Consultative Group on International Agricultural Research

Technical Advisory Committee

Report of the Study

on

CGIAR Commitments in West Africa

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

This report comprises:

(a) Extract from "Summary of Proceedings and Decisions", CGIAR Mid-Term Meeting 1995, Nairobi, Kenya

(b) Letter from TAC Chairman, transmitting the Report of the Study on CGIAR Commitments in West Africa

(c) TAC Commentary on the Study of CGIAR Commitments in West Africa

(d) Centre Directors Committee's (CDC) Commentary on the Report with the transmittal letter from the Chair of CDC

(e) Transmittal letter from Panel Chairman to TAC Chairman

(f) Report of the Study on CGIAR Commitments in West Africa

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

September 1995

From: The Secretariat

July 1995

CGIAR Mid-Term Meeting
May 22-26, 1995
Nairobi, Kenya

Review of CGIAR Commitments in West Africa 1/

The Study of CGIAR Commitments in West Africa, requested by TAC, was conducted by a Panel chaired by Mr. John McIntire. The Panel found that the present organization of the CGIAR's work in West Africa is reasonably efficient and cost-effective and that there is no need for a major restructuring of the way the CGIAR is operating in West Africa. A key issue is how to incorporate the opinions of NARS into the formulation of Center programs.

Following are the main issues raised by the Panel:

- Policy and management research: The Panel recommended that IFPRI should be named a strong convening Center for socio-economics, policy, and management research in West Africa, with greater focus on its work in Nigeria than at present. Both IFPRI and concerned Center Directors objected to this recommendation.

- Institution building, training, and information: The Panel recommended that the Centers, with the exception of ISNAR, should limit their activities in institution building to training and information and should abandon organization and management counseling because it is not their comparative advantage. The overall size of training and information activities should also be reduced. The Center Directors Committee did not share this point of view.

1/ Extract from "Summary of Proceedings and Decisions - Report from the *Ad Hoc* Evaluation Committee II", CGIAR Mid-Term Meeting 1995, Nairobi, Kenya

- Production systems versus germplasm development research: The Panel recommended that production systems and management research be devolved by IITA and ICRISAT to NARS in order to augment upstream work by the Centers on the conservation and management of natural resources and germplasm enhancement and breeding.

- Impact: The Panel felt that the current production impact of ICRISAT and ILRI in West Africa is low. Its recommendation is for a high-level review of ICRISAT's crop improvement program for sorghum and a shift of ICRISAT's research effort in millet improvement from the Niamey site to a less arid area where such management issues as inter-cropping, mechanization, complex cropping patterns, and rotations can be incorporated into millet improvement.

- An alternative organization: The Panel proposed a common Board of Trustees for WARDA and IITA with ex-officio representation of ICRISAT, ICRAF, and IRRI as a means of harmonizing research between the two institutions.

- Relations with partners: The contacts of Centers with national programs are on the whole efficient. The Centers have many mechanisms to inform themselves about national activities, to receive input into their research planning, and to collaborate substantively on common problems.

- TAC was pleased with the experience gained and with the outcome of the study. It intends to proceed by undertaking a similar study in Latin America and subsequently in Asia and West Asia/North Africa.

Members of *Ad Hoc* Committee II thanked the Panel for a thought-provoking report. The report's difference from other CGIAR reviews was found to be refreshing.

The Committee was pleased to note that the Panel found the present organization of the CGIAR's work in West Africa to be reasonably efficient and cost-effective. The Committee also noted the Panel Chair's assurance that the CGIAR's investments in this region are productive and that no major institutional reforms are necessary.

A number of issues identified by the Panel led to a lively dialogue between the Panel and the Centers operating in West Africa. These included the following:

- What the impact of the Centers had been on the region.

- How impact assessment could be enhanced.

- Production systems versus germplasm development research.

- Coordination of policy research at the regional level.

- Role of the Centers in institution building and training.
- Harmonizing governance and activities of the Centers operating in West Africa.

The Committee concluded that this experiment with a regional review of CGIAR investments was a success, and encouraged TAC to commission reviews of other regions. Lessons learned from this review should be used in designing future reviews. These include possibly larger panels, earlier dialogue with Centers and NARS, and reports that are frank--where one does not need to read between the lines.

The Committee proposed that the Group should recommend the review report for further consideration by Centers, NARS, donors, TAC, and other actors, and encourage TAC to continue experimenting with similar regional reviews for other regions. The Group agreed.

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Donald L. Winkelmann
Chair

11th April 1995

Dear Mr. Serageldin,

I have great pleasure to transmit to you the Report of the Study of CGIAR Commitments in West Africa, conducted by a Panel chaired by Dr. John McIntire (USA). The Panel Report and the comments of the Centre Directors' Committee were considered by TAC at its 66th meeting at CIP, Lima, Peru from 13th - 24th March 1995. I should recall here that the proposal to undertake this study was made in TAC's recommendations on Medium-Term Resource Allocation 1994-98 and in the revised Chapter 13 of the report on CGIAR Priorities and Strategies.

TAC praises the Panel for a thought-provoking review and a well-written, analytical report. The Committee is pleased with the finding that the present organization of the CGIAR's work in West Africa is reasonably efficient and cost-effective. TAC was also pleased to note that "the Panel strongly supports the centres' efforts in West Africa, admires the significant successes that have been achieved and expects these successes to multiply in the future". The Panel also makes valuable suggestions with respect to improvement of IARCs-NARS relations and impact assessment as well as a number of centre-specific recommendations.

In addition to the Panel Report, I attach the TAC Commentary, which summarizes TAC Members' reactions on some of the major issues raised in the Report. The Report has raised generic issues on policy research and the returns to investment in research in semi-arid areas which will be referred to the forthcoming stripe study on public policy and management research and a special study to be commissioned by TAC respectively. Other centre-specific issues will be addressed through the external review process.

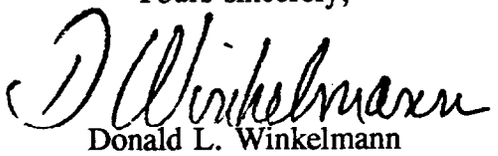
Mr. Ismail Serageldin
Chair, CGIAR
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
USA.

Mail address: 1058 Mansion Ridge Road, Santa Fe, New Mexico 87501, USA
Tel & Fax: (1-505) 820-7248

TAC was pleased with the experiences gained and with the outcome of this study. It intends to proceed by undertaking a similar study in Latin America, and subsequently in Asia and West Asia/North Africa.

I look forward to a stimulating discussion at the Mid-Term Meeting in Nairobi.

Yours sincerely,



Donald L. Winkelmann
Chair, TAC.

TAC COMMENTARY ON THE STUDY

OF CGIAR COMMITMENTS IN WEST AFRICA

TAC is grateful to John McIntire and his colleagues for a thought-provoking review and a well written, analytical report. The Committee is very pleased with the Panel's conclusion that the current organization of the CGIAR's work is reasonably cost effective and that there is no need for major restructuring of the way the CGIAR is operating in West Africa. The Panel's report has many useful suggestions and observations for some of the centres' research programmes on which the Committee will follow up on, through the external reviews of the centres concerned. It is to be noted that the reviews of IITA and ICRISAT are scheduled to occur during 1995 and 1996 respectively.

At the request of TAC, the Panel addressed a range of issues which were beyond its original terms of reference. By so widening the scope, TAC has given the Panel an opportunity to make additional important contributions. This has stimulated discussion and identified a range of issues for consideration by the CGIAR. Such issues include the interaction between small NARS and the CGIAR Centres, particularly the ideal and realistic division of labour and complementarities among them in a dynamic context; the comparative advantages of individual Centres and IFPRI in policy research; and the impact of CGIAR Centres.

