The difficulties of organizing such an effort will no doubt be formidable, and may well prove to be insuperable; but potential benefits are great enough to justify a determined try.

4. Assuming the accpetance of the postulate stated above, AID should propose the adoption of procedures along the following lines, once a collective decision, which reflected the views of a representative number of developing countries as well as those of important developed countries, was reached that a new item be added to the working agenda of the international research network:

a. The Technical Advisory Committee of the Consultative Group on Agricultural Research would canvass the Governments of countries with tropical and sub-tropical research capabilities to determine what contributions they might make to a project designed to cope with the problem.

b. Providing the responses were sufficiently encouraging, a special task force would be established to consider the adequacy of existing resources and possible means for organizing and financing the joint effort; or, where existing resources were not fully adequate, to consider various possible means to supplement them.

c. Where existing resources were substantially adequate for the job, and arrangements could be made to enlist them in a joint endeavor, some form of coordinating mechanism would be required. One or two scientist-administrators working under the umbrella of the Technical Advisory Committee might perform this task--men of the type of Bob Chandler, for example, who will retire as Director of IRRI within the next eighteen months.

5. In cases where the procedure outline above is unproductive, and there is a clear need for centralized research activities in an area outside the temperate zone, it will be desirable to consider the establishment of an additional research center modeled on those already existing. Even in these cases, consideration should be given to the

possibility of limiting the new center to a small nucleus, reinforced by links with already established institutions doing work in the same area.

VI. Linkages. As the term is used in this paper, "linkage" is intended to imply simply the means whereby separate individuals or institutions are joined in a common research effort, with a common understanding of problems, agreement on goals, and channels of communication which facilitate the exchange of knowledge and materials between them.

Achieving effective linkages is not a problem peculiar to the international network. The development of effective cooperation among the various institutions, and indeed, the various disciplines, involved in agricultural research was a matter of major concern to agricultural leaders in the United States for many years. The achievement of the objective was neither easy nor rapid; and it is probably not fully realized even today, and we tend to forget how relatively recently the principle won acceptance. The phrase"package approach" to agricultural development, implying an interdisciplinary approach to agricultural efforts of plant breeders, pathologists, soil scientists, etc., has become so firmly embedded in the trade jargon that it is hard to realize that this kind of cooperation was not common in the United States prior to 1945. (Albert Moseman, "Building Research Systems in the Developing Countries", p. 38) Such cooperation does not occur automatically, as the spontaneous result of the confluence of minds intellectually harmonious and spiritually attuned. It is, for the most part, and in the really significant cases, the product of plan, organization, and deliberate effort.

The linkage of institutions is a principal problem for the international network, to which the experience of the United States area may be relevant. Confining the discussion to government-financed agricultural

research in this country, we find a separate institution (or group of institutions) in each state, deeply rooted in the needs and aspirations of the farmers of that state: each institution a part of a discrete political system, geographically separate and serving different consitutencies.

In principle, the USDA, the national element in the U.S. system, has the general functions of guidance and coordination, and a leading role in research on such matters as soil classification, soil and water management, conservation, the collection, evaluation and preservation of germ plasm, the development of advanced scientific techniques and on broad scientific problems requiring heavy expenditures, long-continued study and the correlation of the results of numerous investigations. Location specific problems, such as cropping practices, are the responsibility of the states.

The proper functioning of the over-all system requires the cooperation of the parts. The achievement of this cooperation has, in the United States, been facilitated by the ability of the Federal Government to provide financial support for state institutions, and thus to exert strong and continuing influence. Even so, the closeness and effectiveness of cooperation among the various elements in our national system varies from one period to another: it is very close and harmonious in periods of stress and when there are special demands for research inputs; much less so, when all is going well and the pressure for agricultural production relaxes.

Although the parallel is far from exact, there are sufficient similarities between the evolution of a cooperative system of research in the United States and the development of the international research network to warrant the effort to apply some of the lessons we have learned from our own experience to the international scene.

The developed country component of the network contains centers which perform functions similar to those of the USDA in American agricultural research--e.g., the collection, evaluation and preservation of germ plasm, the development of techniques beyond the competence and skills of the LDCs, the treatment of broad scientific problems requiring significant expenditures, long-continued study and the correlation of the results of numerous investigations. Just as location specific problems are the province of the states in the United States, they must be dealt with by individual LDCs in the international system.

Obviously, the more effective each part of the system is, and the better the communication and cooperation between the parts, the more efficient the total international system will be.

The use of the word "network" to describe this system implies an arrangement considerably more complex than that suggested by comparing it to the internal system in the United States. And this is in fact the case. There is not one "center" for international agricultural research: there are a number of institutions which serve as centers for particular crops and serve one or more regions of the less developed world; and there are large parts of the agricultural systems of the developing countries for which no centers exist. The established centers have only the most indirect means for influencing policy and programs in the developing countries: their recognized professional expertise; the manifest value of the plants they breed, the advice they give, the training they provide. And as much as the fifty states of the Union differ in size, resources, scientific skills, soils and climate, the hundred or so developing countries differ a great deal more. (Some, in fact, are themselves federal systems, larger in size or population, than the United States, and containing

within themselves the same problems of federal-state relationships.)

Taking account of these factors--the similarities to and differences from the international system in the United States--what conclusions can be drawn as to how to develop effective linkages, encourage better cooperation, among the elements of the international research network? This question requires a restatement of the principal elements in the network, in a form somewhat different from that used in previous sections of this paper. The discussion here will be treated under five headings: 1) relations (linkages) among the relevant institutions within individual countries; 2) linkages among individual scientists and research institutions of different developing countries; 3) the cooperative effort of the various American institutions and associations which have competence in agricultural and agriculture-related research in the LDCs; 4) linkages among individual scientists and institutions of the developed countries doing research on LDC agriculture; 5) linkages between and across groups 1), 2), 3), 4).

Before these elements are considered, a few prelininary comments may be in order.

First: we should recognize that some linkages develop spontaneously as a natural outgrowth of the process of establishing research institutions; some are created by deliberate effort; some are the product of chance. This paper, naturally, is concerned with linkages of the first and second type.

Second: though cooperative endeavors of individual research scientists may sometimes be quite singificant, institutions make the really substantial continuing contributions to research; consequently, this paper is primarily concerned with inter-institutional links.

Third: as noted in the discussion of the U.S. system of agricultural research, cooperative programs do not develop in vacuo; they are not generated by good-will (though this may be an important part of their effectiveness.) They develop most naturally when there is a job of recognized urgency and importance to be done. If the requisite institutional competence is available, even though the components are widely separated, the pressure of circumstance will tend to bring them together. The converse is also true. Even when separate institutions have forged an effective link while working together on important problems, the bond may become attenuated and tend to wither away when the pressure relaxed.

Fourth: though LDC participation in both the planning and the carrying out of research programs is an obvious good, the extent to which such participation is essential varies from one case to another. Research projects in social science which may tend to affect the distribution of economic and political power in the state clearly require LDC participation and usually that of the LDC Government. On the other hand, the manner in which the high-yielding cereal varieties were developed and disseminated demonstrates that an obviously valuable research product will make its way regardless of the auspices under which it appears. If further proof is needed of the validity of this proposition, it is provided by recent reports that IRRI rice is now being widely planted in North Vietnam.

Fifth: notwithstanding the above, the most valuable form of cooperative research enterprise is that which most thoroughly involves indigenous research institutions, in project planning as well as adaptation and application of results, which leaves a permanent residue of increased

interest and competence behind, and thus moves the LDC institution closer to equal partnership in the research network.

The foregoing comments are intended to serve as reference points in the discussion of the problem of linking the various elements in the international network listed on page 24 .

1) Linkages within individual LDCs. Some of the most important problems in this area have already been discussed in Section IV. To summarize: There is a widely prevalent failure to link the trained scientists of the country in an effective inter-disciplinary attack on defined problems of priority significance. Even when effective research is accomplished, it frequently fails to affect agricultural production, because of poor linkage between the research organization where it is accomplished, and other parts of the system. This is particularly true of the research of agricultural universities operating in isolation from Ministries of Agriculture, which have the capacity to get research results into the hands of the farmers. There is also a general failure of communication between research scientists and policy officials, whose deliberations should take account of the economic and social consequences likely to follow the introduction of new agricultural technology. These are, of course, internal problems of the developing country, in which it is unwise and undesirable for donors to become involved, except by invitation.

2) Linkages among the LDCs. The development of increased cooperation between the social and physical scientists and the agricultural research institutions of the developing countries is an obviously desirable end. It is an end easier to endorse than to achieve. During the past decade or so there have been a good many regional programs involving LDCs with

common problems in a particular geographical area. In some of these, the participation of LDC institutions has been minimal, with the major part of the effort and financial support supplied from outside (as, for example, the AID-supported CIMMYT wheat program in North Africa.) In others, the LDC's have been deeply involved, and in a few cases (as, for example, the rinderpest and locust programs in Africa) have successfully assumed major responsibility. The most advanced form of such cooperation is, of course, found in regional research institutions which serve and are administered and supported (at least in part) by several LDCs. The small number of such insitutions now operating owe their existence either to the initiative of a colonial power in the period prior to independence, or to some outside organizing force.

It is fair to say that no significant regional programs of institutions have been created or established solely by the LDCs themselves; the impulse and, at least initially, the leadership and the bulk of financial support have come from outside. Those which have had to depend on regular appropriations from several LDCs to support their annual budgets have usually run into trouble. Even when regional research institutions were left a legacy of efficient plant, organization and momentum by the departing colonial power they usually experienced increasing problems as external leadership and financial support diminished. The successful programs of rinderpest and locust control cited above suggest that the essential conditions for a successful continuing cooperative research venture administered and supported by a group of LDCs are a clear and urgent danger which transcends national boundaries, and which will surely exact a heavy penalty if cooperation fails.

The encouragement of cooperation among the developing countries which have common problems and occupy a contiguous geographical area will not be easy and successes will probably be limited for a long time to come. It is an effort worth making, but those who make it should have no illusions. External initiative and substantial amount of external funding will probably be indispensable for some time to come. The most ambitious effort to stimulate cooperation in research among the LDCs so far undertaken is the current project of AID's African Bureau, working through the National Academy of Science, to rationalize the research efforts of the entire continent. Although this project assumes the availability of outside assistance in significant amounts, its success will depend ultimately on the willingness and ability of the countries of the continent modify their own internal systems and to develop much closer cooperation than they have heretofore achieved. The results of this venture will merit careful attention: they may have far-reaching implications for the organization of research in the developing countries.

More limited initiatives, likely to yield useful results in the foreseeable future, are the newly formed Association of Asian Agricultural Universities, and the proposal now pending before the Consultative Group for the Long Range Support of Agricultural Research to establish a center in Asia which would provide support and encouragement for cooperative research among the social scientists of the region concerned with the economic and social impact of the new agricultural technologies now being used on a widening scale.

The FAO and the International Institutes for Agricultural Research

have demonstrated the potential of international conferences and seminars for bringing together the agricultural scientists of a region and focusing attention on specific problems. This is a device which could be used more extensively, and, as experience develops, probably to greater practical effect. As progress is made in the preliminary identification of problems meriting the attention of the international research network, it may well be desirable to utilize this technique to develop a consensus of opinion on priority problems for each of the major regions, and to agree on an effective division of labor and means for individual country participation and cooperation in common programs.

3) Improving coordination of efforts within the United States. The principal U.S. institutions concerned with agricultural research in the developing countries are AID, the USDA, TVA, and the Land Grant Universities. AID has principal authority and the coordinator's role, but there is some confusion in the statutory allocation of functions. For in addition to the specific mandate in Section 211 e of the Foreign Assistance Act to accord a high priority to efforts to increase food production in food deficit countries, by adoptive research programs, the Department of Agriculture, is also authorized (by Section 406 of PL 480) "To conduct research in tropical and subtropical agriculture for the improvement and development of tropical and subtropical food products for dissemination and cultivation in friendly countries." In practice, no problems have resulted from this overlapping grants of authority: the Department of Agriculture has refrained from seeking appropriations to carry on activities under the authorization of PL 480. However, under the authority of Section 104 (b) (3) of the Act, the Department has entered into a number of arrangements to conduct "cooperative research

projects of mutual benefit to the United States and the developing countries." Although many of these projects have undoubtedly been useful, there is no pretense that they have been chosen because of their priority status or their relevance to any general plan for expanding knowledge important to agricultural growth.

The Department of Agriculture has indicated its desire to work with AID to increase the utility of the U.S. agricultural research program to the developing countries--both providing them useful material and in strengthening their research establishments. More effective programs to this end, can no doubt be devised, which will employ the authority of Section 406 as well as Section 104 of PL 480.

Once decisions have been reached on research priorities, as proposed in Section II, and it becomes apparent what the other participants in the international system will do, a thorough reassessment of the United States effort will be in order. This assessment should take into account the important work that remains to be done, the potential contributions of AID, the USDA, TVA, and the Land Grant Universities, and the most efficient way their effectives can be combined to strengthen and supplement the international effort. Decisions on this point must, of course, be made with due regard for financial constraints, and should reflect a considered judgment of how to get the most for the money.

4) Linking the scientists and research institutions of the developed countries. Aside from those drawn into the orbits of the international research centers and the somewhat narrowly focussed work of the FAO, there is no real community of Western biological and social scientists doing research on LDC problems. Knowledge accumulated on an individual

or institutional basis is not pooled, and consequently, individual projects are not mutually reinforcing. There needs to be much better communication among researchers working in the same general field.

The establishment of the Technical Advisory Committee of the new Consultative Group on Agricultural Research promises to contribute to this end. This body may help to channel and accelerate the somewhat desultory efforts of the FAO to compile a data bank including the results of all significant agaicultural research already undertaken and in process. Limiting the scope of operations initially to areas of obvious priority should facilitate the task and accelerate progress where it is most needed.

Section V, The Advance Country Component of the Network, was primarily concerned with increasing cooperation among the developed countries. This discussion will not be repeated here, but there are several additional points worth making.

The international research centers proper are preoccupied with practical problems of production. They are neither staffed nor organized to do basic scientific research, and frankly state that they depend on other institutions for work in this area: for example, CIMMYT utilizes basic research by Purdue, Nebraska, California, Manitoba and Guelph. It is possible that a deliberately planned program of support to those U.S. institutions doing basic research in areas judged most important by the scientists of the international centers could significantly strengthen the Centers' work on crop production. Such arrangements already exist for wheat, triticale and corn, (CIMMYT and several American Universities) anf for cattle (Ciat and Texas A&M). If the proposed new institute for upland crops is established in Asia, the work already done by Purdue should prove extremely valuable, and continuing cooperation between Institute and University will probably be desirable.

The larger socio-economic implications of new agricultural technologies seem particularly suited to cooperative endeavors, involving the scholars of the developed countries. The work of the OECD Development Center on the impact of new agricultural technology on rural employment is an encouraging example of efforts in this field. The International Research Centers are becoming increasingly concerned with the socio-economic impact of their work and when CIMMYT acquires the complement of agricultural economists it plans to recruit, all the Centers will all have a degree of competence in this field. However, the Centers' staffs are small and cannot possibly undertake the broad range of research required. These staffs should be linked with scholars in universities, in a coordinated attack on the broad range of problems which need to be studied in this field. This effort could begin with certain U.S. Universities which are already engaged in relevant studies--e.g., land tenure, the role of agricultural prices in economic development, the impact of new technology on rural employment--and have the capability and desire to do more.

5) Cross-Linkages Among Elements in Network. It is cross-linkages--the combining of the disparate elements listed above into something beginning to approach an integrated system--which justifies the use of the term "network" in discussing world-wide agricultural research relevant to the problems of the developing countries. Fragments of this system formed over the years, with individual pieces relating to and reinforcing formerly isolated elements. But nothing remotely resembling an international network existed until quite recently.

The focal points which began to draw the disparate elements together in larger fragments were the International Institutes for Agricultural

Research, with their international nursery programs, the training of scientists from numerous countries developing countries in crop production techniques, the conferences they convened, which brought the LDC scientists together to discuss common, practical problems. And behind the scenes, the Ford and Rockefeller Foundation, which gave the International Institutes financial support and leadership, provided a sense of direction for the total effort.