TAC's reaction to the major themes identified in the report is provided below. Two distinct observations and lessons emerge from the West Africa Study on process issues. First, because the Panel's report covered issues other than the original terms of reference and reached controversial conclusions on several of them, it prompted stronger reaction as can be seen from the attached CDC's comments. Second, the draft report presented to TAC in October 1994 was discussed in an open session, leading to its premature circulation to donors prior to the Panel having an opportunity to fully respond to the comments of affected CGIAR Centres. The Committee of Centre Directors has expressed a concern at this procedure and TAC concurs, that circulation of the earlier draft might have given a less favourable picture of the Centres' work and impact than is warranted, particularly in view of the revisions made by the Panel in the report in response to Centre Directors' comments, and the fact that several centre programmes were in any case changing in line with what the Panel is now recommending. There is an important lesson to be learned regarding the sequence of the process of consultations and subsequent revisions given the synergetic review process.

TAC's commentary below focuses on only a few important issues covered by the Panel.

Policy Research

The Panel recommends that IFPRI should be named as a strong convening centre for socioeconomics, policy and management research in West Africa with a greater focus of IFPRI's work in Nigeria than hithertofore. This is in order to integrate the

micro-economics focus of the commodity Centres with its own policy focus, and to provide leadership to the policy work.

Both IFPRI and concerned Centre Directors have objected to this recommendation on grounds of logistics, replicability of likely impact of CGIAR's policy research in Nigeria to other countries, and impact vis-à-vis that of other actors, for example, the World Bank. TAC recognized that while IFPRI may have a strong track record in policy research, this does not provide it with the natural leadership in other areas of social science and management research. Furthermore, TAC's forthcoming stripe study on policy research will address this issue in a more generic way, for example, the relationship of IFPRI with commodity centres in policy research and may reconsider this recommendation in the light of the findings of the stripe study.

Production Systems versus Germplasm Development Research

The Panel recommends that Activity Category 3 (Production Systems and Management Research) be devolved by IITA and ICRISAT to the NARS in order to augment upstream work by Centres in Categories 1 (Conservation and Management of Natural Resources) and 2 (Germplasm Enhancement and Breeding). The report also emphasizes strategic and process-oriented research in the IARCs in Category 3, and devolution of site-specific production systems to strong NARS through long-term joint programmes. It argues that the work of the IARCs should be more strategic, for example, on the development of computer models of multiple cropping and soil-water interactions, etc.

ICRISAT, ILRI and IITA are already devolving a substantial share of their applied research work to national research systems which is congruent with the Panel's recommendation. However, other recommendations, particularly with regard to the extent to which even strong NARS can take over most of the production systems and management research, remain contentious in view of the generally poor funding of the NARS in West Africa. For example, TAC does not believe that outright devolution will be appropriate under existing circumstances. Strengthening of partnerships between the Centres and NARS in the subregion will inevitably result in a shift towards the more strategic spectrum of production research by centres. TAC also notes that in recent years major efforts have been made to strengthen the organization of national research to a regional perspective e.g. through SPAAR and CORAF. These efforts merit full support and may lead to further opportunities to devolve current CGIAR activities to national agencies.

Research in Semi-Arid Areas

The Panel has recommended: (a) a high-level review of ICRISAT's crop improvement programme in West Africa, including that of CIRAD's programme for sorghum; (b) shift of ICRISAT's research effort in millet improvement from the Niamey site to a less arid area where such management issues as inter-cropping, mechanization, complex cropping patterns, and rotations can be incorporated into millet improvement.

TAC considers that, to the extent such changes are not already in process, these issues should be explored further both in the forthcoming review of ICRISAT, the cereals study, and the ecoregional initiative on the desert margins.

A Common IITA and WARDA Board

The Panel proposes a common Board of Trustees for WARDA and IITA with *ex-officio* representation of ICRISAT, ICRAF, and IRRI as means of harmonizing research between the two institutions.

Harmonization of boards by ensuring a few common board members is a direction in which CGIAR Centres are moving to increase inter-centre coordination of research, for example, between CIFOR and ICRAF. Yet there is no consensus in TAC that a fully common board will be either feasible or effective in harmonizing the research programmes. Cross-representation at programme committee level is a possibility which should be examined by the IITA review. It is therefore an issue which will be addressed by TAC again in the near future.

Irrigation and Water Management

The Panel expresses caution with respect to future work on irrigation and water management in West Africa. Many of what seem to be technical or social research questions are in fact problems of public policy for irrigation and water management.

TAC notes that West African governments have tended to opt for large-scale surface irrigation projects. While there is also considerable scope for the transfer of simpler, small-scale technologies, to Africa, from the viewpoint of employment, income generation, rates of return, etc, TAC believes that future policy work by others, and perhaps the CGIAR, for example on investment policies with regard to irrigation in West Africa, is needed.

March 2, 1995

Donald L. Winkelmann
TAC Chair
TAC Secretariat
FAO
Via delle Terme di Caracalle
Rome 00100, Italy

TAC 66: REPORT OF THE PANEL OF THE CGIAR COMMITMENTS IN WEST AFRICA

Dear Mr. Winkelmann:

The earlier draft of this report was discussed by Center Directors with TAC during the joint meeting in Washington in October of 1994. The CDC requested that we be given a chance for a full review. In Washington it was accepted that CDC comments were to be sent to the authors. Furthermore, it was agreed that the Center Director comments would be attached as an annex to the final report. Finally, the hope was expressed that the draft report would not be widely circulated, as it may mislead readers.

The Center Directors submitted individual as well as combined comments to the authors, the latter are attached to this letter in their unedited form. Mr. McIntire refers at length to them in his letter of submission to you. In some cases he accepted our comments, in other he rejected them, or dealt with them only partially.

Unfortunately, time is now too short to request all Center Directors to review the "finalized" TAC paper and forward you their individual detailed or any CDC combined comments. There are a number of statements in the final report to which some of my colleagues would disagree. At this time I will make only the following major points on the report as it stands now:

1. Many conclusions reached by the authors lack supporting evidence. (Why would regional coordination in the social sciences be more appropriate in West Africa than in the other regions?) Others are generalizations and might be applicable in some instances, but certainly not for all countries or for all centers.

INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH

Headquarters
Laan van Nieuw Oost Indië 133
2593 BM The Hague
The Netherlands

Correspondence
P.O. Box 93375
2509 AJ The Hague
The Netherlands

Communications
Telephone: (3170) 349-6100
Telex: 33746
Cable: ISNAR
Telefax: (3170) 381-9677

2. Natural scientists and agriculturists would disagree with some of the emphasis given or conclusions reached in the report. (For example: hybrid seed under local conditions of production might not be superior in many countries; they require inter alia appropriate national policies, adequate institutional support, assured provision of various inputs, and a strong national seed industry.)

3. The recommendation to reduce the work on production systems and "resource management" research not only contradicts the proposed ecoregional approach and the future emphasis on natural resource management, but is a hasty conclusion in light of the limited time and resources so far invested in the many existing as well as potentially viable production systems in West Africa. Furthermore, most national programs lack the human and the financial resources to absorb this important work.

4. The report still does not do justice to the manifold aspects and intricacies of institution building. The resources for the latter cannot and should not be reduced. There is considerably more to institution building than general training and information

5. The report misinterprets and does not do justice of many aspects and problems of small NARS. While small NARS are generally weak, not all weak NARS in West Africa are small. For the small NARS the report proposes more training, with the assumption that the trained manpower can then be absorbed by the government. The government should then also be able to provide the necessary financial and physical resources for effective and efficient research.

In conclusion, while the report makes a valuable contribution to the discussion about the different problems in agricultural research and development in West Africa, it is insufficient to guide decisions on the future commitments of the CGIAR in that region. Further comments could, of course, be provided by Center Directors, should this be requested by TAC.

Finally, we propose that as the next step the report be discussed with the NARS leaders of the countries covered, in order to underline the role of our partners in such important subjects.

With best regards,

C. Bonte-Friedheim
Chair,
Center Directors Committee

cc: Guido Gryseels, Deputy Executive Secretary TAC

Encl.

Report of the Panel on
CGIAR Commitments in West Africa

Comments by Centre Directors Committee

1. The Panel has addressed an extensive task in a relative short time. While the Centre Directors Committee has reservations on some of the recommendations, it wishes to acknowledge the large amount of very useful information gathered, and the many constructive recommendations made by the Panel.

2. The chapter on the economies of West Africa provides an excellent description of the economic, structural, environmental, and technical constraints that any agricultural research organizations faces in this region.