Illustrative of the far-flung influence of these international institutes are the CIMMYT nursery program, which includes a correspondents in 50 countries, the wheat production programs the institute has launched in North Africa, the Middle East and South Asia; and the fact that IRRI graduates are now to be found in virtually every Asian research institute and experiment station concerned with rice production.

As indicated in Section 4, above, the International Centers have numerous links with agricultural scientists in the developed countries. CIMMYT, for example, depends heavily on certain U.S. and Canadian Agricultural Universities and the U.S. Department of Agriculture for much of the basic research which undergirds its production-oriented efforts. Thus, the International Institutes are, in fact, central linkage points in an increasingly coherent international system.

Numerous research scientists and institutions in the developed countries have their own direct ties with research in the LDCs. Those of the United States are particularly numerous and far-flung: AID and USDA technicians working with counterparts in the developing countries on crop production campaigns or special projects; the Lang Grant Universities, working under AID contract to develop institutional competence,

including the ability to perform useful research and train scientists, in Agricultural Universities of the developing countries; the Ford and Rockefeller Foundations providing directly (in addition to their indirect support through the International Institutes) highly trained scientists in some of the agricultural disciplines in which the LDCs were most deficient. None of the other donor countries has so extensive a system of relationships in this area as the United States, but there are a number of individual countries which carry on important research programs, and the sum of their efforts is substantial.

With the establishment of the Consultative Group for the Long Range Support of Agricultural Research, and its Technical Advisory Committee, there will be, for the first time, a mechanism to coordinate these diverse activities. The Consultative Group is intended to include all the important donor countries and institutions, and the Technical Advisory Committee will include representatives of the developing countries as well.

The frame for genuinely world-wide network of agricultural research for the LDCs and including the LDCs, and a considerable number of interconnecting elements are now in place. It should be a relatively easy matter to insert additional elements from time to time, and to multiply the connecting links.

D. Action Proposals - Linkages

Within individual LDCs.

1. Develop closer cooperation between AID and USDA research-related activities within individual LDCs. The USDA activities, conducted under 104 b) of PL 480, are extensive and employ a considerable number of scientists. The useful contribution they now

make could probably be significantly increased if projects were related to an agreed set of priority objectives.

2. The forthcoming AID evaluation reviews of experience in developing research competence in LDC Agricultural Universities and Government institutions should pay particular attention to two aspects of the linkage problem: a) cooperation between research institutions and the extension services which get research results into production and b) the receptivity of policy making officials to information concerning the results of research, and their willingness to take account of the probable economic and social impact of new agricultural technologies.

3. The problem stated in "2" above should, of course, be a major concern to those who conduct joint surveys of LDC research establishments, as recommended in B-5.

Among the Developing Countries

4. In spite of the acknowledged difficulties, continue to encourage regional research programs, wherever these seem to have a fair chance of success. Encouragement, in this context, implies the willingness to provide assistance in launching and supporting such enterprises.

5. Also continue to encourage the development of the Association of Asian Agricultural Universities launched in 1970, and seek to promote the extension of the association's cooperative activities into the area of agricultural and agriculture-related research. If this enterprise lives up to its promise, attempt to stimulate the development of similar associations in other regions.

6. Increase the contacts among social and biological scientists in the several regions of the less developed world through meetings, conferences, etc., and, where appropriate, the development of professional associations among these scientists. The first concrete proposal to this end is that submitted to the Bellagio Group to provide a center and modest support to the social scientists of Asia. This proposal, which will come before the Consultative Group on Agricultural Research for action, should receive strong support from AID.

Within the United States

7. Following the establishment of a set of priorities for agricultural research and the determination of the scope of international and other bilateral programs, reassess on-going U.S. programs in support of research for and by the LDCs. Attempt to design a U.S. program which combines total available resources--in AID, USDA, TVA, the Land Grant Universities--with maximum effectiveness and economy in activities which strengthen and supplement the international effort.

8. The reassessment proposed in '7' above should consider the desirability of utilizing the authority of the USDA under Section 406 of PL 480, possible modifications of AID research and 211 d programs.

Among the Advanced Countries

9. Seek agreement among the members of the Consultative Group on a procedure for establishing research priorities, and for involving the developing countries in this task.

10. Attempt, through the machinery of the Consultative Group and the Technical Advisory Committee, to activate and canalize

the efforts of the FAO to establish a data bank on agricultural research. This effort should be focussed initially on priority areas, and thus avoid the dissipation of energies involved in the attempt to cover too broad a front.

11. The establishment of research priorities and progress in assembling data on research already completed or in process should be followed by an effort to obtain agreement on a world-wide division of labor. This effort should include an attempt to obtain agreement on a planned system to support and reinforce the work of the international research institutes with basic biological research, and work on the social and economic implications of new technologies to be performed by institutions of the donor countries.

Cross-linkages

12. Advocate the participation of the LDCs in the Technical Advisory Committee of the Consultative Group on Agricultural Research, and its various subsidiary panels, with a view to obtaining as broad a consensus as possible on what needs to be done to strengthen agriculture in the LDCs and how best to do it.

13. Continue to encourage the "outreach" activities of the International Research Institutes and to support their position as focal points in the research network for the regions they serve.

14. Encourage and facilitate continuing ties between the scientists of U.S. Universities and those of the LDC institutions they have helped to develop.

15. Promote and support international meetings attended by agricultural scientists of the LDCs and those of the developed countries.

VI. Conclusion.

The ultimate success of the world-wide network does not require the disappearance of the system. The measure of its success will rather be the degree to which the LDC component moves closer to equality with the components in, or drawn from, the advanced countries. The more that progress is made in this direction, the more effective the operation of the research network will become. As the flow of benefits becomes more obviously reciprocal, the willingness of the developed countries to provide support will increase. As the LDCs see their own prosperity progressively increased by the flow of technology which reaches them through these channels, their understanding of the importance of research and willingness to help provide the continuing financial support is needs, should increase also.

WORLDWIDE AGRICULTURAL RESEARCH NETWORK

Overview - A Statistical Paradox

The hungry fraction of the world's population is probably smaller now than ever before in man's history, yet because the population is now so large, there are more hungry people - in absolute terms - than ever before.

A survey of 67* developing nations in Africa, Asia and Latin America shows that 51 of these 67 nations regularly export several times more in agricultural products than they import, six have exports that about equal imports, only ten import more than they export and three of these ten are atypical,** i.e., only seven of the 67 LDC's surveyed import more agricultural products than they export. All three of the developing regions, containing these 67 developing nations, export significantly greater amounts of agricultural products than they import, yet hunger and malnutrition are widespread in these same regions. Consumer food prices are high, relative to incomes, therefore effective demand for food is for smaller than the real (nutritional) need for food, i.e., people often cannot afford as much food as they ought to have. This imbalance grows as rural to urban migration continues, since more and more people change from subsistence producers to commercial consumers.

Farm prices are low, relative to urban incomes, and this creates an

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*Reported in the 1969 FAO Trade Yearbook.

** Libya and Venezuela have oil incomes to pay for imports and Vietnam is in a wartime situation where normal comparisons do not apply.

indirect tax that results in a net flow of capital from the farms to the cities. Agriculture is the main capital formation sector in nearly all developing countries, but it is itself under-financed. This is not to say that the agriculture sector should not be taxed - it should - principally because it is the largest source of income in most developing economies and the only viable sector im many. But the tax should be less severe and the farmer should get more services from the rest of the economy than he presently receives. These services are essentially those things which the farmer cannot provide for himself (fertilizers, credit, processing, transportation, markets, agricultural technology, new genetic material, and the other advantages that research can supply) so that there truly will be a rural-urban transfer system that is not so heavily a one-way street. The farmers' needs are broad and the research that serves him must be equally as broad to cover an agriculture system.

Imports of food by some developing nations and the food shortages in most of these nations seem to present nearly impossible problems when viewed in tons or in dollar value, but these shortfalls are actually quite small compared to present production or consumption levels.* This means that relatively small production increases, per hectare or per farm, could correct most supply imbalances.

Goals - An Empirical Judgment

A 4.5 to 5 percent sustained annual increase in agricultural production in the LDCs should be the first goal of the network.

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* For example, the Latin American region imports only 3% of its consumption of agricultural products and exports 7 times that amount in dollar value, in terms of coffee, cacao, bananas, sugar, etc.

This is a realistic goal that is fairly well balanced between what is desirable and what is possible and between what can physically be produced and what can be consumed and/or marketed at prices that will keep the farmer producing.

	A 2.5% to 2.8%	increase would just about keep up with population growth. This is occurring now in the LDCs. A little over this in L.A. and Asia but a little below this in Africa.
Another	1.0% to 1.2%	increase would make modest improvements in caloric intake each year, or some improvement in diet quality - but not both.
Another	1.0%	increase would add modest amounts to exports, assisting overall economic growth. This increment could easily be absorbed internally if increases in food prices can be held below increases in income.
Totals	4.5 to 5%	

Since the 2.5% to 2.8% increase allocated for population growth in the breakdown above is already being realized, it is the 2.0% to 2.2% in the other two categories that is required for sustained progress. This is and will be the most difficult increment to add to overall production since increased production is a response to increases in effective demand - and this demand grows, above population increases, when consumer incomes rise faster than food prices. Therefore:

Employment opportunities	-	for greater numbers of people
Improved incomes	-	for low and medium income-level people
Relatively lower food prices	-	for greater numbers of consumers
Relatively higher farm profits	-	for small to medium producers

become the real controlling factors in commercial production and in social and economic growth. Food production, distribution, and utilization may be the most immediate goal that a research network can focus on, but this is only slightly more urgent than achieving the second goal of better balanced diets. The problems of inadequate protein levels and poor amino acid balances need to be given major attention along with the total food production problem. The third goal, and the one that is perhaps the most important of all in the long run, is the development of LDC research competence in agriculture and related disciplines so that these countries can, on their own efforts, stay ahead of agricultural problems.

Goal Requisites - A Partial Listing

Holding consumer prices as low as possible, commensurate with adequate farm prices (incentives), will require:

1. Higher yielding, more broadly adapted crop varieties
2. Cheaper farm inputs
3. Improved production techniques that match the new crop varieties' needs

4. Lower production costs
5. More enlightened government policies that respond to rural needs
6. More efficient marketing systems that
    a. Reduce the number of sales transactions
    b. Increase market competition and reduce markups
    c. Lower transportation costs
    d. Lower processing and storage costs
    e. Reduce spoilage and waste

It is really not important at this point to discuss the relative merits of increasing yields on land already in farms, as opposed to increasing acreage by opening new lands. The factors listed above will favor both of these production systems - one relatively new and the other traditional - and in most cases future production increases in the developing world will be from a mixture of the two systems. It is important - for enlightened perspective - to view the difference in these systems in a developed agricultural country where the traditional means of more labor and more land has given way to better technology and services. The U.S. is a good, if extreme, example.

In the three developing regions food production totals about 0.3 tons per capita per year, while in the U.S. such production is 1.8 tons per capita per year. In the developed area, the food production is six times greater, on intentionally limited acreage, by 2 percent of the labor

force. Such production cannot possibly be consumed by the population, so large increments are fed to livestock, exported to industrialized nations, used as an assistance input in developing countries and stored as surplus when the supply could not be otherwise utilized. It is true that this production system has produced some economic imbalances and environmental degradation which hopefully the developing nations will not and need not copy, but the road to success is clear. A production technology wedded to reasonably good production resources, managed by multidisciplinary-minded administrators in a favorable production environment of enlightened policies and dependable markets makes up a system each part of which is an essential ingredient. There is an almost uncontrollable urge to credit the last essential input with an explosion of success. The last essential input is indeed the critical factor, while being no more important to the whole than any other necessary part. It is the multidisciplinary nature of a system that makes it truly responsive, but at the same time makes it necessary for the research network to be sharply focused on a group of system requirements and not just on the agronomic elements of the system.

Analysis - The Gap Finder

Highly effective production systems and favorable production environments are not hastily thrown together, rarely happen by accident nor are they completely planned and fine tuned in advance. They are most often developed by assessing resources, applying known techniques,

researching our unknown essentials, modifying constraints, making orderly changes led by research findings and utilizing experience. A systematic analysis, rigorously applied, is the most efficient device known for locating action or knowledge gaps, constraints and lagging elements in a system. Analysis generally leads to research and indicates the need for and the type of research capability that will continuously feed new information into the system. Analysis is an essential ingredient that should precede planning, but should also be as nearly a continuous process as is possible in order to maintain the multidisciplinary nature and focus of the research and service functions.

Research - The Problem Solver

Experience has shown that the achievement of significant continuing increases in agricultural yields requires a flow of new agricultural technology, and this in turn requires a sophisticated research apparatus including skilled workers in the various sub-disciplines of agricultural science; an effectively organized interdisciplinary effort under forceful and imaginative leadership, and the assurance of adequate continuing financial support. Almost all the developing countries lack some of these essential ingredients, as well as the economic research capability and service-oriented institutions that make agricultural sciences truly useful.

Agricultural research in the developing countries has been handicapped most of all by the lack of skilled agricultural scientists. But this deficiency has been compounded by faulty organization, poor management and indifference on the part of government leaders obsessed by the chimera of industrial development. In the past few years, there has

been a noticeable shift in attitude in some of the most populous developing countries, and agricultural development is receiving greater emphasis. It appears that a critical period in history has arrived when the bringing together of the requisite manpower, political interest, experience, capital and technical competence can be combined in a world-wide effort to build a research capability adequate to the awesome task.

During the second half of the decade of the sixties, it was demonstrated conclusively that technological, organizational and managerial shortcomings need not be insuperable obstacles to the adoption by the LDCs of new agricultural technology. Research institutions established, led and largely staffed by the advanced countries, bred new varieties of wheat and rice which produced double the yield of traditional varieties. They were disease resistant, photoperiod insensitive, highly responsive to fertilizers and broadly adapted. Between 1965-66 and 1969-70, the area planted to the new cereal varieties increased from 41 thousand to 43.9 million acres. Yields of the new varieties, when accompanied by appropriate inputs, were as much as 100 percent greater than those of traditional varieties.

These are impressive achievements, and demonstrate the great potential of a system designed to mobilize scientific skills and resources of the developed countries in support of agricultural development in the LDCs. But the results should not be exaggerated. Success has been restricted largely to two cereals, grown, for the most part, on irrigated lands where the water supply could be controlled; moreover, only about a

dozen countries have planted the new varieties on a large scale, and in these countries the record is not one of unalloyed success. Moreover, the rate of increase in production achieved by these countries seems to be slowing down, as the limits of the optimum planting areas are reached. In 1970, land planted to the new varieties amounted to only about ten percent of the cultivated area of non-Communist Asia -- the continent where diffusion has been greatest; in other continents, the percentage is much smaller. The new varieties, important though they have been in meeting food requirements where the need was most acute, have not materially improved the lot of the farmers of the less developed world.

Further progress will require substantial additional research on the technology needed to increase food production or the concomitant problems of employment, income distribution, government policies, marketing systems and on the associated problems which increased production creates. It seems reasonable to conclude that the best way to get at this will be to build from the model which has already proved its worth -- that is, to supplement the presently inadequate research establishments of the LDCs by concentrating a "critical mass" of scientific skills from the developed countries for an extended period on each of the main problems. The potential of this technique has only begun to be realized. What is required for a fuller realization of potential is:

1. a substantial coordinated effort on the part of donor countries,

2. intensified attention to agricultural research and production

in and on the part of the LDCs and

3. the linking of these elements in an effective system.