3. The Panel's review of research institutions clearly shows the difficulties the NARS are facing. However, it does not adequately address the opportunities for assisting the small NARS. For example, the Panel notes: "But where national institutions are so weak as to be almost completely ineffective, as is the case of practically all countries in this group (small countries), then the only practical solution is to have a focused bilateral project, tied to a foreign university because of the importance of adequate academic training in developing national capacity, that seeks to create a core national institution." This statement ignores the excellent cooperation between Centres and all NARS in the region, including the small ones, through a large variety of formal and informal linkages between the Centres, other research institutions, and the NARS.

4. The statement also goes against ISNAR's findings on the small countries' research programmes. Small countries need a flexible research system, closely linked to national policymakers, which can scan a wide range of external sources to match technologies to national demands, and give advice to farmers and policymakers. Tying a NARS to a single donor agency or a foreign university does not build a flexible system, it does not strengthen the link to national policy, and it does not encourage NARS to scan widely and use innovative linkage mechanisms. Unfortunately, many small NARS in West Africa have fallen into dependency on a single donor or university. The results are not promising. There is a loss of institutional identity, and a tendency for researchers to see themselves as employees of the donor agency as opposed to the national system. There are problems of parallel management between donor technical assistance teams and national counterparts, and a feeling of loss of autonomy.

5. The Panel expects that CGIAR commitments in the region will stay high, and it gives various reasons for this. It does not see significant areas of overlap in the ongoing CGIAR activities. While this may be correct, it is somewhat surprising that mainly financial arguments are used for these conclusions. Alternatively, emphasis on matters such as the need for working together as a system and streamlining the relationships with NARS might have led to the development of -recommendations for more common approaches in the future. In West Africa, the Centres are continuously working on these relationships.

6. The Panel notes that Nigeria has absorbed 56% of IARC resources in West Africa. However, as the Panel acknowledges, the IARCs are not bilateral research aid organizations. Centres have established programmes at locations in Nigeria judged to be the best for conducting ecoregional research in the humid and subhumid zones of West Africa, not to favour Nigeria. Elsewhere in the report, the Panel itself uses the representativeness and extent of these zones in Nigeria, and the opportunities to draw on collaboration of NARS and extension services, as arguments to support its recommendation that two IFPRI staff be located in Nigeria.

7. The report draws a number of conclusions with respect to administrative costs. It shows the complexity of the matter, and the difficulty of comparing costs as presented by the various Centres. Any Centre that works in the region will have administrative costs. The report states: "Another assertion is that administration costs are higher than those of like institutions in the industrialized countries." In fact, however, the percentage overhead costs of the Centres are about half that charged by institutions in industrialized countries. A more detailed and accurate analysis of overhead costs is needed before firm conclusions can be stated.

8. The suggestion in the Panel's report that resources to be shifted from research on production systems and management to germplasm enhancement and breeding and that the African centres pull back to little more than breeding is untenable. It also demonstrates a failure to understand and put to work the lessons that some 30 years of agricultural R&D have provided. Although strategic breeding is indeed a great strength of many Centres in Africa, its potential benefits depend heavily on other critical aspects of agricultural R&D.

9. For example, for obvious reasons, crop varieties that require significant amounts of costly and often-unavailable external inputs are not likely to assist the majority of women and men farmers in Africa. And even where such inputs are affordable and available, there may be, for example, serious environmental and human health implications linked with the use of agrochemicals. Thus crop varieties must be configured to work in tandem with low-external-input and environmentally friendly complements: on the one hand, things like new techniques of seedbed preparation, plant spacing, weed control, soil management, composting, water harvesting, and so forth; and on the other, technologies like biological control and IPM.

10. To develop such environmentally and socioeconomically appropriate 'packages', research is required in these other domains of agricultural R&D, just as much as in breeding. Otherwise, the breeding effort will be vitiated. In any case, as breeders themselves will readily agree, it is extremely difficult to include every desired trait in every variety. New varieties will generally need to be accompanied by other elements of production improvement.

11. Many researchable questions are obviously best addressed by agricultural disciplines other than plant genetics alone. Such questions must be answered before embarking upon a breeding initiative, so as to guide and target breeding efforts in an efficient way. Leaving these questions solely to the NARS, as the stripe report would seem to urge, opens up the possibility of poorly directed breeding efforts in which a great deal of scarce scientific, human and financial resources could be squandered.

12. This is not to say that NARS should not do the work of fitting varieties into specific farming systems. Quite the contrary. It is to say, however, that if Centres forego research in these other critical areas of the R&D enterprise, their breeding work is likely to suffer in terms of ultimate impact. Neither would Centres then have the basic knowledge or capacity to advise and assist NARS in their efforts to further develop varieties for local use. Centres would be left in the position of just 'guessing' and releasing varieties and hoping for the best.

13. The Panel has made its recommendation on the shift in resources based on the perceived limited impact of centre research on production systems and management compared to the impact of crop improvement research. It did not, however, present specific criteria on how such impact should be measured, either in terms of better understanding of the complex production systems, or in terms of significant changes and improvement in production practices. Such evaluations should, for example, take into account the different timeframes over which changes may reasonably be expected .

14. The Panel's recommendation that the process of devolution should be assisted by Centres with funding from their own core budgets, with appropriate reallocations from category 3, completely ignores the limited resources available to the IARCs and the inappropriateness of using these funds as if IARCs are donors. Contrarily, the Panel in its commentary on institution building argues the IARCs have no role there. With the example of the 'Second Agricultural Research Project in Senegal', the Panel correctly notes that the IARCs have no comparative advantage in institution building, which requires greater resources, a wider perspective, and political reforms that they cannot effect.

15. The CG system is now embarking on ecoregional approaches, in which both sustainable resource management and improved productivity research needs will be addressed together with various partners, in particular the NARS. In these new cooperative efforts, the CG system should make full use of production systems and management research results achieved so far and also assist in identifying additional research needs.

16. There are hardly any references to water in the entire text, which is strange considering that the Sudano-Sahelian zones have very adverse water/people ratios. Irrigation is dismissed in a few sentences, the conclusion being that "irrigated agriculture... is not usually economic." There is no consideration as to whether cost-reduction might be an appropriate objective for a management approach, or whether the recent devaluation of the CFA franc might alter the economics in countries of francophone West Africa. The report also appears to discount the strong interest shown by governments in exploring fully the possibility of applying irrigation to their food security needs.

17. The report defines the scope of activities linked to institution building too narrowly, to include only training and information. Direct institution building benefits that can be derived from regional networking include: (1) experience in priority setting, development of sound research projects, resource allocation/management, and reporting; (2) improved awareness of and access to new research methodologies, results, and

technologies; (3) reallocation of natural resources to activities in which institutions have a regional comparative advantage; and (4) improved morale of national scientists by working with regional disciplinary peers. In these discussions, the activities of IIMI with respect to improving the capabilities of NARS to manage irrigation systems should have been mentioned.

18. The authors of the report do recognize that there is more to institutional development than training and information, but they suggest that it should be done by institutions such as university consortia and consultants rather than IARCs. While it is true that commodity oriented centres have no comparative advantage in institutional development in general, they can make a valuable contribution (with ISNAR), to strengthening the quality of research through better research planning and improved research methods, etc. Station development, which in the report is suggested as the single contribution of ISNAR to the region, should also be done in conjunction with Centres across the region. It would make sense that such training take place on research sites.

19. The Panel concludes that the root cause for institutional weakness of the NARS is their flimsy political commitment to research and extension. But the lack of policy commitment alone cannot explain the poor performance of West African NARS. The post colonial experience of many countries in the region is fairly limited and the management tradition of research institutions has not been effectively replaced. There were few national scientists in colonial research organizations who could carry over a management tradition for effective research organizations. NARS of the colonial period, and of the post colonial period in some cases, functioned very much as developed country institutions; they did not experience serious financial difficulties, and their staff was recruited from a much wider resource pool than is available to present day NARS. Their incentives were substantial and promotion mechanisms were clear and operational. They did not have to cope with the difficulties of managing pools of equipment provided by several donors, with their own purchasing constraints. They never had to report to as many donors, each one with his own reporting requirements, and they would never have tolerated the project management mechanisms now imposed by donors as a way to ensure proper management of their projects.