Linkages - The Unifying Imperative

It is abundantly clear that government officials, heads of educational institutions, managers and directors of assistance agencies, private foundations and businesses and international organizations - in both the developed countries and the developing countries want to see agricultural development proceed at an accelerated rate. Looking at the magnitude of the overall effort one cannot help but come to this conclusion. Also, there has been for some years increasing recognition that the overall effort is disorganized, scattered, duplicative or at least overlapping, uncoordinated and to some degree competitive where development funds were available from different "windows" of different interest rates and with different requirements. Broad recognition of these problems, and many meetings and discussions on the subject have culminated in the formation of a "Consultative Group for Worldwide Agricultural Research" headed by the tripartite leadership of the IBRD, the FAO and the UNDP, to contribute to and coordinate the funding of a worldwide agricultural research effort. The Group has had its first organizational meeting. Canada, Denmark, France, Germany, Netherlands, Sweden, United Kingdom, United States, African Development Bank, the Ford, Rockefeller and Kellogg Foundations and the International Development Research Center of Canada are members. Australia, Belgium, Finland, Italy, Japan, New Zealand, Norway,

Switzerland, the Asian Development Bank and the Interamerican Development Bank attended as observers (Some of these observers will probably become members later). A "Technical Advisory Committee" made up of 12 outstanding technical leaders from developing as well as developed regions and broadly representing the various disciplines in agricultural development, has been named. This Committee will report directly to the Consultative Group. The establishment of these institutions gives official form to the international network for agricultural research which has been gradually taking shape and provides a central coordinating mechanism for the system.

The newly-formed Consultative Group for Worldwide Agricultural Research, forming the financial backbone for the network, should assure that money will not be a limiting factor in this research effort. The Technical Advisory Committee representing the various regional and disciplines provides a forum and a mechanism whereby technical inputs or initiatives from any country or any organization can be considered, evaluated and made known to the consultative group. It remains now to establish linkages between all parts of the proposed system, as it is the linkages that really tie the whole into a network. The term linkage, as used here, is intended to imply the means whereby separated individuals or institutions, within or between countries and regions, are joined in a common research effort, with a common understanding of problems, agreement on goals, with channels of communications which facilitate the exchange of knowledge, materials and at times people between them. When a large number of linkages have been established then a network has been formed.

The idea of a linked agricultural research network is not really new, as such networks developed more or less spontaneously (but partly by design) in the U.S., in other developed countries and between developed countries. Such networks operate much better now than in the past mainly because transportation and communications are now easier, more dependable and cheaper. Professional societies in the agricultural sciences have become well established, meeting regularly and publishing their own journals. National and international conferences, special seminars, visiting lecturers and professors on sabbaticals have all contributed to networks. Modern textbooks with individual chapters written by different experts from various institutions have also contributed to network interchange. The broader, and admittedly more difficult, idea of an International Agricultural Research Network, linking developed and developing countries and their institutions into a unified network with the principal idea of assisting agriculture in the developing world, is indeed an ambitious undertaking. If, however, such a broad network proves to be truly functional, even though it may be difficult and slow to put into operation, it should pay its way in more rapid LDC development at lower cost to recipient and donor nations alike. Agricultural research is usually both time consuming and expensive, and ways must be found so that research findings can be utilized in more than one place. While it is true that much research is country specific in nature (even site specific in some cases) there is ample evidence that very important research results, or the ideas and principles involved, often have broad application.

Linkages need to be developed:

1. Between interested institutions in developed countries
2. Between developed countries
3. Between institutions in developing countries
4. Between developing countries
5. Cross linkages between all of these

Membership in such a cross-linked network need not restrict the initiatives nor operations of any individual or institution. In fact, the benefits should far outweigh any extra effort involved. Information should flow to all parts of the network from all other parts so that each group is fully informed on research in progress, preliminary or final data, planning information, priority decisions, etc. Some form of automatic data storage and retrieval system will have to be used in order to handle the information flow. The Science Information Exchange of the Smithsonian Institution is equipped and anxious to take over this task.

At first the network will mainly be transferring developed country technical skills, people, ideas and research competence to developing country institutions. As research competence grows in the LDCs their inputs will become more and more significant and dependence on the developed countries for research capability will diminish. Eventually this process should help to build research capability in the LDCs' institutions that will benefit themselves, other developing nations and also the institutions of the developed countries. This is indeed a long range goal that will not be realized soon but it merits the full attention of all members of the network community.

Priorities - The Order of Things

Before decisions can be taken concerning what problems the system should attack, some ordering of priorities for work in both the biological and social sciences will be necessary. There are multiple possibilities for research in both areas: very few crops have received the intensive, multidisciplinary attention given wheat and rice; effective means for farming large parts of the world--e.g., the humid tropics and the dry-land tropical uplands--have never been developed; there is much more to be learned about managing soils and water under varying conditions; the great bulk of the farm population of the less developed world are still untouched by the agricultural revolution; the problems of price policies, marketing, distribution, which become increasingly urgent as production mounts, have not been effectively dealt with; the social and economic problems of income distribution, employment, migration, etc., intensified by rapid agricultural growth, have received scarce attention. All of these problems are important and could profit from research; but they cannot all be attacked simultaneously. A decision must be made as to which are most urgent and require attention first.

The United States, with its long experience in dealing with its own massive problems of agricultural growth and adjustment; its large body of highly trained agriculturalists and social scientists in the USDA, the Land Grant Universities, the Foundations, and in A.I.D.; plus its extensive experience with the agricultural problems of the developing countries, is qualified to develop a reasoned view as to the subjects which merit priority attention. A.I.D. should organize an effort directed

toward this end as an early order of business (preferably in the summer of 1971). A few highly qualified personnel from U.S. institutions active in LDC agriculture should be asked to draft a rough ordering of priorities. This draft should then be discussed by a larger group of agronomic, economic and planning specialists that are sensitive to the research needs and requirements of the LDCs on a broad scale. This exercise would reflect the knowledge and experience of the participants and their best judgment as to the probability that the efforts proposed would prove productive. The results of these deliberations would help guide U.S. representatives in the Consultative Group during 1971 and 1972, and help in planning A.I.D.'s own program of assistance in agricultural research.

The operations of the research network will be useless unless the results find practical application in the developing countries. Although the network has been created in large part to help compensate for the inadequate research establishments of these countries, the LDC must have some degree of competence in order to use the knowledge and materials supplied from outside. The success of the international network should be judged not merely by the extent to which it contributes to increasing food production in the developing countries, but also by the degree to which it succeeds in raising the research establishments of these countries to the level of contributors to the international network.

It would seem that the plausible and economic procedure would be to determine the priority areas for research, and to concentrate on assembling information relevant to these priorities. There is another

area in which the developed countries could cooperate to good effect. They have manpower, facilities, and resources to conduct fundamental research which provides the essential undergirding for the production-oriented efforts in which the international research institutes have specialized. As efforts of the latter sort are extended in accordance with agreed priorities, the donor countries can assist materially by cooperating in providing the fundamental research required.

Increased cooperation in agricultural research among contiguous countries with common problems, or between countries of different regions that have similar ecological situations, should be encouraged wherever possible, but with full recognition of the difficulty of maintaining sustained efforts which require financing by a number of LDCs. The FAO, and the international institutes for agricultural research can facilitate a degree of cooperation among such countries by conducting workshops and seminars and thus providing opportunities for scientists with similar interests to become acquainted and learn of the work others are doing in their field.

To this end, the effort must be made to develop more trained scientists, to improve institutional competence, and to involve the developing countries increasingly in the whole range of research programs with which the network is concerned--from decisions on research priorities to the adaptation and application of results.

A.I.D. can and should play an important constructive role in the future, as it has in the past. The Agency was influential in the launching of the Consultative Group, and has helped persuade the international centers to extend their "outreach" activities--an important element in the development of the network.

If the Agency utilized the substantial resources available in the United States to develop a comprehensive research strategy--what things need to be done first and what instrumentalities are best able to do them--it can reasonably expect to influence international developments and to improve the effectiveness of its own programs.

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Kelley

WORLD-WIDE AGRICULTURAL RESEARCH NETWORK

I. A Problem of Definition.

1. In the listing of TA Bureau Key Problem Areas (PAM 4, October 28, 1970) the "World-Wide Agricultural Research Network" is shown as a sub-topic under the major heading "Development of Agricultural Research Capabilities in the LDCs." There is a certain ambiguity in both the formulation of the problem area, and the topical arrangement. "Development of Agricultural Research Capabilities in the LDCs" is an appropriate designation of a key problem area as the term has come to be used in the Bureau exercise: an important area in which deficiencies in LDC technical capabilities and performance have a serious adverse effect on economic development. Thus stated, the locus of the problem is clearly in the LDCs; obstacles to progress would be in the LDCs, and the plan of action would aim at eliminating these obstacles.

2. But the sub-topic, "World-Wide Agricultural Research Network" is an altogether different matter. It is not, strictly speaking, a "problem area" at all, but an instrument for problem solving. The network does not lie exclusively within the LDCs; important elements are in the developed countries. Moreover, its most immediate concern is not the development of agricultural research capabilities in the LDCs, but the achievement of increased food production with the limited LDC capabilities now available.

3. It thus becomes apparent that our problem, properly defined, is the inadequacy of agricultural technology in the LDCs, and the inability of most of these countries to produce the continuing flow of new technology

needed to sustain agricultural growth. This is a problem of great importance and urgency: the accelerated rate of population growth in some of the most densely populated areas of the world, together with the virtual exhaustion of the supply of new arable land which can be brought under cultivation, has made it imperative to increase yields, and to do this rapidly.

4. The record of agricultural growth in the advanced countries - particularly in the past thirty years -shows that with improvements in technology it is possible to achieve phenomenal increases in yields. The problem was and is that the LDCs do not have the research institutions and programs, the research leaders and the required number of agricultural scientists to generate these technologies. And the problem is too urgent to await the tedious process of building LDC research institutions and training scientific staff to the point that they can themselves develop the technology needed to increase food production commensurately with the rate of population growth. The evolution of the world-wide agricultural research network has been in large part a response to this urgent need. In the short run, it provides a means to compensate for the critical deficiencies of the LDCs in the field of agricultural research by supplying externally developed technological improvements. In the long run, it will be instrumental in helping to correct these deficiencies.

5. Though increased food production is the primary and most critical need, and the objective to which the preponderant part of the effort of the research network has been addressed, it is becoming increasingly apparent that even a measure of success in this area creates a host of ancillary problems which demand attention. These, too, require research capabilities

beyond those most of the LDCs are able to muster, and may be appropriate matter for the world-wide research network. At a minimum, the problems of employment and of income need to be considered.

We have begun by reformulating the problem area, and indicating the general position of the world-wide agricultural research network in this area. We need now to identify the specific problems in the general area which lend themselves to treatment by the network, to indicate some order of priorities among these problems (or how such priorities can be set), and to consider how the network can best be shaped to perform the prescribed assignment.

II. The Network - And How It Grew.

6. The US effort to promote agricultural development in the LDCs through the application of research is now entering its third phase. During the first phase it was assumed that the advanced technology developed by research in the temperate zones could be transferred directly to the tropics and sub-tropics, provided an extension service was developed for this purpose. When these efforts proved unproductive, we recognized that the assumption was wrong, and abandoned the effort. The premise underlying efforts in the second phase was that the agricultural problems of every country were unique and could be solved only by a fully developed research system in each country. Efforts toward this end proved to be costly and laborious; agricultural growth remained slow, and many questioned whether significant results would ever be achieved.

7. In the past few years the outlook for agricultural development has changed radically, and AID is endeavoring to modify its concepts to accommodate this change. The Green Revolution grew out of the work of two

international research centers, CIMMYT and IRRI; and, though located in the sub-tropics, these are essentially western institutions. They applied western scientific skills and method to develop plant materials (whose genetic sources were, in many cases, the temperate zone) which produced unprecedented increases in yields over wide areas of the tropics and sub-tropics. This development has led to the formulation of a new concept which incorporates elements of the first two: The world-wide agricultural research network, linking scientists and scientific method of the West to research and extension in the LDCs.

8. Experience to date leads to some conclusions of great importance. It has shown that it is possible for scientists of the developed countries to do agricultural research highly useful to the LDCs; that the results of such research on wheat and rice have proved adaptable over wide areas; and that their availability made significant progress possible in LDCs, some of which had relatively limited research competence. We have also seen that some research efforts directed and coordinated by institutions of the developed countries - some US Universities and a half-dozen French government institutes, for example - have been successful in solving problems for a number of developing countries. We have found that it is possible to organize relatively low cost cereal programs on a regional basis with considerable success. These are positive achievements which indicate the vast potential of the network approach. On the other hand, we must recognize that in terms of the percentage of farmers or of arable land affected, success so far has been limited.

9. The research network as it now stands includes three major elements: a) The agricultural scientists and institutions of the less developed countries. b) Some agricultural scientists and research institutions of the developed world devoting some part of their efforts to the problems of the developing countries. c) Linkages whereby the product of the scientists of the advanced countries are made available to individuals and institutions in the developing countries.

III. Network Components and Their Inter-Relations.

The LDC Component.

10. We have noted above that the network began to take shape at least in part in order to compensate for the deficiencies in the agricultural research competence of the LDCs. These deficiencies were and still are basic, acute and almost universal. Until they are substantially eliminated, at least in the larger food deficit countries, there will be no assurance that a satisfactory rate of agricultural growth will be maintained. So many of the problems of food production are location specific that we cannot look to a limited number of external institutions, however excellent they may be, to provide universally valid solutions. The deficiencies of the LDCs can be summarized under four headings: i. trained scientists, ii. organization, iii. management, iv. politics.

11. Trained Scientists. Though the overall deficiency has never been computed either in gross terms or by category, and adequate data are available on only a very few countries, the fact that the LDCs suffer seriously from a deficiency of trained agricultural scientists and agricultural

economists is universally recognized. Training programs in the agriculturally advanced countries and at the international centers for agricultural research have made and continue to make an important contribution. Many of the research leaders of the LDCs have been produced by these programs, and there are adequate grounds for continuing and expanding them. (However, it should be noted that there are complaints that much of the training provided in American Universities is not entirely relevant to the needs of the developing countries.) Trained observers seem to agree that the deficiency is so vast that only a small part of it can be met by the provision of training in the developed countries. The requirement is part of the general development problem and will only be adequately met as the LDCs advance to the point where their own educational establishment is capable of producing trained agricultural scientists. There is need for in-service training of middle-level research workers through participation in problem-oriented research projects and for University training to the M.S. level - most of which will have to be provided within the developing country. The relatively few Ph.D.s required to provide leadership both for the general program and the major disciplines on which the effectiveness of the general program depends can, for the most part and for the foreseeable future, be provided training in the institutions of the developed countries.

12. The shortage of trained scientists. This lack is accentuated by the ineffectiveness of organization in most of the LDCs. Even when a developing country is relatively well endowed with trained scientists (as a few of them are), their efforts are likely to be diluted and frustrated by faulty organization. In representative countries, where the number of trained

scientists is very limited, the tendency is to spread this small number over so numerous an assortment of research institutes and experiment stations that nowhere is there an aggregate of skills capable of doing significant work on food production problems.

13. Management. Though listed separately, the ineffectiveness of management is at least a partial cause of the faulty organization described above, and cannot be separated from the political factors dealt with below. The major indictment of management is the failure to identify the crucial problems on which the research efforts of the country should be focused, or to bring to bear on these problems a sufficient array of talent to solve them. F. F. Hill of the Ford Foundation has stated the matter as follows: "In some cases, the research in which staff members are engaged has little bearing, directly or indirectly, on the problem of finding answers to the country's food problems."

14. Politics. The principal political problem has probably been indifference. The agricultural sector, generally, did not attract attention or support of Ministers who were obsessed with the forced draft industrialization of the country. Agricultural research suffered from this lack of interest, and from inadequate funds to purchase equipment or to attract trained scientists. This situation has changed for the better in a number of countries during the past few years. The pressure of food shortages and the demonstrated potential of the new cereal varieties were sufficient to overcome bureaucratic rivalries and inertia, and to involve the highest levels of government in intensive food production campaigns, in which the abilities of the

country's agricultural scientists were fully utilized. (Subramaniam's first act on becoming Minister of Agriculture in India in 1966 was to meet with all of the Government's senior agricultural scientists - an act unprecedented in Indian history.) In most of the LDCs, however, agricultural research continues to suffer from official neglect.

15. The Western Component. As noted above, a relatively small number of plant scientists and research institutions of the developed countries have organized to do intensive research on food production problems of the LDCs. This relatively limited effort has in a few cases yielded dramatic results over wide areas, with a minimum of adaptive work in the LDCs. Since the technique has not been widely tested we are unable now to assess its ultimate potential. To the extent that readily adaptable results of external research can be made available to the developing countries, demands on their own research establishment are of course diminished. Limited as the production oriented research of the developed countries has been, it substantially exceeds the volume of systematic research on the effect of new production technology on employment and income distribution, or on methods for guiding developments in socially desirable directions. The principal elements of the Western contribution are described below.

16. International "centers of excellence." As employed here this term refers to an institution which a) has a significant complement of trained manpower in the agricultural sciences, b) organizes this manpower for interdisciplinary studies of problems of importance to agricultural development in the LDCs and c) has the means, actual or potential, for

getting the results of these studies accepted and applied in some LDCs; d) ideally receives a "feed-back" from the developing countries which conditions further work. In those centers seeking to improve plant materials, a system is established for assembling and preserving a substantial part of the useful genetic material available throughout the world. These genetic materials are combined in multiple variants, and screened for the most promising specimens. Varieties desirable in terms of yield, disease resistance, fertilizer responsiveness, etc., and adapted to use over the widest possible areas are developed. An effort is made to achieve wide adaptability through use of a system which links the center with various outposts, where materials initially screened at the center are planted, and those most successful under local conditions identified. Seeds of the superior performers in each locale are returned to the center to be recycled; and so on, until types considered satisfactory for general release are evolved. The varieties thus developed are disseminated to the LDCs where they are adapted, as necessary, to specific local conditions and placed in production. The process cannot be terminated with the first success achieved. Experience indicates that a new variety will probably fall victim to some disease or insect within a relatively few years, and that new materials with a different genetic heritage must be "on the shelf" and quickly available to replace it.

a. The best known of the practising centers are IRRI and CIMMYT, which have focussed their efforts on the improvement of three cereal crops. The results of these efforts do not require repetition here.

b. Two additional centers, IITA and CIAT, have a mandate to work on a broad range of tropical crops and cropping systems and, in the case of CIAT, on animal production, as well. They are still in the formative stages, and their efforts over the next few years will test whether a system which has worked well when narrowly focussed can be successfully applied to a broader range of problems.

c. Consideration is now being given to the desirability of establishing a number of additional international centers including: i) water management as related to crop production; ii) food legumes, iii) starchy root crops, iv) livestock systems in East Africa, v) upland crops in Asia - sorghums, grain legumes, corn, millet, barley, and appropriate cropping systems, vi) policy, management and analysis of socio-economic and development strategy problems.

d. The success and fame of the foundation-sponsored international centers have tended to establish them as the model for external arrangements aimed at supplementing LDC research capability and have recently won them a substantial body of support. AID has become a "full share partner" in the support of all four institutes. Canada is contributing to IITA and is considering support for at least two more. The World Bank is organizing support for the Centers and is now calling a first meeting of potential donors, some of which have already pledged support. The regional banks are becoming involved. The UNDP is supporting a special project at CIMMYT, and FAO, more or less excluded from what it must regard as its proper territory, would no doubt welcome a more active role.

e. The available evidence does not support the broad conclusion, that the international research center is always the best means to mobilize western resources to work on research problems of the LDCs. What the evidence does prove is that under certain circumstances this type of organization can be phenomenally successful. Under different circumstances, it is possible that another organization might perform as well, or better. As a matter of fact, a number of unpublicized organizations have already shown considerable capability: for example, the TVA fertilizer center and the Universities mentioned in 'g' below. These examples demonstrate that under certain circumstances established research institutions of the developed countries can be adapted to serve an international role; moreover, by utilizing existing institutions it may be possible to save time, energy and money.

f. The Agricultural Research Service of the USDA has an impressive array of talents in the agricultural sciences, and the potential to organize a number of enterprises which could qualify as international centers of excellence. However, the service is organized to deal with problems of US agriculture, and its LDC-oriented efforts have so far been limited. If a mandate were provided and continuing financial support assured, the ARS could almost certainly organize a significant program in support of LDC agricultural development.

g. A number of Land Grant Universities have served effectively as centers of excellence - e.g., North Carolina State for soils analysis, Purdue for sorghum and high protein maize, Nebraska for high protein wheat, Mississippi for seed production and storage. The potential among these

Universities is great, and only a modest beginning has been made toward realizing it. The requirements for realizing this potential are i) assurance of continued financial support and ii) an organizational form which does not make excessive demands on the manpower of a single University. Requirement i) can be met by 211 d grants and long-term contracts; ii) by a 211 d grant and/or the establishment of a consortium - a cooperative arrangement whereby two or more Universities join in support of a common program.

h. Institutes for tropical research in other developed countries. Our knowledge of the competence and scope of these institutes is fragmentary, but we have enough evidence to indicate that they are doing significant work, and most be taken into account in considering the components of a world-wide "system". France, for example, has ten research centers devoted to tropical crop production, all of which have headquarters in the metropole, and field staffs stationed in the francophone countries of Africa. The United Kingdom has a Tropical Products Institute; both Germany and Belgium have several institutes of tropical agronomy; the Netherlands has an International Institute for Land Reclamation and Improvement, which has established cooperating institutes in several LDCs.

i. Although the recognized International Centers for agricultural research have become increasingly concerned with the broader implications of their work - such problems as pricing, marketing, rural employment, the disadvantaged farmer, alternative uses for land, etc. - they remain predominantly production-oriented. Some of these broader problems, if they relate to individual countries or regions, are studied by one institution or another:

e.g., the FAO, University scholars of this and other countries, the OECD Development Center. But there is no system of organized, coordinated research devoted to these subjects, comparable to that devoted to crop and animal production. Efforts are largely ad hoc, and do not form part of a network or system.

17. Linkages. The International Centers, as a result of their training programs, have contacts strategically placed in the research systems of many developing countries. AID Missions have frequently served as communication links between the International Centers, as well as US institutions doing research under AID contract, and the Governments of developing countries. International conferences and symposia on research questions are becoming more frequent. In addition, more regular continuing arrangements are developing.

18. These include certain regional centers, organized on a much more modest scale than the international centers, or regional "coordinators" who assist with programs in several continguous countries and serve as linkage points between an international center and national research institutions. Such an intermediate institution need not conform to any rigid pattern: it may be an outpost of an international center, or one international center serving as a regional outpost for another (as CIAT and IITA serve for CIMMYT on corn), or a regional coordinating group, as CIMMYT, with AID support, has established for wheat work in North Africa, or an "open" national system serving several countries in the region, as is

planned for the Turkish institute working with Rockefeller support on upland wheat, or a regional effort sponsored by the UN, such as the West African cereals project coordinated by the Agricultural Research Service of USDA and the East African corn program.

19. Account must also be taken of regional research institutes sponsored by groups of developing countries, such as the East African Agriculture and Forestry Organization. These enterprises, though highly desirable in principle, in practice have not been markedly successful. They are not effectively insulated from national political considerations, and they do not have the assured continuity of funding which makes it possible to maintain first-class staff and to sustain work over the extended periods usually required to achieve successful results.

20. Scientific cooperation and exchange of information. An important part of the evolving research network sketched above, is the increase in professional contacts and cooperation among scientists of the LDCs and between them and the scientists of the developed countries. Training programs at international centers, international conferences and symposia are helping to create a scientific community, whose existence facilitates the exchange of information and materials. The FAO has been studying means to achieve wider and faster dissemination of research results, and will probably make specific recommendations looking to this end. A study of the possibility of using computers to aid in programming world-wide research activities has been proposed. All of these elements, present and potential, could increase the effectiveness of the world-wide network.

IV. Outline of an Action Program.

21. Complexity of the Problems Confronting the International Network

a. At a minimum, it must be concerned with: i) production: including proteins as well as gross calories, ii) employment and income distribution, and the special problems of the disadvantaged farmer. This means that research in the social as well as the biological sciences is needed.

b. Agricultural development has multiple aspects, and what begins as a simple program to increase food production may encounter or even create complex socio-economic problems. At a minimum, agricultural scientists should have an awareness of the milieu into which technological innovations will be introduced, and their possible economic, social and political effects. As far as possible, these elements should be considered together as aspects of the same problem. To cite an example of the application of this principle: After successfully adapting IRRI varieties to local conditions, CIAT produced a study showing that its introduction in the irrigated lowlands would result in driving the rice farmer of the rain-fed uplands out of the market. With this type of forewarning, Governments can consider the total impact of a new technology before deciding to launch it.

- Giving effect to this objective is partly a problem of organization - arranging for social scientists to work directly with the biological scientists concerned with production problems.

- In part, it requires a greater awareness in the developing countries of the broader implications of new technology. The assignment of the right kind of technical advisors, and the advanced training of additional LDC social scientists will contribute to this end.

- There is merit in the proposal of a Ford Foundation study to unite the social scientists of the Asian countries in some form of association in which they would work on common problems of adjustment created by the new production technologies. The organizational structure best suited to this purpose is a debatable question, but there can be no doubt that the problem addressed is an important one and that improved means are needed to cope with it. The need is most acute in Asia but it exists in other regions, as well.

22. There are multiple constraints on agricultural growth. In deciding on those which merit attention as part of an effort to strengthen the world-wide research network we should consider: a) What research should be undertaken by the network. In deciding a possible subject for research, we must take account both of the importance of progress on it to agricultural and general economic development, and the probability that the research will be successful and its results applied. b) What form of organization is best fitted to do the job. Decisions on the substance of research will affect decisions on organization form. The instrument, obviously, must be shaped according to the purposes it serves. The first need, therefore, is to determine research priorities.

23. The best technique for AID to employ in developing a position on research priorities is a subject for discussion. An immediate decision on the proposals to be considered at the World Bank meeting must be made, and for this purpose, AID will have to depend on its Washington staff possibly supplemented by scientists of the USDA. For the future, a better system should be devised.

24. To some extent, these questions have already been prejudged for the immediate future, by the Bellagio Group and the studies prepared for it.

Although the judgments are not now definite, an effort to obtain firm commitments will be made at a meeting of potential donors to be convened by the World Bank in January 1971. AID will want to help maintain the momentum of this initiative, and must give support. However, as far as we can do so consistent with this objective, we should attempt to avoid firm commitments to the proposed new enterprises until we have had an opportunity thoroughly to consider both the question of priorities and the most efficient means for addressing those decided upon.

25. Institutional means for developing international agreement on problems of priority and organization will be proposed by the World Bank at the January meeting. (These proposals are considered below.) Although the establishment of an international arrangement for dealing with these questions means that final decisions will be taken in a different context, this will not diminish the need for AID to develop its own position.

The LDC component of the international network

26. The discussion below is couched in general terms, applicable to all LDCs. For purposes of an AID action program, however, it will be necessary to decide at the outset on what LDCs we will focus. A substantial effort will be required to deal with the array of problems listed below, and realistically we should probably think of four to eight countries, in the first round (to last from 18 to 24 months).

a. Constraints on the research efforts of the LDCs can be conveniently grouped under two headings:

i. Short run - i.e., likely to yield to brief treatment, if the country is resolute in its will to succeed and effective technical assistance is provided. These constraints include the following:

- faulty organization and management of trained research personnel.

- lack of a few key personnel who might be supplied from outside.

- lack of effective linkage between internal and external elements of international system.

- lack of government support.

ii. Long-run - i.e., requiring sustained effort over a period of years. The principal long-term constraints are:

- the lack of scientific manpower

- the lack of effective institutions - both to do scientific research and to train research scientists.

- the lack of government support.

b. In reality, of course, the division is not nearly so clear-cut as this categorization implies. There is some advantage, however, in distinguishing between areas where a well-directed effort might produce some return in the foreseeable future, and those where years of effort will probably be required before results of any significance can be reasonably expected. "Lack of government support" is listed in both categories, because it is an immediate problem which any attempt to effect rapid improvements will probably encounter, and because it will doubtless persist in many LDCs for years to come. Industrialization has long been regarded by the LDCs as the essential core and the visible sign of economic development and their low regard for the agricultural sector is too often reflected in their policies and budgets. This attitude must change, if agricultural research is to obtain the support it requires. A positive attitude on the part of the governments will, in fact, be essential to the implementation of most of the proposals set forth below.

Short-term constraints.

27. The intensified cereal production campaigns of the past few years have highlighted organizational deficiencies in some countries, have exerted pressure for correcting them, and have at least in a few cases accelerated the development of a coherently organized system, including a research component. If the operations of the international research network stimulates a rate of agricultural growth in some LDCs beyond the capacity of the local system to generate, the deficiencies of the local system will be clearly revealed to government leaders. This may create a more positive attitude toward improving the system, and encourage a new willingness to seek outside help in the task.

28. Probably the best device for achieving more effective organization of an LDC research effort is the joint review, in which scientists of an advanced country and of the developing country together study the problem and produce agreed recommendations. This technique has been employed in India, Pakistan, Malaysia and Indonesia, and several other countries have indicated an interest in undertaking a similar review.

29. AID should encourage the Governments of the larger developing countries to accord agricultural research the attention it merits and to study how their research effort can be most effectively organized. The Agency should discreetly stimulate requests for assistance in making such studies, and should place itself in a position to respond effectively to such requests.

30. Albert Moseman, in his recent study "Building Agricultural Research Systems in the Developing Nations" indicates that though specific

organizational structure may vary from country to country, three basic components will normally be required. (page 102)

" (1) a strong national center for background research and for conceptual and coordinating leadership for national and regional projects.

(2) regional centers for adaptive research and specialized attention to the agricultural requirements of the major cropping regions of the country.

(3) localized research and/or verification and testing stations designed to fit innovations to specific soil and climatic conditions."

31. It is possible that studies of an LDC's research institutions will reveal that though reorganization will help, the system will not operate effectively, unless a few skilled "advisors" are provided from outside In these circumstances, AID should use its best efforts to make such personnel available.

Long Term Constraints

32. In the long run, as in the short, the critical constraint in the LDC component is the lack of skilled manpower. And this problem cannot be solved by temporary expedients or crash programs. Its magnitude is so great that it cannot be solved by the provision of training in the developed countries. In the long-run, salvation must come from within: the country must itself produce most of the trained scientists it needs.

33. Training in the developed countries must continue, of course. For a long time to come, most LDCs will have to depend on this source to meet their relatively limited requirements for scientific leaders trained

at the Ph.D. level - both in the biological and social sciences. The Report to the President by the AID Administrator and the Secretary of Agriculture (Feb. 19, 1970) included a passage which provides continuing guidance concerning U.S. assistance efforts in this field:

> "Training in the United States should be increased and made more relevant to actual needs of academic and non-academic students from developing countries. There are exceptions, but too often the individual finds himself immersed in studies oriented to our own sophisticated agriculture.
>
> There is distinct need to change curricula and course materials to meet the most urgent requirements of developing country students .....
>
> AID plans to develop a pilot curriculum to meet needs of academic and non-academic students and lay a basis for development of needed course material. Subsequently it would be prepared to support institutions willing to develop such material and offer the proposed courses. This approach probably will tend to concentrate students at fewer universities and institutions in order that maximum advantage accrues from the new courses."

Under the terms of a grant agreement with AID, The Agricultural Development Council is taking the lead in developing curricula and course materials more relevant to the requirements of students from the developing countries.

34. Over the past decade and a half, AID has mounted a major effort to help the developing countries achieve the capability to train their

own agricultural workers and scientists. Since 1954, about $100 million has been committed to programs designed to improve the competence of some 50-odd agricultural Universities in the LDCs. How successful these efforts have been is a moot question, however. It is probable that only a small number of these institutions have developed to the point where they produce competent research scientists at the M.S. level. Among the findings of the Spring Review of New Cereal Varieties, approved in June, 1969, was that "Greater stress....should be placed on building more research and service capability into LDC universities and other institutions." And, further, "when AID considers phasing out an assistance program.....special attention should be directed to the stage of research capability achieved, and, where further assistance is required to bring agricultural research institutions to a state of maturity, means should be sought to accomplish this purpose."

35. As part of the joint review of research capabilities it is proposed to undertake with selected LDCs, we should attempt to estimate the numbers of trained agricultural scientists in the various disciplines they will need in the 1970s. We should evaluate the ability of their agricultural universities to produce these scientists in the numbers required, and, where such an effort seems warranted, arrange for a program to improve the universities' competence. Jointly with the country government's representatives, we should propose a program for developing agricultural scientists in the numbers needed in the various disciplines, utilizing the facilities of the indigenous University to the full, and supplementing it, where necessary, with training abroad, in the international centers, American Universities, etc. Particularly where AID is pulling out.