20. If the policy environment is to blame, surely donors must be considered part of the policy environment in which NARS had to function, and many of the problems they faced were indeed created not only by their governments but by well intentioned donors. The failure to take into consideration essential management dimensions in project design, and the disregard for institutional development, can explain many of the failures of NARS. It would be convenient to lay the blame on policy but it would not be accurate. Institutional development may be as important, if not more, to the development of performing NARS.

21. The current indifference or hostility to non-public institutions involved in technology generation and transfer can be explained in a historical perspective. Most countries with a thriving agriculture relied on public institutions to develop technologies and promote their diffusion in the farming community. Developing countries are simply trying to copy models of development that have proved highly successful: as in USA, the European Union, etc. Can we blame them for following such models rather than

adopting the untested measures recommended by policy analysts who have little stake in the country's development. Often, such policy prescriptions recommend the adoption of measures that are in vogue in developed countries, but which have little relevance in the present environment of NARS.

22. Managing research through competitive research contracts is a case in point. It makes a great deal of sense in countries where the labour market is fully developed, and where individuals are supported by competitive institutions. The current shift towards natural resource management research following the Earth Summit of Rio illustrates the case. Developed countries can rely on the extent of their resource markets to hire new skills and shift promptly to the new agenda. Most West African countries, with the possible exception of Nigeria, will probably have to recruit young scientists, send them abroad for training, wait a few years while they are in training, count on losing a few (to non-public institutions operating in the region), and then operate the change. At best, only a few will be available at any one time in a given subject matter area. Competitive grants to researchers is an interesting institutional innovation, based on experience in developed countries, which does not take into consideration the challenge of managing research organizations in developing countries.

23. Early interventions of the private sector in the USA and Europe were obviously tied to areas where the private sector could reap the benefits of its efforts, such as in farm machinery development in the USA, or in crop improvement. They did not invest in areas where the technology was more of a 'public good' character. If we consider the recommendation of the report to devolve much of the work in 'production systems and management' to NARS, it would seem that that will increase reliance on public institutions, as a non-public institution will not have much gain from developing technologies it will not be able to sell.

24. In the overview of private sector research, the unwillingness of some West African countries to liberalize intellectual property restrictions is mentioned. However, the basis for this concern is not elaborated; as such it may be interpreted as an unjustified CGIAR interference in national policy matters.

25. The Panel's observations on impact are tenuous. The Panel's comments rely upon Jahnke et al., (1985), which was not based on primary data from research sites or beneficiaries. The Panel has not added any significant evidence on which to base its assessment of impact. The Panel's conclusions seem to be needlessly provocative, but the Panel should be aware of the reports on scientific and production impact that have appeared over the years since 1985.

26. The suggestion that IFPRI be named as a strong convening centre for socioeconomics research in the region is too sweeping. We agree that economics research in the centres could be better linked, and that IFPRI could play an effective coordinating role for policy research. But the orientation and focus of IFPRI research, as set out in their MTP, differ significantly from the objectives of most economics research now conducted in commodity oriented Centres, which aim at micro-level technology development and evaluation.

27. While the original version of this report was a 'draft', it certainly has achieved wide availability within the System, and perhaps beyond it, since it was made available to donors attending the TAC meeting at ICW'94. This is most unfortunate, particularly in view of the concerns expressed regarding its content. The interests of the Centres and the sensitivity and needs of the donors would surely demand that draft reports of this kind are managed carefully before release.

The World Bank
INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
INTERNATIONAL DEVELOPMENT ASSOCIATION

1818 H Street, N.W.
Washington, D.C. 20433
U.S.A.

(202) 473-3980
Cable Address: INTBAFRAD
FAX: (202) 676-0199

February 10, 1995

Dr Donald Winkelmann
Chairman
Technical Advisory Committee

Mr Chairman,

Attached is the final report of the Panel on CGIAR Commitments in West Africa. I again thank you and your predecessor for this interesting task.

The Panel benefitted initially from a Desk Study of Center commitments, done by the TAC Secretariat[1/]. We visited West Africa in the last week of June 1994 and met TAC members and national program representatives during TAC 64 at Bouake, Cote d'Ivoire. The Panel traveled to Mali, Burkina Faso, Niger, Nigeria, Ghana, Benin, Cameroon, and the Gambia in August of 1994. It presented its draft report to TAC at the Committee's 65th meeting. The Panel met at the TAC Secretariat from February 7, 1994 through February 9, 1994 to consider the various comments on the draft report made during TAC 65 and afterwards.

The report now incorporates the Panel's reponses to comments made by the Centers, the Center Directors' Committee, TAC itself, the NARS and others at TAC 65. I have replied in detail to the comments sent by the TAC, the CDC, ICRISAT, IITA, ILRI, ISNAR, and WARDA and discussed Dr Pinstrup-Anderson's remarks with him by phone; I have copied the replies to you and to the TAC Secretariat.

Let me reiterate some of our main points and highlight the changes we have made since the draft report, both in response to comments and upon further reflection about some of the issues.

Comments by the TAC

The final report responds fully to TAC comments on the draft. Here we highlight a few of the main points made by TAC. One of TAC's principal observations concerned issues in the report that went beyond the sub-region. TAC noted that it might be helpful if a section of the final report covered general systemic issues; this has been done in Annex 3 of the final report, which also discusses how this study might be done in other regions where the Centers are active.

1/ The Desk Study (June 1994) is not attached to the Panel's final report, but is available from the TAC Secretariat.

Genetic exports. TAC noted that the draft report's comments on 'genetic exports' required further clarification because it considered that some of the Panel's suggestions exceeded the brief of the CGIAR. The Panel agrees with this view; the final report states that actions in the area of genetic exports might be taken jointly by the Special Project for African Agricultural Research (SPAAR) and regional institutions in West Africa, not by CGIAR institutions.

Nigeria. TAC commented that the draft report appeared to recommend an excessive concentration of Center efforts in Nigeria. We believe that the Center's overall allocation to Nigeria is reasonable, in view of that country's importance and the diverse opportunities it offers for research with implications outside its borders. We have recommended that a few additional staff of IFPRI and ICRISAT work on Nigeria, but this does not affect the aggregate very much.

Comments by the CDC

Several comments in the CDC summary are copied from the remarks sent by particular Centers. I have answered them in the individual replies and in the final report as appropriate. Reference to some of the CDC's observations follows.

The small NARS. These NARS **basic problem** is that they are too small to justify major investments by individual Centers in view of other demands on Center resources. Their **basic need** is more trained people; to fill that need, they must have academic training. Those are the reasons why a stable, long-term arrangement with academic institutions is both essential and preferable to a like arrangement with a Center. This does not exclude Center contribution to these countries through the usual mechanisms, nor need it interfere with the development of a pluralistic research system.

Administration costs. The draft report did *not* endorse the opinion that IARC administrative costs were higher in West Africa than in industrial countries; it only referred to such an assertion having been made in a TAC paper and then proceeded to say why the Panel lacked the information to evaluate the assertion and to speculate about why such an assertion would be groundless anyway.

Water and irrigation issues. The final report argues that many of what appear to be researchable problems in West Africa on water and irrigation have solutions that are already well known and can be easily transferred from other regions where irrigation is much more important than West Africa. Examples are marginal cost water pricing, strong property rights, efficient water markets, and the transfer of public irrigation schemes to private farmers.

We assumed that most issues about IIMI, including its regional allocation to West Africa, were covered by its recent external review[1/]. On one particular point, the CDC/IIMI noted that "the report also appears to discount the strong interest shown by

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1/ We further recognize our failure to say nothing about ICLARM or about fisheries in general, but this error can perhaps be rectified by the current ICLARM external review.

governments in exploring fully the possibility of applying irrigation to their food security needs". Naturally we do see the importance of developing irrigation in the region where it is economically efficient. But some of the "possibilities of applying irrigation" in the region are good illustrations of the failure to develop a long-term perspective, as discussed in Annex 2 of the Report. The Centers should not provide research to support inefficient policies which lead to unsustainable production systems just because governments are interested; research on managing irrigation for wheat production in Nigeria comes to mind.