Constraints on the advanced country component of the network.

36. With a minimum investment of money and manpower the scientists of the developed countries have already made a substantial contribution to agricultural growth in the LDCs. It is a fair assumption that with some additional effort they could do much more. Essential to the success of this effort are: a) the proper establishment of priorities, and b) effective organization to cope with priority problems. AID will no doubt have significant influence on the decisions reached on these questions, but the Agency's views will not be controlling. The impending establishment of the World Bank consultative group (with a corps of technical advisors lead by the FAO) in support of the international agricultural research institutes will place the UN agencies in a focal position. In view of Mr. MacNamara's reported attraction to the international center concept, this may result in some distortion of the organizational pattern. The consultative group is being organized by the Bank primarily to support existing centers and proposed new centers of similar type.

37. Ideally the question of organization should be addressed only after decisions had been reached concerning research priorities. In some cases, the establishment of a new international center will be the most effective means for dealing with the problem, but this should not be taken as a foregone conclusion. Generally speaking, the international center should probably be the chosen instrument only when the following conditions obtain:

a. Location of the headquarters operation in a tropical or sub-tropical area is essential.

b. The need cannot be met equally well by other means; e.g., the expansion of existing international centers, or making a national center "open" by providing it financial support, or by means of cooperative programs coordinated by an outside expert -- e.g., from one of the foundations, the established International Centers, the USDA, the FAO. Even where a new installation in an LDC seems necessary, consideration should be given to the possibility of following the model recommended by North Carolina State for the establishment of a Potato Center: that is, the location of a coordinating unit with a minimum staff in Peru, linked to a number of U.S. Universities already engaged in some aspect of potato research.

38. If there is a strong drive led by the World Bank to increase the number of international research institutes, with an accompanying increase in financial requirements, the Agency will have to balance a number of considerations:

a. The desirability of encouraging increased participation by DAC member countries by demonstrating our own support.

b. The need to strengthen national systems of agricultural research.

c. The possibility of accomplishing the desired objective by strengthening or creating U.S. centers of excellence.

39. The Bank is understood to be considering matching any funds put up by new donors to the international institutes. It would probably be appropriate for the U.S. to take the same position and maintain the ratio established in the general assistance effort - our share equaling the combined contribution of the other donors. If the decision is made to proceed

with all the additional Centers considered at Bellagio, and financial targets are met on the basis of the position already taken by the Foundations and the formulae for the Bank and AID subbested above, the following pattern of contributions would emerge:

Two Foundations	6 million
AID	6 million
World Bank	6 million
Other donors	6 million
TOTAL	24 million

40. The proposal that AID strengthen national research capabilities through training and further institutional development clearly implies increased costs, also. The initial limitation of the program to one or two countries in each geographical region should hold costs within manageable limits, however.

41. The creation of a number of U.S. centers of excellence, rather than focussing exclusively on the establishment of additional international institutes, is clearly attractive to AID. Leaving aside the consideration that the Universities form an important part of the Agency's limited political constituency, there are good reasons for favoring this course:

a. In some cases, a U.S. center of excellence can perform substantially the same work as an international center; in some, it can

support and/or supplement the work of the international center; in some, its primary role may be to assist in U.S bilateral programs, perhaps in the strengthening of the research capability of an LDC University. There are a number of centers now receiving AID support which are making significant contributions to agricultural development in the LDCs. Examples of two U.S. institutions which perform the essential functions of international centers: The TVA fertilizer center; Purdue in its sorghum work, where a coordinated program involving an exchange of information and materials with several dozen correspondents is maintained.

b. The international research centers proper are preoccupied with practical problems of production. They are neither staffed nor organized to do basic scientific research, and frankly state that they depend on other institutions for work in this area: for example, CIMMYT utilizes basic research by Purdue, Nebraska, California, Manitoba and Guelph. It is possible that a deliberately planned program of support to those U.S. institutions doing basic research in areas judged most important by the scientists of the international centers could significantly strengthen the Centers' work on crop production. The larger socio-economic implications of new agricultural technologies seem particularly suited to cooperative endeavors, linking international centers with the universities of the United States and other advanced countries. The Centers are becoming increasingly concerned with this problem, and when CIMMYT acquires the complement of agricultural economists it plans to recruit, they will all have a degree of competence in this field. However, the Centers' staffs are small and cannot possibly undertake the broad range of research required. These staffs should be linked with scholars

in American universities, in a coordinated attack on the broad range of problems which need to be studied in this field. U.S. Universities are already engaged in a number of relevant studies -- e.g., land tenure, the role of agricultural prices in economic development, the impact of new technology on rural employment -- and have the capability and desire to do more. It should be AID policy to encourage studies directly related to the impact of the new agricultural technologies; and to make these studies operationally significant.

Improving linkages

42. Aside from those drawn into the orbits of the international research centers and the somewhat narrowly focussed work of the FAO, there is no real community of Western biological and social scientists doing research on LDC problems. Knowledge accumulated on an individual or institutional basis is not pooled, and consequently, individual projects are not mutually reinforcing. There needs to be much better communication among researchers working in the same general field. As a first step, an effort should be made to inventory, classify and put in usable form the results of tropical and sub-tropical research conducted by the former colonial powers - the British, French, Belgians and Dutch. This could form the core of an expanded data bank where information on all significant research projects, including all fresh initiatives would be readily available. The proposed Technical Advisory Committee of the World Bank Consultative Group would probably be the most appropriate institution to undertake this work. But if the job is to be done effectively, it will have to be given greater resources than those currently proposed.

a. Each Center should have its own group of correspondents and cooperating institutions in the LDCs it serves. As the operations of the Centers expand and their associated institutions increase, the system will become a real network, with many articulations and intermeshing strands.

Helping to organize and conduct regional programs

43. It may well be that the most useful work in strengthening the world-wide research network can be done in the intermediate area between the international centers where new technologies are developed and the frequently inadequate institutions of the developing country which channel the new technologies into local production. A variety of intermediate institutions have been tried over the past few years, and a number have demonstrated their utility. Examples include the AID-support CIMMYT wheat program in North Africa, the AID-supported USDA corn and cereals programs in East and West Africa, the FAO cereals program in the Middle East. In each case the national institutions of several contiguous countries have been enabled to conduct programs which would probably have been beyond their ability to implement without such aid. We should encourage the International Centers to establish more of these regional centers and coordinated programs, and, where circumstances are appropriate, AID should support regional programs under the direction of the Agricultural Research Service of the USDA.

The recent contract of the African Bureau with the NAS to develop a continent-wide plan which would make the most rational use of resources available for research is perhaps the most ambitious effort yet launched

to bring order and discipline to agricultural research. Experience with this enterprise will be significant not only for Africa, but to the entire world-wide research network.

44. The ultimate success of the world-wide network does not require the disappearance of the system. The measure of its success will rather be the degree to which the LDC component moves closer to equality with the components in, or drawn from, the advanced countries. The more that progress is made in this direction, the more effective the operation of the research network will become. As the flow of benefits becomes more obviously reciprocal, the willingness of the developed countries to provide support will increase. As the LDCs see their own prosperity progressively increased by the flow of technology which reaches them through these channels, their understanding of the importance of research and willingness to help provide the continuing financial support it needs, should increase also.

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M. Cox
M. Broadwax

JUN 11 1971

MEMORANDUM

TO: Task Force Members June 9, 1971

FROM: TA/AGF, Omer J. Kelley

SUBJECT: Interim Action Plan for World-Wide Network for Agricultural Research

Attached for your review is the latest draft of an interim action plan for this Key Problem Area. Because considerable regional bureau work is called for in Section VIII during July, August and September, we plan to provide the TAEC with an opportunity to review it on June 30 unless you and your bureau deputy feel that is not necessary. Therefore, we would appreciate receiving oral or written comments by June 16. If you feel a Task Force meeting is necessary we will, of course, call one.

Attachment

cc: SHButterfield, AA/TA

Note: Three appendices are attached to the paper. The fourth is Mr. Daspit's 38 page staff paper, which you already have and is not attached.

Corrected pps inserted 6/14 LS

WORLD-WIDE NETWORK FOR AGRICULTURAL RESEARCH

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The Problem - Food Production

There are at least five factors which food policies of and for the developing countries must take into account: 1) the continuing increase in the demand for food created by the inexorable growth of population, 2) the further increase in demand resulting from the slow but steady rise of income in these countries, 3) the need in most developing countries for a better nutritional balance in the average diet; i.e., a higher proportion of protein, 4) the LDCs scarcity of foreign exchange and the diminished availability of food on concessional terms, which together make it imperative for them to meet increased requirements from indigenous production; 5) the desirability of the agricultural sector contributing to general economic development, by producing some surplus over domestic requirements.

These factors taken together indicate the need for an increase of 4-1/2 to 5 percent a year in food production in most of the developing countries, and for a significantly larger proportion of proteins. 1/

In the past, most increases in food production have resulted from bringing new lands under cultivation. This possibility still exists in parts of the developing world, though the process will in many cases be difficult and expensive because of the need to create infrastructure and supporting services. In others, including some of the most densely populated countries, virtually all arable land is

1/ See appendix 1 for analysis.

already under cultivation, and increases in production can be achieved only by increasing yields.

Experience has shown that the achievement of significant continuing increases in agricultural yields requires a flow of new agricultural technology (dealing with ~~a group of~~ the entire system and not just the agronomic requirements) and this in turn requires a sophisticated research apparatus including skilled workers in the various sub-disciplines of agricultural science and related disciplines; an effectively organized interdisciplinary effort under forceful and imaginative leadership, and the assurance of adequate continuing financial support. Almost all the developing countries lack some of these essential ingredients, ~~as well as the economic research capability~~ and service-oriented institutions that make agricultural sciences truly useful.

Agricultural research in the developing countries has been handicapped most of all by the lack of skilled agricultural scientists. But this deficiency has been compounded by faulty organization, poor management and indifference on the part of many government leaders obsessed by the chimera of industrial development. In the past few years, there has been a noticeable shift in attitude in some of the most populous developing countries, and agricultural development is receiving greater emphasis. It appears that a critical period in history has arrived when the bringing together of the requisite manpower,

political interest, experience, capital and technical competence can be combined in a worldwide effort to build a research capability adequate to the awesome task.

The Opportunity - An Effective Research Network

During the second half of the decade of the sixties, it was demonstrated conclusively that technological, organizational and managerial shortcomings need not be insuperable obstacles to the adoption by the LDCs of new agricultural technology. Research institutions established, led and largely staffed by the technologically developed countries, bred new varieties of wheat (at CIMMYT in Mexico) and rice (at IRRI in the Philippines) which produced double the yield of traditional varieties. They were disease resistant, photoperiod insensitive, highly responsive to fertilizers and broadly adapted. Between 1965-66 and 1969-70, the area planted to the new cereal varieties increased from 41 thousand to 44 million acres. Yields of the new varieties, when accompanied by appropriate inputs, were as much as 100 percent greater than those of traditional varieties.

These are impressive achievements, and demonstrate the great potential of a system designed to mobilize scientific skills and resources of the developed countries in support of agricultural development in the LDCs. But the results should not be exaggerated. Success has been restricted largely to two cereals, grown, for the most part, on irrigated lands where the water supply could be controlled; moreover, only about a

dozen countries have planted the new varieties on a large scale, and in these countries the record is not one of unalloyed success. Moreover, the rate of increase in production achieved by these countries seems to be slowing down, as the limits of the optimum planting areas are reached. In 1970, land planted to the new varieties amounted to only about ten percent of the cultivated area of non-Communist Asia -- the continent where diffusion has been greatest; in other continents, the percentage is much smaller. Furthermore, the new varieties, important though they have been in meeting food requirements where the need was most acute, have not materially improved the lot of the farmers of the less-developed world.

Further progress will require substantial additional research on the technology needed to increase food production and the concomitant problems of employment, income distribution, government policies, marketing systems and on the associated problems which increased production creates. It seems reasonable to conclude that the best way to get at this will be to build from the model which has already proved its worth -- that is, to supplement the presently inadequate research establishments of the LDCs by concentrating a "critical mass" of scientific skills, from both the developed and developing countries, for an extended period on each of the main problems. The potential of this technique has only begun to be realized. What is required for a fuller realization of potential is:

1. A substantial coordinated technical and financial effort on the part of donor countries,

2. intensified attention to agricultural research and production in and on the part of the LDCs (utilizing both LDC & DC experts), and

3. the linking of these elements in an effective system, i.e., into an action-oriented, multi-disciplinary worldwide network for agricultural research. It is encouraging that steps are beginning to be taken along all three tracks.

Linkages - The Unifying Imperative

It is abundantly clear that government officials, heads of educational institutions, managers and directors of assistance agencies, private foundations and businesses and international organizations - in both the developed countries and the developing countries want to see agricultural development proceed at an accelerated rate. Looking at the magnitude of the overall effort one cannot help but come to this conclusion. Also, there has been for some years increasing recognition that the overall effort is disorganized, scattered, duplicative or at least overlapping, uncoordinated and to some degree competitive where development funds were available from different "windows" of different interest rates and with different requirements. Broad recognition of these problems, and many meetings and discussions on the subject have culminated in the formation of a "Consultative Group for Worldwide Agricultural Research" headed by the tripartite leadership of the IBRD, the FAO and

the UNDP, to contribute to and coordinate the funding of a worldwide agricultural research effort. A "Technical Advisory Committee" made up of 12 outstanding technical leaders from developing as well as developed regions and broadly representing the various disciplines in agricultural development, has been named. This Committee will report directly to the Consultative Group. The establishment of these institutions gives ~~official~~ a major segment of form to the international network for agricultural research which ~~has been~~ is gradually taking shape and provide a central coordinating mechanism for the system.

The newly-formed Consultative Group for Worldwide Agricultural Research, forming the financial backbone for the network, should assure that money will not be a limiting factor ~~in this~~ in priority research effort. The Technical Advisory Committee representing the various regions and disciplines provides a forum and a mechanism whereby technical ~~inputs~~ funding or initiatives from any country or any organization can be considered, evaluated and made known to the Consultative Group. 2/

The next task is to strengthen the parts of the proposed system and develop linkages that really tie the whole into a network. The term linkage, as used here, is intended to imply the means whereby separated individuals or institutions, within or between countries and regions, are joined in a common research effort, with a common understanding of problems, agreement on goals, with channels of communications which facilitate the exchange of knowledge, materials and at times people between them.

2/ See Appendix 3 for report on first meeting of Consultative Group (May 19).

Linkages (and an information storage and retrieval system) need to be ~~developed~~ improved and expanded:

1. Between interested institutions in developed countries within & between scientists and
2. ~~Between developed countries~~
3. Between institutions in developing countries sci.
4. Between developing countries
5. Cross linkages between all of these which tie their output to LDC producers and consumers needs.

Role of the Developed Countries

Oversimplified, the developed countries will, for the next decade or so, provide ~~most~~ much of the ~~intellectual~~ scientific leadership for the overall network and by far the largest share of financial and technical resources for almost all parts of the system. The developed countries will underwrite existing and new ~~international~~ multi national centers and will provide most of the scientists to staff them. ~~Domestic~~ DC research institutions with ~~high~~ specialized competence ~~relevant to~~ and experience in one or another important aspect of ~~tropical~~ LDC agriculture will be important contributors and will need to be fully exploited.

3/ Over the years there has been considerable developed country interest in promoting regional research institutions serving several countries. Increased cooperation in agricultural research among contiguous countries with common problems, or between countries of different regions that have similar ecological situations, should be encouraged wherever possible, but with full recognition of the difficulty of maintaining

sustained efforts which require financing by a number of LDCs. The FAO, and the international institutes for agricultural research can facilitate a degree of cooperation among such countries by conducting workshops and seminars and thus providing opportunities for scientists with similar interests to become acquainted and learn of the work others are doing in their field.

AID sponsored
U.S. examples are:

1) the consortium of agricultural universities working in India,

2) Purdue's sorghum and corn research projects utilizing computer based rapid information retrieval methods, and

3) Michigan State's work in agricultural economics and employment generation

As donors to LDCs, the developed countries will need to provide planning and operational experts, substantial financial assistance and academic training to help LDCs build effective national research systems and institutions.