Organization and Process

We saw no reason to change our view that the current organization of the CGIAR commitments in the region is reasonably efficient and cost-effective. (You will not be surprised to learn that the Centers had no disagreement with this conclusion). While administration costs need to be investigated in individual Center reviews, we doubt that savings from various reforms are very consequential.

A key process issue is how to incorporate NARS opinions into the formulation of IARC programs. Though we have received comments on the draft report only from Togo, the Gambia, and Ghana (from Professor Haizel, who is a regional representative to the CGIAR) on the draft report, the report is based partly on discussions with national programs in seven countries (Mali, Burkina, Ghana, Niger, Nigeria, Benin, and the Cameroon) and Dr Ouayogode is himself a NARS representative. Annex 1 of the report reviews WARDA's experience with this question. We adhere to our conclusion that current mechanisms of collaboration between the IARCs and the NARS are efficient and do not require systemic changes.

The Panel found four other structural or process reforms that would, in its view, significantly improve the impact of the IARCs in West Africa. The first is to lessen the concentration of ICRISAT research at Sadore. Given that ICRISAT has already moved to diversify its work away from Niger, one may consider this a moot point, but it is one that requires continuing re-evaluation in light of ICRISAT's overall resource allocation in the region and in light of the universal difficulties in raising agricultural productivity in the semiarid tropics. A second concerns the ILRI programs in Nigeria, where we have recommended a consolidation of two small programs and a firmer commitment to a stable ILRI presence in the humid and subhumid zones. The third is to make IFPRI the strong convenor of social science research across the Centers in West Africa. The fourth is to deemphasize and reorient production systems and management research in the IARCs. We return to these points below.

Production Systems and Management Research (Category 3)

This issue provoked voluminous comments from individual centers and from the CDC. There was, I think, some misunderstanding. We did not say that the Centers should "forego research" on Category 3; we did say that they should concentrate on basic process problems, as ICRAF is doing, and develop explicit partnerships with the national programs to devolve the leading role in applied production systems research to the NARS. Nor did we say that no one should do this work; the NARS should do most of it

The growth of national research capacity in the region, and the many failures in this category worldwide, impose a smaller role for the IARCs.

We therefore maintain our recommendation that the Centers should devolve that part of their work in Category 3 that is not consistent with their main responsibility for strategic research to the national programs. Resulting savings should be invested in Category 2 (Germplasm Enhancement and Breeding) because most productivity gains have come from that category. I expect that implementing this recommendation will require some attention from the external reviews of each Center.

The Role of IFPRI

The draft report of the Panel recommended that IFPRI be designated as the convenor of all Center social science research in the region, including that of ISNAR, to provide stronger leadership in that field. Despite the general unpopularity of this recommendation, we have retained it. We believe that social scientists based in West Africa and those working on it from IARCs outside the region, are too isolated, lack a coherent strategy and unified approach to common problems, and have failed to exploit important opportunities in this field. The recommendation is definitely not that IFPRI should do all this research, but that it should lead it.

Dr Ryan and Dr Pinstrup-Andersen have alike objected that such an arrangement will weaken microeconomic research now done in the commodity Centers in close contact with natural scientists. While we take this objection seriously, it is not an insurmountable problem. The point of the arrangement would be to ensure that such work fits into the policy analysis, much of which is impossible without a good knowledge of the technical relations.

Institution Building, Training and Information

We have kept the draft's recommendation that the Centers, with the exception of ISNAR, should limit their activities in Category 5 (institution building) to training and information and should abandon organization and management counseling because it is not in their comparative advantage. The overall size of training and information activities should also be reduced and the savings transferred to Category 2 in view of the many sources of training and information services outside the Centers. We maintain the opinion that ISNAR's future in the region is not well-defined and believe that designating IFPRI as the regional convenor of IARC social science research would define that role more clearly.

The Impact of ICRISAT and ILCA

In a letter to Dr McCalla, I said that ICRISAT and ILCA, in contrast to IITA, have "really had no impact in West Africa and it is very hard to see what the impact of some of their current work will be." It might have been better initially to put that conclusion in a broader context; it has been difficult to achieve research impact in dry areas everywhere--in the United States, Latin America, Australia, the Middle East, as well as Africa--and this is the challenge for everyone, not only for the Centers.

My earlier conclusion provoked a long reply from ICRISAT and a briefer one from ILRI. With those replies, and with other additional information, we have again looked carefully at impact.

In light of ICRISAT's comments about the scientific impact of research, including publications, apart from their eventual production impact, we have modified the report in one place to give due credit to scientific impact. We note here that ICRISAT has produced more than twice as many advanced lines and varieties of millet, sorghum, and groundnut in West Africa in 1993-94 as it did in 1985-92; this is not production impact, but it is a hopeful sign.

ICRISAT commented extensively about the reasons for its lack of production impact in West Africa, most notably for the failure to have measured adoption of its varieties at even the local level. In making the criticism, we recognized fully the environmental difficulties involved, as well as the debility of the national systems of technology generation and transfer. While it is clear that ICRISAT is doing the right thing in moving resources away from Sadore to other sites in the region and in changing its aggregate structure to achieve better synergies between African and non-African research, we have not changed two major recommendations about ICRISAT. The first is to devolve much of Category 3 research to the national programs and to concentrate more on basic process questions.

The second is to commission a fundamental scientific review of ICRISAT's crop improvement work in West Africa, including that of CIRAD for sorghum. The Panel did not have the competence to do this, but my strong belief is that such a review is needed because the plausible solutions have been tried for a long time--introducing exotic materials, exploiting the characteristics of local materials, intensive screening for sources of biotic stress resistance, and increasing the harvest indices--with little noticeable field impact. Furthermore, the contrast between ICRISAT Asian successes with crop improvement and its failures with resource management suggests that we will observe a similar contrast in West Africa--as clearly seen in ICRISAT's section of "Current CGIAR Research Efforts and Their Expected Impact on Food, Agriculture, and National Development" (CGIAR Secretariat, March 1994)--this expectation logically shifts more emphasis to crop improvement. The failure to find durable solutions is not exclusive to ICRISAT, but has occurred with colonial research, the independent NARS, bilateral programs, and regional programs like SAFGRAD.

ICRISAT has replied to this second recommendation to suggest in its place a study of the constraints to adoption of improved materials of millet and sorghum. The Panel could not accept this suggestion. The basic constraint to adoption has long been evident: the introduced materials are not better than the locals under field conditions, even in farmer-managed trials when there are no problems with extension, input supply, risk, or marketing. We need to know why the "improved" materials are not really improved.

There is one other question about ICRISAT. The draft report recommended that the question of separating ICRISAT's African activities from its non-African work be considered again in the near future. The final report omits this recommendation to avoid giving the false impression that the Panel has endorsed the notion.

ILRI contended that the Panel "has not added any significant evidence on which to base its of assessment" beyond what was in the Impact Study of Africa. I assure you that we have. I have again reviewed ILCA's own submissions about its impact in West Africa, including Dr Fitzhugh's presentation at the World Bank last fall (which summarized 20 years of ILCA research), the ILCA material in a CGIAR paper ("Current CGIAR Research Efforts and Their Expected Impact on Food, Agriculture, and National Development", March 1994), and an ILCA study ("Potential for Impact: ILCA Looks to the Future", April 1992) published soon after ILCA's past external review. I have also interviewed Dr Boubacar Hassane, the president of the national livestock owners' association of Niger and who wrote his PhD on fodder production in northern Nigeria, to discuss the impact of ILCA's work. I see no convincing reason to change the Panel's report on ILCA's *current* impact. While, as ILRI's reply to the draft report says, it may be true that "the jury is still out" on the future impact of both fodder banks and alley farming for livestock production, the benefits of research to the present have been less than the costs. Given the paucity of ILRI's expected allocation to West African research, I remain very doubtful about the future impact.

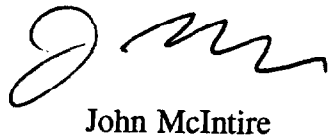
A Common IITA and WARDA Board

The draft report erroneously justified its proposal for a common IITA and WARDA Board in terms of an insignificant benefit, i.e., cost savings. The real benefit of a common Board is to harmonize research. We have, therefore, retained the recommendation and have further incorporated Dr Lampe's suggestion that IRRI be represented on the proposed common Board.

Let me say that the Panel strongly supports the Centers' efforts in West Africa, admires the significant successes that have been achieved and expects those successes to multiply in the future. We hope that nothing in this report will be used to diminish the overall level of resources available for Center activities in the region. While our report perhaps emphasizes criticisms of the Centers by the national programs, we found that the NARS are generally very appreciative of the Centers' research; the best proof of this is their growing interest in closer scientific collaboration.

I would like to close by thanking you and Dr McCalla again for this assignment, and by expressing my appreciation to Dr Bakary Ouayogode, the other Panel member, as well as to Dr Philip Kio of the TAC Secretariat, for their work on the report.

Sincerely,



John McIntire
Panel Chairman

AGR/TAC:IAR/94/15.1

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

REPORT OF THE STUDY

ON

CGIAR COMMITMENTS IN WEST AFRICA

Panel: John McIntire (Chairman)
Bakary Ouayogode

Philip Kio, TAC Secretariat

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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1. WHAT SHOULD BE THE ROLE OF THE IARCS IN WEST AFRICA?

The rapid growth of the national agricultural research systems (NARS), the heavier presence of the IARCs since about 1980, lagging agricultural growth, and concerns about the efficiency of the CG system have prompted a review of the IARCs' role in West Africa[1]. This report provides a reconsideration by asking: What is the appropriate role of the IARCs in West Africa, given (i) the changes in the national programs, including possible contributions from the private sector; (ii) the novel ecoregional perspective; (iii) the likely evolution of farming systems in the region; and (iv) lessons of IARC experience in the region and outside, including the recommendations of the Impact Study, external reviews of individual centers, the Priorities Study and the various Stripe Reviews?

Specifically:

- What does the evolution of the national programs mean for IARC activities?

- What changes should be made in IARC relations with partners?

- What can the Centers most efficiently contribute to the institutional development of the national programs?

- Are there any IARC responsibilities that should be devolved to the NARS, including commodities, themes, or ecoregions?

- What are the views of the NARS on these questions and on the activities of the IARCs in general?

- How do the activities of the Centers conform to the ecoregional approach?

- Should there be major changes in the regional organization of the IARCs, to accommodate the ecoregional approach or other proposed institutional alternatives? What are the alternative roles (eg, those proposed by the vision paper)?

- Is there costly duplication across IARCs in activities?

- Are there costly gaps in the Centers portfolio?

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[1] West Africa means Benin, Burkina Faso, Cameroon, Chad, Cote d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Bamako usually refers also to Samanko, Niamey to Sadore, and Kano to Bagauda.

- Are there other measures that the IARCs can take to make their commitments more efficient?

- Do the Centers use adequate methods to measure all their impacts?

Materials

The report relies on a Desk Study done by the TAC Secretariat of Center spending, staffing, and programs in 1992, supplemented by information from ISNAR about Center activities in 1986. The Desk Study is the database of this report. The first draft of the Desk Study was distributed for comment to the Centers in March, 1994; the second draft of June, 1994 reflects those comments. The Panel visited Cote d'Ivoire in June 1994 and Mali, Burkina Faso, Niger, Nigeria, Benin, Ghana, the Cameroon and the Gambia in August 1994 to gather other information and to interview staff in the IARCs and in the NARS. It presented a draft report to TAC 65. It then received comments from TAC, the Centers, the national programs of Togo, Ghana, and the Gambia, and other participants at TAC 65, which it incorporated into this final report.

Outline

The report first sketches the main agricultural characteristics in the region (Section 2). It continues with a summary of the principal types of research institutions (Section 3) before discussing the major issues of the report (Section 4) and summarizing the recommendations (Section 5).

2. THE ECONOMIES OF WEST AFRICA

Table 1 outlines the region's economies. Roughly 215 million people live there, of whom some 70 % are employed in agriculture. Agriculture--crops, livestock, forestry, and fisheries--provides about 40% of the regional product, varying from 23% (Senegal) to 55% (Mali). Average regional GDP is low, less than US$400 per caput, and declined in many countries from 1980 to 1992.

The main field crops are maize, sorghum, millet, rice, cassava, yam, cowpea, and groundnut. The chief tree crops are banana, plantain, coffee, cocoa, oilpalm, rubber and coconut. Cereals dominate the semiarid countries (Mauritania, Senegal, Mali, Burkina, Niger, Chad, northern Nigeria and Cameroon) while roots, tubers, and tree crops dominate the subhumid and humid (Guinea, Guinea-Bissau, Cote d'Ivoire, Ghana, Togo, Benin, and the central and southern parts of Nigeria and Cameroon). Rice and maize are grown throughout the region.

The chief problems relevant to the mandate of the IARCs in West Africa are agricultural growth with an employment content adequate to relieve poverty and alleviating the environmental degradation associated with agricultural intensification. Are

TABLE 1: Some Characteristics of West Africa

Country	Population (millions)	GNP (US$)	Area (millions hectares)	Total cropland (millions hectares)	Irrigated cropland (% of total)	Agricultural growth rate (annual %)	Index of food production	Fertilizer nutrients, used (kg/ha)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	------	1990	------	---- 1970/89	----	1965/90		
Benin	5.0	360	11.3	1.8	0.3%		112	1.8
Burkina Faso	9.0	330	27.4	2.8	0.4%	1.0	114	5.8
Cameroon	12.0	960	47.5	6.7	0.2%	3.0	89	4.1
Chad	6.0	190	128.4	3.1	0.2%	−1.0	85	1.5
Cote d'Ivoire	12.0	750	32.2	3.2	1.3%	1.0	101	11.3
Gambia				0.2	6.7%			
Ghana	15.0	390	23.9	2.8	3.0%	−1.0	97	3.1
Guinea	6.0	440	24.6	0.7	1.6%		87	1.1
Mali	9.0	270	124.0	3.2	0.8%	2.0	97	5.4
Mauritania	2.0	500	102.6	0.2	5.4%	−1.0	85	11.6
Niger	8.0	310	126.7	3.2	0.8%	−2.0	71	0.8
Nigeria	116.0	290	92.4	30.5	0.8%		106	12.1
Senegal	7.0	710	19.7	5.1	3.2%	−1.0	102	5.5
Sierra Leone	4.0	240	7.2	1.7	1.1%		89	0.3
Togo	4.0	410	5.7	1.4	0.4%		88	8.3
Total/average	215.0	0	773.6	66.3	1.0%		99.5	8.0
%, Nigeria	54.0%	n.a.	n.a.	46.0%	78.6%	n.a.	n.a.	152.1%

Notes: Full data unavailable for Guinea−Bissau, Liberia, and Gambia
(7) Index of food prod per capita, for 1988/90 (1979/81=100)
(8) Plant nutrient, 1989/90

Sources: Columns (1)−(3),(6)−(8), World Bank, Stars Database; Columns (4)−(5) World Resources Institute Database

the problems facing West African agriculture so different that they impose a different mandate on the CGIAR Centers from other regions?

The basic arguments for concentrating on food production as a growth strategy are three. First, food is always a high share of the consumption of the poor, so that gains in food productivity translate into welfare gains for the poorest. Second, many poor consumers of the basic foods also produce those crops and have few alternatives for raising their incomes. Third, food output is a high share of farm output, so the latter cannot develop without improvements in the former. These arguments are quite strong in West Africa. In addition, there are economic limits to complementary strategies based on expansion of cash crops. Perennial crops in the humid zones face both rising economic and environmental costs. Cash crops except cotton and groundnut have low additional potential in the semiarid climate without irrigation, and groundnut faces competition from oil crops produced outside Africa.

The growth path of West Africa agriculture has shifted, and will do so more and more, toward intensification--that is, to higher output per unit of land and to higher variable inputs per unit of output. Intensification is expected to induce higher costs of environmental degradation through: (i) greater soil erosion and weed infestation induced by shorter fallows; (ii) loss of organic matter from intensively cultivated soils; (iii) loss of vegetative cover from overgrazed areas; (iv) damage to water sources and wildlife from greater quantities of agrochemicals; and (v) deforestation.