Role of the Developing Countries

The first efforts for interested LDCs inevitably must be to develop ~~a~~ adaptive research institutions that can translate generalized technical improvements (from international or DC research centers or from other LDC research efforts) into locally useful technology. Parallel with ~~adaptive~~ agronomic research should go research ~~or analysis leading to other "system" changes~~ on other elements of the system (price policy, employment, marketing arrangements, etc.) to ensure ~~producer readiness to utilize the~~ utilization of the new technology as ~~when~~

it is ready. LDCs will need to draw heavily on experts from donor countries while their own professionals are being trained. A few LDC experts will contribute to the network from the outset (~~as~~ Participation, in the TAC, and in ~~international~~ multinational research centers and in their own institution). As research competence grows in the LDCs their inputs will become more and more significant and dependence on the developed countries for research capability will diminish. Eventually ~~this process should help~~ however to build research capability in the LDCs' institutions that will benefit not only themselves but other developing nations and also the institutions of the developed countries. This is indeed a long range goal that will not be realized soon but it merits the full attention of all members of the network community.

From the beginning, however, LDC policy makers should be involved in the broad decisions regarding priorities for the network and how LDC efforts should be meshed with the other elements of the network.

Ordering of Priorities

Before decisions can be taken concerning what problems the system should attack, some ordering of priorities for work in both the biological and social sciences will be necessary. There are acute multiple needs for research in both areas: very few crops have received the intensive, multidisciplinary attention given wheat and rice; effective means for farming large parts of the world--e.g., the humid tropics and the dry-land tropical

upland --have never been developed; there is much more to be learned about managing soils and water under varying conditions; the great bulk of the farm population of the less-developed world are still untouched by the agricultural revolution; the problems of price policies, marketing, distribution, which become increasingly urgent as production mounts, ~~have not been effectively dealt with~~ are not well understood; the social and economic problems of income distribution, employment, migration, etc., intensified by rapid agricultural growth, have received scarce attention. All of these problems are important and could profit from research; but they cannot all be attacked simultaneously. A decision must be made as to which in total or in part are urgent enough to require attention first.

Role for AID

AID can and should play an important, constructive role in the development of an effective agricultural research network.

The Agency was influential in the launching of the Consultative Group, and has helped persuade the international centers to extend their "out-reach"activities--an important element in the development of the network. We have made substantial financial contributions to the international centers and have been involved for years helping LDCs develop agricultural research competence.[4/]

4/ See Appendix 2 for summary of AID contributions for 1970.

The elements within AID's contribution are:

1. Recommendations in a variety of forums regarding priorities, strategy and operations of the network.
2. Financial ~~contributions~~ and other assistance to ~~international~~ meetle centers.
3. Financial support and role delineation for U.S. research and training institutions.
4. Assistance to LDCs in obtaining planning consultants, OPEX experts, institutional development advisors, training and capital loans and grants.
5. Continuing contribution to evaluation of efforts to develop an effective network.

Immediate New Action for AID

A. While AID should proceed with all of these elements and should not put a "stop order" on important assistance efforts while we fully spell out a grand strategy, it is essential that we proceed immediately to sort out a rough-and-ready list of substantive problems that merit priority attention by the network and then develop a plan to get at them. This will be of fundamental importance to our proceeding intelligently with each of the assistance elements over the next 12 to 18 months.

At the risk of seeming arrogant, we should recognize candidly that the U.S., with its long experience in dealing with its own massive problems of agricultural growth and adjustment; its large body of highly trained agriculturalist and social scientists

in the USDA, the Land Grant Universities, the Foundations, and in AID; plus its extensive experience with the agricultural problems of the developing countries, is qualified to develop its own reasoned view as to the subjects which merit priority attention. The Key Problem Area Task Force and TAB are organizing an effort toward this end now. ~~A few highly~~ qualified ~~personnel~~ from U.S. institutions active in LDC agriculture [are being asked] to draft a rough ordering of priorities. This draft will then be discussed by a larger group of agronomic, economic and planning specialists in and out of AID that are sensitive to the research needs and requirements of the LDCs on a broad scale. The product should reflect the knowledge and experience of the participants and their best judgment as to the probability that the efforts proposed will prove productive.

Once this priority assessment is in hand (hopefully by the end of July) the following steps should take place:

1) Circulate the assessment to selected field missions for their views and those of knowledgeable LDC people.

2) Share the conclusions, informally, with the U.S. member of the TAC and with various GC members.

3) Have the Task Force members ________________________ /put together a draft overall strategy and action plan for the foreign aid program's participation over the next

several years in this key problem area in the light of the interim conclusion on priorities. Among other things this will require a brief paper from each regional bureau and from TAB and OIT setting forth present activities and what each plans in view of the overall priority listing and other important factors, such as country priorities.

Selected USAID officers would be asked to come in to review the draft.

Next, implications of this draft plan would be summarized, a set of issues drawn up and the package put before the TAEC for consideration by early September. Subsequently, say, in October, following any needed modification, it ought to go to the Administrator for review.

Utilizing the substantial talent available to it, within and outside the agency, to develop a comprehensive, though necessarily tentative, strategy and action plan for this key problem area -- laying out what things need to be done first, what instrumentalities are best able to do them and, broadly, where they should be done -- AID can reasonably expect to positively influence the development of the international institutions within the research network and to improve the effectiveness of its own projects. Specifically, the results of this effort will help guide U.S. representatives in the Consultative Group and in other international forums during 1971 and 1972 as well as U.S. contributions and recommendations to international research centers. It should also be of some

help to AID in planning with LDCs its program of bilateral assistance within the international agricultural research network.

B. Certain concurrent actions ~~should~~ which may be undertaken by various Task Force members or consultants between July 1 and September 15.

1. "Mine" the mini-review on AID's contribution in strengthening LDC agricultural universities and ministries of agriculture for insights regarding building LDC research competence. Mini-review will take place in late August or early September.
2. Develop with USDA a plan for more effective use of PL 480-financed research and possible use of other legislative authorities for USDA research work.
3. Review with ADC progress to date in its efforts to make curriculum of certain U.S. agricultural universities better fit requirements of students from LDCs.
4. Assess the feasibility of calling for some sort of rational division of labor among developed country institutions carrying out tropical agricultural research -- including social and economic research as well as the more basic research needed to support the production efforts of the international centers.
5. Review and assess AID experience with "joint-surveys" of LDC agricultural research organization and personnel.

APPENDIX No. 1

Goals - An Empirical Judgment

A 4.5 to 5 percent sustained annual increase in agricultural production in the LDCs should be the first goal of the network.

This is a realistic goal that is fairly well balanced between what is desirable and what is possible and between what can physically be produced and what can be consumed and/or marketed at prices that will keep the farmer producing.

A 2.5% to 2.8%	increase would just about keep up with population growth. This is occurring now in the LDCs. A little over this is L.A. and Asia but a little below this in Africa.
Another 1.0% to 1.2%	increase would make modest improvements in caloric intake each year, or some improvement in diet quality - but not both.
Another 1.0%	increase would add modest amounts to exports, assisting overall economic growth. This increment could easily be absorbed internally if increases in food prices can be held below increases in income.
Totals 4.5 to 5%	

Since the 2.5% to 2.8% increase allocated for population growth in the breakdown above is already being realized, it is the 2.0% to 2.2% in the other two categories that is required for sustained progress. This is and will be the most difficult increment to add to overall production since increased production is a response to increases in effective demand - and this demand grows, above population increases, when consumer incomes rise faster than food prices. Therefore:

Employment opportunities	-	for greater numbers of people
Improved incomes	-	for low and medium income-level people

Relatively lower food prices	-	for greater numbers of consumers
Relatively higher farm profits	-	for small to medium producers

become the real controlling factors in commercial production and in social and economic growth.

Food production, distribution, and utilization may be the most immediate goal that a research network can focus on, but this is only slightly more urgent than achieving the second goal of better balanced diets. The problems of inadequate protein levels and poor amino acid balances need to be given major attention along with the total food production problem.

The third goal, and the one that is perhaps the most important of all in the long run, is the development of LDC research competence in agriculture and related disciplines so that these countries can, with the help of the international network, stay ahead of agricultural problems. A subgoal would be their eventual ability to contribute significantly to the international network.

Goal Requisites - A Partial Listing

Holding consumer prices as low as possible, commensurate with adequate farm prices (incentives), will require:

1. Higher yielding, more broadly adapted crop varieties
2. Cheaper farm inputs
3. Improved production techniques that match the new crop varieties' needs
4. Lower production costs
5. More enlightened government policies that respond to rural needs
6. More efficient marketing systems that

a. Reduce the number of sales transactions

b. Increase market competition and reduce markups

c. Lower transportation costs

d. Lower processing and storage costs

e. Reduce spoilage and waste

It is really not important at this point to discuss the relative merits of increasing yields on land already in farms, as opposed to increasing acreage by opening new lands. The factors listed above will favor both of these production systems - one relatively new and the other traditional - and in most cases future production increases in the developing world will be from a mixture of the two systems. It is import ant - for enlightened perspective - to view the difference in these systems in a developed agricultural country where the traditional means of more labor and more land has given way to better technology and services. The U.S. is a good, if extreme, example.

In the three developing regions food production totals about 0.3 tons per capita per year, while in the U.S. such production is 1.8 tons per capita per year. In the developed area, the food production is six times greater, on intentionally limited acreage, by 2 percent of the labor force. Such production cannot possibly be consumed by the population, so large increments are fed to livestock, exported to industrialized nations, used as an assistance input in developing countries and stored as surplus when the supply could not be otherwise utilized. It is true that this production system has produced some economic imbalances and environmental degradation which hopefully the developing nations will not and need not copy, but the road to success is clear. A production technology weeded to reasonably good production resources, managed by multidisciplinary-minded administrators in a favorable production environment of enlightened policies and dependable markets makes up a system each part of which is an essential ingredient. There is an almost uncontrollable urge to credit the last essential input with an explosion of success. The last essential input is indeed the critical factor, while being no more important to the whole than any other necessary part. It is the multidisciplinary nature of a system that makes it truly responsive, but at the same time makes it necessary for the research network to be sharply focused on a group of system requirements and not just on the agronomic elements of the system.

APPENDIX No. 2

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA FPMR (41 CFR) 101-11.6

UNITED STATES GOVERNMENT

Memorandum

TO : TA/AGF, Dr. Milo Cox

DATE: May 18, 1971

FROM : TA/AGF, William F. Johnson WFJ

SUBJECT: AID Investment in Research for FY 1970

Attached is the information on AID's investment in research for FY 1970.

Grants and contract expenditures for research for FY 1970 as summarized for TAB and Regional Bureaus are as follows:

TAB/AGF		$ 4,271,000
EA Bureau		605,000
LA Bureau		3,575,000
VN Bureau		454,000
NESA Bureau		467,872
AFR Bureau		2,742,000
	Total	$12,114,872

Attachment: a/s

cc: TA/AGF: Dr. Kelley
Dr. Ayers
Dr. Coutu
Mr. Galli
Mr. Urano

5/18/71

TA/AGF & REGIONAL BUREAU FUNDING FOR AGRICULTURAL RESEARCH
FOR FY 1970
May 4, 1971

TA/AGF - Research Project Funding in FY 70 - $ 4,271,000

EA - East Asia Bureau -	Regional -	SEADAG (grants)	$ 75,000
		IRRI (grants)	350,000
		SEAFDEC (fisheries)	50,000
	Countries -	Thailand	$ 130,000
		Total	$ 605,000

LA - Latin America -	Regional (grant)		$ 75,000
	Countries -	Argentina (grant)	$ 20,000
		Bolivia (grant)	500,000
		Brazil (grant)	1,000,000
		Chile	-0-
		Colombia (grant)	250,000
		(loan)	350,000
		Costa Rica (grant)	60,000
		Dominican Republic (g)	500,000
		Ecuador (grant)	25,000
		El Salvador (grant)	50,000
		Guatemala (grant)	60,000
		Guyana (grant)	20,000
		Honduras (grant)	20,000
		Nicaragua (grant)	40,000
		Jamaica	-0-
		Panama (grant)	15,000
		Paraguay (grant)	100,000
		Peru (grant)	350,000
		ROCAP (grant)	10,000
		Uruguay (grant)	75,000
		Total	$ 3,575,000

VN - Vietnam (Vietnamese input with generated local currency)

Institute of Agricultural Research	$ 225,000
Plant Protection and Rice Bureau	85,000
USAID Support of Vietnamese Research	140,000
AIK (Aid In Kind) funds, ie; PL 480, to assist Vietnamese Research	4,500
	$ 454,000

NESA - Near East South Asia

India	$ 250,000
Afghanistan	100,000
Pakistan	112,822
	$ 462,822

OPTIONAL FORM NO. 10
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UNITED STATES GOVERNMENT

Memorandum

MAY 10 1971

TO : TA/AGF, Mr. James Urano

DATE: May 6, 1971

THRU: AFR/TAC, Miss Marjorie Belcher

FROM : AFR/TAC, John Osguthorpe

SUBJECT: Research and Development Project and Activities on Agriculture

The following is in response to your verbal request for a list of the projects with fifty percent or more research component and funding for FY 70 (for funding add 000 unless otherwise noted). This same information was supplied to TA/RUR, February 12, 1971 in a memo from Belcher to Long.

1.	West Africa Rice Production and Marketing FY 70 $900.00	625-11-190-177	CWARP *
2.	Major Cereals Research, West Central Africa FY 70 $445	625-11-130-305	CWAPP
3.	Regional Wheat Improvement FY 70 0	693-11-130-173	Afr Reg
4.	Agricultural Economic Research and Planning FY 70 $300	664-11-110-237	Tunisia
5.	Major Cereals and Legume Improvement FY 70 $389	618-11-130-652	East Africa
6.	Animal and Crop Production FY 70 $95	618-11-110-644	East Africa Reg
7.	Rubber Development FY 70 $126	620-11-110-749	Nigeria
8.	Agro-Industrial Sector Survey FY 70 $37	663-11-120-127	Ethiopia

9.	Agriculture Research FY 70 0	617-11-150-053	Uganda
10.	Agriculture Research FY 70 0	621-11-110-107	Tanzania
11.	Soil Fertility & Crop Management in the Tropics FY 70 $450	698-11-190-349	Afr Regional
12.	Agricultural Research Survey-NAS FY 70 0	698-11-110-360	Afr Regional
13.	Association for the Advancement of Agricultural Science in Africa FY 70 0	698-11-995-154	Afr Regional
	Total	$2,742,000	

* CWARP - Central and West Africa Regional Programs

May 25, 1971

INFORMATION MEMORANDUM FOR THE ADMINISTRATOR

THRU: EXSEC

FROM: AA/TA, Joel Bernstein

SUBJECT: Consultative Group on International Agricultural Research

The first meeting of the new Consultative Group -- jointly sponsored by the IBRD, FAO and UNDP -- was May 19 and went well.

The main developments were:

- 16 countries and organizations became members, and 10 are observers or are still considering whether to become members (See list in Appendix A); several are expected to do so;

- a formula was worked out for developing country participation in the Consultative Group, in addition to major involvement of LDC experts in the technical Advisory Group structure; the five FAO regional caucuses of developing countries will be asked to designate one member each to represent them in the CG, as an interim arrangement for the first two years;

- a statement of objectives, composition and organizational structure was approved (Appendix B); it and the discussion stressed the building of networks of research to tie together DC, LDC and international institutions in ways that will build the LDCs research capabilities -- a point stressed by A.I.D. in the preparatory meeting in January; also there was a clear consensus on the need to avoid interference by the CG structure with the management autonomy and responsibilities of the Boards and administration of the international institutes;

- the initial membership of the Technical Advisory Committee was appointe by the CG (Appendix C);

- a very heavy agenda was recommended for consideration of the TAC and it Chairman, involving not only deliberation on how the TAC should play it role but also getting on quickly to consider the array of proposals already pending for new international agricultural research activities, so that the CG could have TAC recommendations on the most urgent initiatives in time to consider them at its second meeting, agreed for the first week of December; the plan is for the TAC to meet the last week of June and again in September/October;

The proposal for designation of LDC representation on the CG via the FAO representation structure means that it is likely that one designee will be an Iron Curtain country from Eastern Europe (not the USSR). This could be quite useful for the substantive purpose of the CG structure. I have checked this out with Assistant Secretary DePalma, who assures me that this prospect presents no problem for the USG.

It is doubtful that the Bellagio Group will meet again on international agricultural research needs, the responsibility for identifying major needs for donor support having been picked up by the new CG. That the Rockefeller and Ford Foundations take the new structure seriously was evidenced by the attendance and active participation of George Harrar and Dave Bell at both the organizing meeting in Janury and this first regular meeting.

It is of course too early to estimate the effectiveness of the new CG/TAC structure. However, if it is well led and staffed by IBRD/FAO, it could become one of the most significant institutional innovations for international cooperation of the decade. It has a unique combination of a major functional orientation, a combination of representative and expert structures, joint IBRD/FAO/UNDP sponsorship and staff support, and a radically new range of membership --- private institutions as well as governments, regional development financing organizations, and LDC's in a donor consultative forum. We should continue to provide full encouragement and support.

APPENDIX A

Status of Interested Countries and Organizations, as of May 19, 1971

MEMBERS

Canada	World Bank Group
Denmark	GAO
France	UNDP
Germany	Ford Foundation
Netherlands	Rockefeller Foundation
Sweden	Kellogg Foundation
United Kingdom	International Research Development Center (Canadi
United States	African Development Bank

OBSERVERS (those with asterisks are considering early move to membership)

Australia	Asian Development Bank
Belgium	Inter-American Development Bank *
Finland	
Italy	
Japan *	
New Zealand	
Norway *	
Switzerland	

APPENDIX B

Objectives, Composition and Organizational Structure of the Consultative Group on International Agricultural Research

A. Objectives

1. The main objectives of the Consultative Group (assisted as necessary by its Technical Advisory Committee (TAC) described in Part C below) are:

(i) on the basis of a review of existing national, regional and international research activities, to examine the needs of developing countries for special effort in agricultural research at the international and regional levels in critical subject sectors unlikely otherwise to be adequately covered by existing research facilities, and to consider how these needs could be met; 1/

(ii) to attempt to ensure maximum complementarity of international and regional efforts with national efforts in financing and undertaking agricultural research in the future and to encourage full exchange of information among national, regional and international agricultural research centers;

(iii) to review the financial and other requirements of those international and regional research activities which the Group considers of high priority, and to consider the provision of finance for those activities, 2/ taking into account the need to ensure continuity of research over a substantial period;

(iv) to undertake a continuing review of priorities and research networks related to the needs of developing countries, to enable the Group to adjust its support policies to changing needs, and to achieve economy of effort; and

(v) to suggest feasibility studies of specific proposals, to reach mutual agreement on how these studies should be undertaken and financed, and to exchange information on the results.

1/ Research is used in this document in a broad sense to include not only t development and testing of improved production technology, but also trai and other activities designed to facilitate and speed effective and wide spread use of improved technology.

In all of the deliberations of the Consultative Group and the Technical Advisory Committee, account will be taken not only of technical, but also of ecological, economic and social factors.

B. Composition

2. The co-sponsors of the Group are the Food and Agriculture Organization of the United Nations (FAO), the International Bank for Reconstruction and Development (IBRD), and the United Nations Development Programme (UNDP). Its initial membership, in addition to the co-sponsors, consists of the following countries, regional development banks, private foundations and other organizations interested in supporting international agricultural research related to the problems of the developing countries;

(To be filled in at time of adoption)

The following countries are participating in the Group as observers:

(To be filled in at time of adoption)

Other interested parties may be invited to join the Group or to participate as observers, as decided by the members.

Membership in the Group involves no commitment to provide funds.

The Chairman and Secretary of the Group will be provided by the IBRD and its base will be at IBRD headquarters in Washington, but the venue of its meetings will be decided from time to time by its members.

C. Supporting Services

Technical Advisory Committee

3. A small Technical Advisory Committee (TAC) will be created by the Consultative Group, composed of distinguished international experts from developed and developing countries, nominated by the co-sponsors and appointed by the Group. Appointments will be for three years except that in the case of the first appointees one third, selected by lot, will have one-year appointment and one third, similarly selected, will have two-year appointments. The TAC will be supplemented by advisers with special expertise, who may be invited to serve individually or on panels to consider particular problems. TAC will report to the Consultative Group.

4. TAC will, acting either upon reference from the Consultative Group or on its own initiative:

APPENDIX C

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

First Meeting - May 19, 1971

Item 4 of the Agenda

Nominations for Technical Advisory Committee on International Agricultural Research

1. Sir John Crawford (Economist), Chancellor, Australian National University, Canberra. To serve as Chairman. - Australia

2. Ing. Manuel Elgueta (Agronomist), Ex-Director, Chilean Agricultural Research Institute; now working with IICA as Director of proposed Turrialba Research Corporation. - Chile

3. Prof. Dr. Hassan Ali El-Tobgy (Genetecist), Under-Secretary, Agriculture & Chairman, Research Committee. - U.A.R.

4. Prof. H. Fukuda (Irrigation Specialist), Vice President International Commission for Irrigation and Drainage, Tokyo University. - Japan

5. Dr. G. Harrar (Plant Pathologist), President, Rockefeller Foundation. - U.S.A.

6. Dr. D. Hopper (Economist), President, International Development Research Center. - Canada

7. Dr. Luis Marcano (Agronomist), President Shell Foundation. - Venezuela

8. Dr. T. Muriithi (Animal Health), Director, Veterinary Services. - Kenya

9. Dr. J. Pagot (Animal Production), Directeur General, Institut d'Elevage et de Medecine Veterinaire des Pays Tropicaux. - France

10. Dr. V. Pereira (Physicist), Director, East Malling Research Station, Kent (previously Director, Central African Research Organization). - U.K.

11. L. Sauger (Agronomist), Directeur, Centre de Recherche Agronomique du Bambey. - Senegal

12. Dr. M. S Swaminathan (Genetecist), Director, Indian Agricultural Research Institute, New Delhi. - India

D. Financial Arrangements

9. IBRD has agreed to pay for the personal services and travel costs of the Secretary of the Consultative Group, and FAO has agreed to pay for the personal services and travel costs of the Secretary of the TAC.

10. The expenses of the members of the TAC and of its advisers will be shared equally by the cosponsors, subject to necessary budgetary authorization (Each is expected to ante $50,000).

11. With respect to feasibility studies referred to under 1 (v), arrangements for financing will be made by the Consultative Group or by individual members on an ad hoc basis.

Washington, D. C.
March 23, 1971

Appendix 3
Appendix A

(i) advise the Consultative Group on the main gaps and priorities in agricultural research related to the problems of the developing countries, both in the technical and socio-economic fields, based on a continuing review of existing national, regional and international research activities;

(ii) recommend to the Consultative Group feasibility studies designed to explore in depth how best to organize and conduct agricultural research on priority problems, particularly those calling for international or regional effort;

(iii) examine the results of these or other feasibility studies and present its views and recommendations for action for the guidance of the Consultative Group;

(iv) advise the Consultative Group on the effectiveness of specific existing international research programs; and

(v) in other ways encourage the creation of an international network of research institutions and the effective interchange of information among them.

These terms of reference may be amended from time to time by the Consultative Group.

5. The Chairman of the Technical Advisory Committee will be appointed by the Consultative Group and its Secretary will be provided by FAO. Its meeting will normally be held at FAO headquarters in Rome.

6. As a supporting service to the TAC, FAO will endeavor to supply up-to-date information on current and proposed research activities related to the problem of the developing countries.

7. FAO will consult with TAC concerning the feasibility, method and cost of establishing a comprehensive data bank on agricultural research related to the needs of the developing countries, and the form in which this information can be made readily available to potential users and will prepare a report on this matter for the consideration of the Consultative Group.

The Secretariat

8. The Secretariat will be composed initially of the Secretary of the Consultative Group and the Secretary of the Technical Advisory Committee. Arrangements will be worked out to ensure liaison and collaboration between the two wings of the Secretariat.

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UNITED STATES GOVERNMENT

Memorandum

TO : TA/AGF, Mr. Omer J. Kelley **DATE:** 6/24/71

FROM : AFR/DP, David Shear

copy to Kelley 6/28/71

SUBJECT: Interim Action Plan for World-Wide Network for Agricultural Research

Suggested revisions follow:

1. Change policy factor 20 from "... slow but steady rise of incomes in these countries" to "... in most countries" (Pagel, line 6). Aggregate worldwide and regional GNP estimates do not reflect cases where national GNP is stagnant or fluctuates.

2. Reword policy factor 5) to make clear whether it refers only to food production or to all agricultural products. If the former, then there should be an introductory statement at the outset that the new Consultative Group on International Agricultural Research (CGIAR) will focus on research to increase and improve the quality of LDC agricultural output, and that A.I.D. has decided to concentrate on food production or food-deficit production. (Also see item 5 below.)

Given the substantial increase in LDC agricultural exports in the last decade, is it accurate to imply that most countries are unable to produce much of a surplus?

3. Add a new factor along these lines: "6) the necessity for these countries to increase and diversify agricultural production for domestic consumption and for exports in ways which help both to narrow the gap between actual and potential productivity and to raise farmer incomes and rural employment, and which also do not exceed their financial capacity" (page 1, Insert line 14).

4. Delete "and indifference on the part of the government leaders obsessed by the chimera of industrial development" (page 2, last para., lines 5-6). This is like beating a dead horse 1/. Also delete

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1/ Obviously no typical LDC situation exists. However, excluding the largest food-deficit or over populated countries like India, Pakistan et al, plus countries with substantial minerals and fuels for export, the general characteristic has been a predominantly agricultural society in which production for exports comprised the "modern" sector while food production was mainly subsistence or a relatively small segment of the monetized sector. Since "domestic" food production more or less took care of itself except in droughts, many governments, earlier gave less attention to effects of potential growth in population and food imports,

Hand Carried 6/28 10 A.M.

"of the most populous" (last para. line 7). Does "agricultural development" (line 8) refer to all production or only food production for domestic use?

5. Does "food production" apply to both domestic consumption and exports? Will research include food processing? (page 4, para. 2). The International Agricultural Research Group is supposed to take account of economic and social factors, and to keep under review research priorities according to the needs of LDC's, some of whom are likely to stress research on agricultural exports other than food, on food processing, and trade promotion.

6. At this point (page 6, beginning para. 3), it would be appropriate to sum up the next 4 pages along these lines: "The task ahead is to synchronize the existing national, regional and international research efforts of institutions and of individuals in both developed and developing countries, and to begin filling in the most important gaps in the network according to highest priorities based upon reviews of what LDCs need most and of long-term research requirements. Building up LDC capacity will be essential to the key-problem oriented research to ensure local adaptation of generalized research and feedback benefits.

7. Two reservations about footnote 3/. Suggest last sentence (page 7) end after "... wherever possible". Even the poorest countries want to have their own network of national research facilities including agriculture, but lack funds, staff, and know-how to mount and maintain them all in the immediate and middle-term future. Unnecessary drawn-out duplication of agricultural research facilities and efforts would further delay their development. They cannot afford to finance or support regional research in other LDC countries of no interest to them. However, they would be willing to provide modest continuing support to adaptive research high on their priority list and of substantial direct benefit that could not otherwise be obtained. The Consultative Group is committed to high priority LDC research and presumably developed countries would apply similar criteria of priority and maximum benefit before supporting LDC regional institutions. It is premature to discount the possibilities for an enlarged regional role of specialized LDC research institutions in the world-wide network as a means to maximize use of scarce resources, reinforce training, increase the circulation of general and adaptive research, and provide earlier benefits at less cost to the poorer countries. Workshops and seminars by the FAO and international institutions for scientists of similar interest to find out what each other is doing are an inadequate substitute for the function of regional research institutions (top of page

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and more attention to exports (which rose substantially over the last decade), to diversification of agricultural exports, and to the increasing pressures to spend more on education and other government services despite severe budget constraints.

8) so suggest deletion.

8. Delete para. 2 (page 9, lines 3-13) which is quite obvious, and reword para. 3 as follows:

"The CGIAR will include representatives of the developing countries who are expected to participate in the broad decisions regarding priorities for the network and how LDC efforts should be meshed with the rest of the network."

9. Under the priorities section, change last 2 sentences (page 10, para. 1) to: "These important problems requiring substantial research inputs obviously cannot all be attacked simultaneously. Decisions on which problems are universally urgent enough in total or in part to receive high priority will be crucial to the effectiveness of the network as will be making certain to the LDCs that the research is sufficiently relevant and adaptive to their own priorities and is transferable within reasonable periods of time." [The last sentence is based on African experience where the current trend is to reorient most types of foreign and local research toward the resolution of specific key country problems, and where a growing sense of relevance and of immediacy might lead some countries to bypass the international network.]

10. Under item 4, page 14, suggest after "research" (line 4), add "as well as among developing country institutions". In Africa, AFR is already working toward a rational division of labor.

11. Lastly, suggest deletion of page 3, Appendix 1 beginning with "It is important - for enlightened perspective ..." (para. 2, line 7). Reference to current U.S. output and the summary prescription of production technology and interrelated ingredients for a successful sophisticated food production somewhat distorts our perspective on the difference in situations, in causation, and in the severity of problems of the developing countries of today in contrast with those of a century or several centuries ago, and on the different mixtures of tailor-made inputs various LDC countries require. Several examples without precedence are the population explosion and its effects; the dimensions of unemployment, essentially a rural problem; the lack of a gradual rise in education, managerial, or intermediate skills; and various circumstances impeding increases in farmer income and in local effective demand.

cc: AFR/TAC

Dr. Kelly

OPTIONAL FORM NO. 10
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UNITED STATES GOVERNMENT

Memorandum

TO : TAEC Members

DATE: July 2, 1971

FROM : AA/TA, Samuel H. Butterfield

SUBJECT: Action Plan for Worldwide Network for Agricultural Research

Attached for discussion at the TAEC meeting on July 14 is an Action Plan for the Key Problem Area, "Worldwide Network for Agricultural Research." The paper was developed by NAB with a heavy input over several months from members of the inter-bureau task force for that KPA. The paper has not yet been reviewed by Mr. Bernstein.

In considering the paper, several points should be kept in mind:

1) This is a short-term plan aimed at developing a sound longer term strategy and action plan for the Agency to use as a basis for working within the worldwide network concept.

2) The paper consists of ten single-spaced pages, plus four appendices. For the harassed executive, pages 7-10 set forth the immediate steps that we propose be taken.

3) Strategies and action plans for Agency work (including research) in other key problem areas of agriculture (such as sector planning or high protein crop production) will be integrated with the overall strategy agreed upon for the worldwide agricultural research network but will be developed separately by the task forces working in those KPA's.

4) Agency resources devoted to agricultural research are already substantial. In FY 1970, the total was $13,000,000.

5) Members of the interbureau, interdisciplinary task force are:

Francis J. LeBeau, EA/TECH
Milo L. Cox, TA/AGF
Lawrence W. Doran, VN/ND
Donald L. Fiester, ARA-LA/DR
John D. Blumgart, AFR/DP
Louis G. Sleeper, ARA-LA/DR
Lawrence W. Witt, TA/AGF
Irwin Hornstein, TA/N
C. Herbert Rees, NESA/SA
K. Smith, TA/DA
Marjorie S. Belcher, AFR/TAC
James M. Blume, NESA/TECH
Daniel Margolies, TA/OST

Attachment:
a/s

WORLDWIDE NETWORK FOR AGRICULTURAL RESEARCH

Contents

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III.	Linkages - The Unifying Imperative.	3
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Appendices:

1. Goals - An Empirical Judgment
2. A.I.D. Investment in Research for FY 1970
3. Report to the Administrator on Consultative Group on International Agricultural Research
4. Initial Staff Paper

WORLDWIDE NETWORK FOR AGRICULTURAL RESEARCH

The Problem - Food Production

There are at least five factors which food policies of and for the developing countries must take into account: 1) the continuing increase in the demand for food created by the inexorable growth of population, 2) the further increase in demand resulting from the slow but steady rise of income in these countries, 3) the need in most developing countries for a better nutritional balance in the average diet; i.e., a higher proportion of protein, 4) the LDCs' scarcity of foreign exchange and the diminished availability of food on concessional terms, which together make it imperative for them to meet increased requirements from indigenous production; 5) the desirability of the agricultural sector contributing to general economic development, by producing some surplus over domestic requirements.