2.1. The Evolution of West African Farming Systems

We refer to three climates: the semiarid tropics, the subhumid tropics, and the humid. Ruthenberg refers to humid climates, semi-humid climates, semi-arid climates, and the tropical highlands (1980, p. xi). TAC refers to warm arid and semiarid, within which IITA distinguishes the northern Guinea Savanna or moist savanna and mid-altitude semiarid; the term semiarid tropics is used here. TAC refers to warm subhumid climates and IITA to southern Guinea Savanna, derived savanna, coastal savanna, acid woodlands, mid-altitude savanna, and volcanic areas; TAC further refers to warm humid and IITA to humid forest and mid-altitude and highland savanna and woodlands; the term subhumid tropics is used here. TAC also refers to cool climates, which do not occur in West Africa (IITA, 1992, p. 7). While the problems of these climates occur throughout tropical agriculture, they are unusually severe and widespread in West Africa.

Unproductive environment. Soils are poor, attacks of pests, diseases and parasitic weeds are aggressive and rainfall is irregular and often deficient. A long dry season reduces vegetative production. Cloud cover slows photosynthesis in wetter areas. Weeds become troublesome under continuous cultivation. Transport costs are high as a share of producer price and of variable cost, making it unprofitable to intensify with modern purchased inputs because output/input price ratios are too low. Irregular topography makes water control harder and more expensive. Heat and humidity reduce the time for work and cut the productivity of labor when it is employed.

Variable environment. Agriculture is highly variable even with so many common environmental features. IITA's characterization of 14 countries of humid and subhumid West Africa described at least 13 farming systems, distinguished by their major crops (five cereals, cassava, yam, cotton, and four perennials) and six major contrasting conditions of population density and market access (Manyong et al, 1994). ICRISAT village studies in Burkina Faso, Niger, and Mali found many discrete systems with different farm sizes, cropping patterns, types and levels of mechanization, soil fertility and weed control practices, intercropping, and productivity. Variability makes the average fixed costs of research and extension greater per unit of land because there are so many discrete sub-systems among which the costs of identifying and transferring research results are high.

Expensive irrigation. There are poor prospects for economical irrigation, though this may change somewhat in the CFA countries after the 1994 devaluation, because of physical constraints that cause irrigation investments to be expensive. Therefore, and unlike much of East Asia, India, Pakistan, and Bangladesh, irrigated farming in West Africa is likely to remain secondary because it is so costly. This implies: (i) slower adoption of modern inputs in aggregate; (ii) smaller spillovers from irrigated into rainfed areas through factor, input and product markets; (iii) isolated genesis of highly productive and homogeneous farming systems by intensification of a few crops, such as the rice-wheat systems of Asia; (iv) lesser chance of diversifying into higher-value crops; (v) remoter prospect of multiple cropping to boost total land productivity; and (vi) inability to use silt deposition from flood and irrigation waters to restore soil fertility.

Small farms. The principal farm type, a small holding of 2-3 hectares, blocks some innovations that are profitable on larger operations. Examples of such innovations include motorized arable cropping, ranching, and estate agriculture with permanent crops under intensive management. Small farms raise the cost per farmer of management, research, extension, processing and transport.

Effect of climate on livestock adaptation. Trypanosomiasis, other diseases, and the continuous heat and humidity devalue indigenous stock productivity in the wetter climates. The hot and humid climate stops the introduction of European dairy breeds. Innovations depending on those breeds, such as intensive smallholder dairying or ley farming with grasses or legumes as found in highland East Africa, are usually impossible in West Africa, thus closing one path of agricultural development.

Institutions. Public and private institutions alike are often unable to stimulate agriculture. Public extension services are poor. Some technologies that might have been more widely adopted, such as hybrid maize, lag behind their potential because of the weakness of the public extension service. Private research, extension and input supply are weak and sometimes totally absent. Attempts by comparatively powerful international seed companies to establish stable and profitable businesses have generally failed.

Given these basic features, what are the most probable expansion paths in the three climates? What should be the emphasis of the various centers with respect to profitable research directions? The most likely avenues of growth are outlined in Dumont

(1957), Boserup (1965), Ruthenberg (1980), and Pingali et al (1987), among others. If IARC programs radically diverge from those paths, then either the basic theory is fundamentally wrong, circumstances have changed to render it obsolete, or the approach of the Centers is misguided.

2.2. The Humid and Subhumid Tropics

Ruthenberg observed that "The permanent cultivation of upland in a hot, humid climate presents some of the most troublesome problems of tropical agriculture" (p. 127). The toughest problems are soil erosion and weed invasions, which occur rapidly when land clearing for farming removes the natural vegetation, and pest and disease attacks, which devastate introduced cultivars. Ruthenberg concluded that the efficient solutions to those problems are irrigated rice, intensive root crop cultivation, or permanent crop cultivation. Other alternatives, initially proposed by analogy with European farming, such as forest clearing for annual crop cultivation with heavy applications of chemical inputs, induce such soil erosion, nutrient leaching and pest or weed infestation that they quickly become unsustainable[2]. An additional problem in West and Central Africa is animal trypanosomiasis which lowers the return to ruminant livestock production and prevents farmers from using mixed farming to maintain soil fertility.

Any innovative farming system that seeks to provide higher incomes than the traditional alternatives must also protect against erosion, weeds and pests. Irrigated rice is the common solution throughout Asia, but covers only small areas of humid and subhumid West Africa because of the costs of water control and soil problems. In theory, intensive root crop cultivation both covers the soil and provides a marketable surplus of the subsistence crop, while permanent crop cultivation also protects the soil and provides enough cash income to purchase subsistence. In practice, Ruthenberg concluded that irrigated rice is often uneconomic and argued that "there may be technically feasible solutions to the problems of permanent cultivation, but their economic returns are as yet still marginal" (p. 128). There is now more awareness of environment problems caused by agrochemicals, including pest resistance, thus adding additional costs.

Research in the Centers is broadly consistent with the lessons of experience with the humid zones of West Africa. Work at IITA on alley farming, improved fallows, and live mulches recognizes the necessity to maintain the vegetative cover and control weeds in a permanent cropping system. The Slash and Burn Program explicitly recognizes the linked problems of maintaining vegetative cover to protect the soil, while providing higher incomes to producers in a permanent cropping system. WARDA's program takes a careful approach to the problems of vegetative cover, weed management, and the fate of agrochemicals in this environment.

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[2] Dumont (1957) gives a lucid and prescient account of the unhappy fate of such alternatives in the Congo soon after World War II.

2.3. Semiarid Tropics

Ruthenberg was more optimistic about the semiarid tropics, because the costs of land clearing for stable field systems are lower than in the humid zones. More complete land clearing allows field cropping and pasture systems to replace shifting fallows, thereby permitting some farming practices--field mechanization, plowing, planting and cultivating in rows, mixed farming with stable animal production--that are impossible where it is wetter. He argued that the growth paths for the semiarid tropics are irrigated agriculture, ley farming, large-scale ranching, or more intensive upland cropping with shorter fallows. Irrigated agriculture and ley farming are usually not economic. Large-scale ranching is both uneconomic and technically infeasible while being socially impossible because it would deprive small farmers and ranchers of their land rights. Hence, more intensive upland farming and livestock production are the feasible expansion paths, necessarily accompanied by shorter fallows associated with rising population pressure.

Research in the Centers is consistent with this concept. ICRISAT seeks to develop stable cereal-legume production systems with higher yields. Work at IITA, ICRISAT and ICRAF on agroforestry supports both more intensive cereal and legume cultivation with trees. WARDA assists irrigated rice research in the Sahel. Inconsistent initiatives--mainly large-scale ranching--have not been supported by the IARCs. Other inappropriate work--strict monocropping, overreliance on chemical crop protection in lieu of biological control--has not been very consequential in the IARCs' work.