These factors taken together indicate the need for an increase of 4 1/2 to 5 percent a year in food production in most of the developing countries, and for a significantly larger proportion of proteins. 1/

In the past, most increases in food production have resulted from bringing new lands under cultivation. This possibility still exists in parts of the developing world, though the process will in many cases be difficult and expensive because of the need to create infrastructure and supporting services. In others, including some of the most densely populated countries, virtually all arable land is already under cultivation, and increases in production can be achieved only by increasing yields.

Experience has shown that the achievement of significant continuing increases in agricultural yields requires a flow of new agricultural technology (dealing with the requirements of the entire system and not just the agronomic requirements). This in turn requires a sophisticated research apparatus including skilled workers in the various sub-disciplines of agricultural science and related disciplines, an effectively organized interdisciplinary effort under forceful and imaginative leadership, and the assurance of adequate continuing financial support. Almost all the developing countries lack some of these essential ingredients and service-oriented institutions that make agricultural sciences truly useful.

Agricultural research in the developing countries has been handicapped most of all by the lack of skilled agricultural scientists. But this deficiency has been compounded by faulty organization, poor management and indifference on the part of many government leaders obsessed by the chimera

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1/ See Appendix 1 for analysis.

of industrial development. In the past few years, there has been a noticeable shift in attitude in some of the most populous developing countries and agricultural development is receiving greater emphasis. It appears that a critical period in history has arrived when the bringing together of the requisite manpower, political interest, experience, capital and technical competence can be combined in a world-wide effort to build a research capability adequate to the awesome task.

The Opportunity - An Effective Research Network

During the second half of the decade of the sixties, it was demonstrated conclusively that technological, organizational and managerial shortcomings need not be insuperable obstacles to the adoption by the LDCs of new agricultural technology. Research institutions established, led and largely staffed by the technologically developed countries, bred new varieties of wheat (at CIMMYT in Mexico) and rice (at IRRI in the Philippines) which produced double the yield of traditional varieties. They were disease resistant, photoperiod insensitive, highly responsive to fertilizers and broadly adaptive. Between 1965-66 and 1969-70, the area planted to the new cereal varieties increased from 41 thousand to 44 million acres largely as a result of LDC efforts once the technology had been introduced and proven locally. Yields of the new varieties, when accompanied by appropriate inputs, were as much as 100 percent greater than those of traditional varieties.

These are impressive achievements, and demonstrate the great potential of a system designed to mobilize scientific skills and resources of the developed countries in support of agricultural development in the LDCs. But the results should not be exaggerated. Success has been restricted largely to two cereals, grown, for the most part, on irrigated lands where the water supply could be controlled; moreover, only about a dozen countries have planted the new varieties on a large scale, and in these countries the record is not one of unalloyed success. Moreover, the rate of increase in production achieved by these countries seems to be slowing down, as the limits of the optimum planting areas are reached. In 1970, land planted to the new varieties amounted to only about ten percent of the cultivated area of non-Communist Asia -- the continent where diffusion has been greatest; in other continents, the percentage is much smaller. Furthermore, the new varieties, important though they have been in meeting food requirements where the need was most acute, have not materially improved the lot of the farmers of the less-developed world.

Further progress will require substantial additional research on the technology needed to increase food production and the concomitant problems of employment, income distribution, government policies, marketing systems and on the associated problems which increased production creates.

It seems reasonable to conclude that the best way to get at this will be to build from the model which has already proved its worth -- that is, to supplement the presently inadequate research establishments of the LDCs by concentrating a "critical mass" of scientific skills, from both the developed and developing countries, for an extended period on each of the main problems. The potential of this technique has only begun to be realized. What is required for a fuller realization of potential is:

1. A substantial coordinated technical and financial effort on the part of donor countries,

2. intensified attention to agricultural research and production in and on the part of the LDCs (utilizing both LDC and DC experts), and

3. the linking of these elements in an effective system; i.e., into an action-oriented, multidisciplinary world-wide network for agricultural research.

The international network should comprise three elements: a) agricultural scientists and research institutions (plus related economists and social scientists) of the developing countries, b) some individuals and research institutions of the developed world concerned with the agricultural problems of the developing countries (including economic, behavioral and managerial aspects), [2/] and c) linkages whereby the output of "a" and "b" are exchanged; the initial pattern being mainly a flow of technology and other knowledge from the scientists of the advanced countries to individuals and institutions in the developing countries and, subsequently, to or affecting the farmer in LDCs.

It is encouraging that steps are beginning to be taken to strengthen all three elements.

Linkages - The Unifying Imperative

It is abundantly clear that government officials and heads of educational institutions--in both the developed countries and the developing countries--directors and managers of assistance agencies, private foundations and businesses and international organizations, want to see agricultural development proceed at an accelerated rate. Also, there has been for some years increasing recognition that the overall effort is disorganized,

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[2/] Although they are located in and partly staffed by scientists of the LDCs, it seems proper to include the multi-national institutes of agricultural research, such as IRRI and CIMMYT, in this category, since they owe their existence to the initiative of the Ford and Rockefeller Foundations and could not continue without the financial support of the Foundations and the Governments of some of the developed countries, and, probably also, the administrative leadership supplied by the Foundations.

scattered, duplicative or at least overlapping, uncoordinated and to some degree competitive where development funds were available from different "windows" at different interest rates and with different requirements. Broad recognition of these problems and many meetings and discussions on the subject have culminated in the formation of a "Consultative Group for Worldwide Agricultural Research" headed by the tripartite leadership of the IBRD, the FAO and the UNDP, to contribute to and coordinate the funding of a worldwide agricultural research effort. A "Technical Advisory Committee" has been named. The TAC is made up of 12 outstanding technical leaders from developing as well as developed regions and broadly representing the various disciplines in agricultural development. This Committee will report directly to the Consultative Group. The establishment of these institutions gives form to a major segment of the worldwide network for agricultural research which is gradually taking shape.

The newly-formed Consultative Group for Worldwide Agricultural Research, forming the financial backbone for the network, should help assure that money will not be a limiting factor for priority research efforts. The Technical Advisory Committee representing the various regions and disciplines provides a forum and a mechanism whereby technical findings or initiatives from any country or any organization can be considered, evaluated and made known to the Consultative Group. 3/

The next task is to strengthen the parts of the proposed system and develop linkages that really tie the whole into a network. The term 'linkage', as used here, is intended to imply the means whereby separate individuals or institutions (within or between countries and regions) are joined in a common research effort, with a common understanding of problems and agreement on goals and with channels of communications which facilitate the exchange of knowledge, materials and, at times, people.

Linkages (and an information storage and retrieval system) need to be improved and expanded:

1. Between interested scientists and institutions within and between developed countries,

2. Between interested scientists and institutions (including multinational centers) within and between developing countries, and

3. Cross ties between all of these which tie their output to LDC producers' and consumers' needs.

3/ See Appendix 3 for report on first meeting of Consultative Group (May 19).

Role of the Developed Countries

Oversimplified, the developed countries will, for the next decade or so, provide much of the scientific leadership for the overall network and by far the largest share of financial and technical resources for almost all parts of the system. The developed countries will underwrite existing and new multi-national centers and will provide most of the scientists to staff them.[4/]

As donors to individual LDCs, the developed countries will need to provide planning and operational experts, substantial financial assistance and academic training to help LDCs build effective single-country research systems. DC research institutions with specialized competence and experience in one or another important aspect of LDC agriculture will be important contributors and will need to be fully exploited. AID-sponsored examples are:

1) the consortium of agricultural universities working in India,

2) Purdue's sorghum and corn research projects utilizing computer-based rapid information retrieval methods,

3) Michigan State's work in agricultural economics and employment generation, and

4) USDA's work with sorghum, millet and maize in Africa.

Role of the Developing Countries

The first efforts for interested LDCs inevitably must be to develop adaptive research institutions that can translate generalized technical improvements (from international or DC research centers or from other LDC research efforts) into locally useful technology. Parallel with agronomic

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4/ Over the years there has been considerable developed country interest in promoting regional research institutions serving several countries. Increased cooperation in agricultural research among countries with common problems, or between countries of different regions that have similar ecological situations, should be encouraged wherever possible, but with full recognition of the difficulty of maintaining sustained efforts which require financing by a number of LDCs. The FAO and the multi-national institutes for agricultural research can facilitate a degree of cooperation among such countries by conducting workshops and seminars and thus providing opportunities for scientists with similar interests to become acquainted and learn of the work others are doing in their field.

research should go research on other elements of the "system" (price policy, marketing arrangements, employment problems, etc.) to ensure utilization of the new technology as it is ready. LDCs will need to draw heavily on experts from donor countries while their own professionals are being trained.

A few LDC experts will contribute to the network from the outset by participation in the TAC, in multi-national research centers and in their own single-country institutions. As research competence grows in the LDCs their inputs will become more and more significant and dependence on the developed countries for research capability will diminish. Eventually the newly built or strengthened research capability in the LDCs' institutions will benefit not only themselves, but other developing nations and the institutions of the developed countries. This is indeed a long-range goal that will not be realized soon but it merits the full attention of all members of the network community.

From the beginning, however, LDC policymakers should be involved in the broad decisions regarding priorities for the network and how LDC efforts should be meshed with the other elements of the network.

We must bear in mind that the importance of the network will not decrease as the LDCs increase their research capabilities, although the direction and relative magnitudes of information flows will change.

Ordering of Priorities

The usefulness of the research network is highly dependent upon the significance of the research tasks on which its constituent parts work. Therefore, it is essential to make some choices as to priorities for work in both the biological and social sciences. There are acute multiple needs for research in both areas: very few crops have received the intensive, multidisciplinary attention given wheat and rice; effective means for farming large parts of the world-- e.g., the humid tropics and the dryland tropical upland have never been developed; there is much more to be learned about managing soils and water under varying conditions; the great bulk of the farm population of the less developed world is still untouched by the agricultural revolution; the problems of price policies, marketing, distribution, which become increasingly urgent as production mounts, are not well understood; the social and economic problems of income distribution, employment, migration, etc., intensified by rapid agricultural growth, have received scarce attention. All of these problems are important and could profit from research, but they cannot all be attacked simultaneously. A decision must be made as to which in total or in part are urgent enough to require attention first.

Role for A.I.D.

A.I.D. can and should play an important, constructive role in the development of an effective agricultural research network.

The Agency was influential in the launching of the Consultative Group, and has helped persuade the multi-national centers to extend their "out-reach" activities--an important element in the development of the network. We have made substantial financial contributions to the multi-national centers and have been involved for years helping LDCs develop agricultural research competence.5/

The elements within A.I.D.'s contribution are:

1. Recommendations in a variety of forums regarding priorities, strategy and operations of the network

2. Grants and other assistance to multi-national centers

3. Assistance to and role delineation for U.S. research and training institutions to support the network

4. Assistance to LDC research programs in obtaining planning consultants, OPEX experts, institutional development advisors, training and capital loans and grants for institutional development

5. Continuing contribution to evaluation of efforts to develop an effective network

Immediate New Action for A.I.D.

A. While A.I.D. should proceed with all of these elements and should not put a "stop order" on important assistance efforts while we fully spell out a broad strategy, it is essential that we proceed immediately to sort out a rough-and-ready list of substantive problems that merit priority attention by the network and then develop a plan to get at them. This will be of fundamental importance to our proceeding intelligently with each of the assistance elements over the next 12 to 18 months. (We recognize that parallel efforts will be going on under other auspices. However, the Agency needs a mechanism to make up its own mind both for progress of our program and to usefully influence the efforts of others).

5/ See Appendix 2 for summary of A.I.D. contributions for 1970.

At the risk of seeming arrogant, we should recognize candidly that the U.S., with its long experience in dealing with its own massive problems of agricultural growth and adjustment, its large body of highly trained agriculturalist and social scientists in the USDA, the Land Grant Universities, the Foundations, and in A.I.D., plus its extensive experience with the agricultural problems of the developing countries, is qualified to develop its own reasoned view as to the subjects which merit priority attention. The Key Problem Area Task Force and TAB are organizing an effort toward this end now. TAB has asked a U.S. expert active in LDC agriculture to draft a rough ordering of priorities. Some of the criteria to be taken into account are:

a) Size of area and number of people likely to be benefitted; probable effect on disadvantaged farmers

b) Magnitude and quality of current research efforts

c) Probable difficulty and expense of organizing the effort

d) Anticipated returns in relation to dimension of effort; e.g., cost-benefit ratio

e) Effect on agricultural employment, or more broadly, on employment in the rural sector

f) Impact on the country's general program of economic development

g) The odds favoring successful results of the research and the estimated time required to achieve them

h) Receptivity of LDCs: their willingness to cooperate and the availability of the institutional competence needed to get the results applied

i) The penalties of failing to do the job.

When completed, the draft will be discussed by the KPA Task Force and later by a larger group of agronomic, economic and planning specialists in and out of A.I.D. (including other KPA Task Forces) that are sensitive to the research needs and requirements of the LDCs on a broad scale. The product should reflect the knowledge and experience of the participants and their best judgment as to the probability that the efforts proposed will prove productive.

Once this priority assessment is in hand (hopefully in August) the following steps should take place:

1) Circulate the assessment to selected field missions for their views and those of knowledgeable LDC people.

2) Obtain Regional Bureau and other offices' official comments.

3) Share the conclusions, for informal reaction, with the U.S. member of the TAC and with selected GC members.

4) Have the Task Force members put together a draft overall strategy and action plan for the foreign aid program's participation over the next several years in this key problem area in the light of the interim conclusion on priorities. Among other things this will require a brief paper from each Regional Bureau and from TAB and OIT setting forth how each relates now and will in the future to the overall priority listing in light of other important factors, such as country priorities.

5) Invite selected USAID officers to come in to review the draft.

6) Summarize implications of this draft plan, draw up a set of issues, and put the package before the TAEC for consideration in October.

7) Following any needed modification, submit plans to the Administrator for review in November.

Utilizing the substantial talent available to it, within and outside the Agency, to develop a comprehensive, though necessarily tentative, strategy and action plan for this key problem area--laying out what things need to be done first, what instrumentalities are best able to do them and, broadly, where they should be done--A.I.D. can reasonably expect to positively influence the development of the multi-national institutions within the research network and to improve the effectiveness of its own inter-regional and single country projects. Specifically, the results of this effort will help guide U.S. representatives in the Consultative Group and in other international forums during 1971 and 1972 as well as U.S. contributions and recommendations to multi-national research centers. It should also be of some help to A.I.D. in planning with individual LDCs bilateral assistance projects within the worldwide agricultural research network. Finally,

it will help ensure that the Agency's T.A. "response capability" is strengthened in priority areas.

B. Certain concurrent actions which could be undertaken by various Task Force members or consultants between July 1 and September 15 are:

1. "Mine" the mini-review on A.I.D.'s contribution in strengthening the LDC agricultural universities and ministries of agriculture for insights regarding building LDC research competence. Mini-review will take place in late August or early September.

2. Develop with USDA a plan for more effective use of PL 480-financed research and possible use of other legislative authorities for USDA research work.

3. Review with ADC progress to date in its efforts to make curriculum of certain U.S. agricultural universities better fit requirements of students from LDCs.

4. Review and assess A.I.D. experience with "joint-surveys" of LDC agricultural research organization and personnel.

C. Other questions the Task Force and TAEC will need to address as soon as time permits are:

1. The feasibility of some sort of rational division of labor among developed country institutions carrying out tropical agricultural research--including social and economic research as well as the more basic research needed to support the production efforts of the multi-national centers.

2. Relative advantages of more international efforts along the lines IRRI (commodity center) compared to IITA (systems center) or the proposed potato research plan (commodity network).

3. How we can best influence the elements of the system to adopt sound priorities.

4. A more precise set of substantive and financial priorities for A.I.D.

5. How much attention should be paid to non-food agricultural research.

6/30/71