3. RESEARCH INSTITUTIONS

3.1. National Agricultural Research Systems

West African NARS have grown substantially since 1980 (Table 2). The 17 countries now spend more of their agricultural GDP on research, have more PhDs and other graduate degree holders, and manage larger and better facilities (stations, labs, vehicles, information management and communications). In seven of the eight largest countries (no information is available on Cameroon) the number of scientists per farmer has grown at least 17% with an average growth of 28%. Some programs (eg, Mali, Senegal, Niger, Nigeria) have recently reorganized and decentralized in an effort to lower management costs.

West African research investment is still unsatisfactory. Spending is less than that of competing countries in such key import substitutes as rice, maize, and sugarcane; livestock and perennial crop exports (coffee, cocoa, oil palm, rubber, pineapples, fruits), and annual crop exports (cotton, groundnut, vegetables). Funding depends excessively on foreign donors. One cost of expansion has been a decline in operational funding per scientist with detrimental effect on the rate of capacity utilization of trained personnel in research.

TABLE 2: Salient Features of the NARS in West Africa in 1990

Country	National Agricultural Scientists		Foreign Agricultural Scientists		Scientists per million farmers (% change since 1980)	Spending Total (US$ millions)	Operating/ scientist (US$ thousands)
	All	Agronomists	All	Agronomists			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Burkina Faso	73.0	15	18	1	22%	7.6	46.0
Chad	33.0	n.a.	26	n.a.		7.1	n.a.
Cote d'Ivoire	246.8	n.a.	104	n.a.	23%	36.3	131.0
Gambia	41.0	23	n.a.	n.a.		n.a.	n.a.
Ghana	235.7	n.a.	n.a.	n.a.	17%	33.2	n.a.
Guinea–Bissau	19.0	5	3	0		1.0	n.a.
Mali	198.0	55	39	9	37%	6.0	n.a.
Mauritania	5.0	3	0	0		0.5	n.a.
Niger	37.0	11	21	1	52%	n.a.	n.a.
Nigeria	937.9	n.a.	18	n.a.	23%	89.6	94.0
Senegal	104.0	16	35	5	19%		33.3

Note: Information unavailable for Benin, Cameroon, Guinea, Liberia, Sierra Leone, and Togo.
Changes in numbers of scientists are ((1986–90) – (1976–80))/(1976–1980)
Source: Data in columns (1)–(4), (6), and (7) for Burkina Faso, Chad, Gambia, Guinea–Bissau, Mali, Mauritani, Niger, Senegal in 1990 are from Weijenberg et al, 1993, pp. 71–88
Data in column (5) for Mali from Mazzucato, 1994b, p. 9; for Senegal from Mazzucato and Ly, 1994, p.9;
for Niger from Mazzucato and Ly, 1993, p.8; for Cote d'Ivoire from Roseboom and Pardey, 1994, p.10;
for Nigeria from Roseboom et al, 1994, p.17; for Ghana from Roseboom and Pardey, 1994, p.10; for Burkina Faso from Mazzucato, 1994a, p.10.
Data in columns (1) – (7) for Cote d'Ivoire in 1986–90 are from Roseboom and Pardey, 1994, p.10.
Data in columns (1) – (7) for Nigeria in 1986–90 are from Roseboom, Beintema, Pardey and Oyedipe, 1994, pp.17–18.

ISNAR has provided more detail on Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Nigeria, and Senegal which are the major programs in the region. The ISNAR data do not give the precise share of basic research in the major countries, but it is clear that it is very small. Panel interviews with NARS staff in eight countries also indicate that they do little, if any, basic and strategic research. The ISNAR statistical briefs report subsector shares of research as follows: crops, 44.2%; livestock, 18.9%; forestry, 6.9%; fisheries, 8.1%; natural resources, 4.5%; other (including post-harvest and economics), 17.3%. It is not possible to determine the commodity or ecoregional focus of the major NARS from available information.

Problems with effective public research in the independent NARS. The return to additional investment on food crops has been poor since independence after 1958. Technologies from national research--planting materials, crop and land management practices, fertilizer and pest control recommendations, forage crops, livestock breeds and animal management practices--are not widely used. Examples of research failures are noted in Matlon (1985) for millet and sorghum in the semiarid zone; McIntire, Bourzat, and Pingali (1992) for crop and livestock technology in Burkina Faso, Mali, Niger, and Nigeria; IITA (1992) for sole crop cowpea and sorghum in northern Nigeria. Exceptions are modern varieties of mangrove rice in Sierra Leone and Guinea (Zinnah et al, 1993), the replacement of traditional floating rices in the Niger Delta of Mali by modern rice varieties (McIntire, 1980), the Florido yam cultivar in Cote d'Ivoire (personal communication of Dr Sekou Doumbia) maize cultivars in Mali, and cowpea in Senegal (Oehmke and Crawford, 1992). The basic explanation for low and inconsistent impact is historical underinvestment in staff and in the financial resources that would allow national staff to use their skills, compounded by the weaknesses of the national extension services.

The national programs have often been poorly managed in addition to lacking qualified staff and operational funds. There is excessive bureaucracy, little scientific autonomy, weak accountability, and poor incentives for good science. The national programs concentrate on crops, not on livestock or forestry, and rarely consider the interactions among system components that are prominent features of regional farming systems.

To summarize, the national programs have not produced widely applicable results. However, at least six (Cameroon, Cote d'Ivoire, Burkina, Niger, Mali, Senegal) have become much stronger in capacity since the late 1970s. While the research output in those countries is still behind their research capacity, they might soon produce useful results despite various growing pains. A group of small countries (Mauritania, the Gambia, Guinea, Guinea Bissau, Sierra Leone, Liberia, Togo, Benin, and Chad)--has little capacity to do independent work. Nigeria is unique. Both the small countries and Nigeria present special challenges to the IARCs and these are discussed immediately below.

3.1.1. Small Countries

West Africa is one of five regions in the world with many small national programs. Gilbert et al (1992) have discussed the problem of small NARS, including those of Mauritania, the Gambia, Guinea Bissau, Sierra Leone, Liberia, Togo, Benin, and

Chad. In addition to the defining criterion of size Gilbert identified lack of a core institution, vulnerability to external influence, instability, "narrow scientific base and isolation" as particular afflictions. Those programs illustrate the kinds of institutional problems that most IARCs, with the exception of ISNAR, cannot deal with efficiently. Benin is the only country in the group with a significant Center presence; the others have one or two IARC scientists and limited other collaboration.

The IARCs alone obviously cannot provide a solution to the institutional and scientific problems of these countries. Where selected national capacities in large or small countries--e.g. in farming systems research--are not strong, the Centers can provide assistance. But where national institutions are so weak as to be almost completely ineffective--as is the case of practically all the countries in this group--then the basis of a sustainable solution is to have a focussed bilateral project, tied to a foreign university because of the importance of adequate academic training in developing national capacity, that seeks to create a core national institution. The reason that a Center should not be the lead institution is that the size of the required commitment is so great as to detract from Center efforts in other countries of the region. The IARCs would complement this effort where they have a comparative advantage in doing so, but would not be the leading institution because of the size and duration of the necessary commitments. It should be apparent that this recommendation does not exclude direct collaboration by many different means between IARC scientists and colleagues in small national programs and that it sees a strong role for non-CGIAR regional organizations in assisting the small countries.

3.1.2. Nigeria

In 1992, Nigeria absorbed 56 percent of IARC resources in West Africa, an increase from the 23 percent of 1986. This change reflects the closing of the IITA bilateral program in the Cameroon (16.5 % in 1986 and 2.4 % in 1992) and the Nigerian devaluations beginning in November, 1986.

Nigeria has 54% of the region's population, 46% of its cropped area, more-than three quarters of its irrigated cropland and uses 70% of the mineral fertilizer (Table 1). It is the region's social and intellectual leader, the major market and will eventually be the pole of economic growth. Its research problems are of unique importance. Nigerian agriculture represents the main ecoregions, crops, and farming systems. It is the world's leading producer of cowpea and yam. The variability in its farming systems--crop type, prevalence of irrigation, the variety of intercropping, disease and pest pressure, population density, mechanization, and fertility management--make the country an uncommonly rich site. Nigerian research has produced useful knowledge on many topics and the national program, despite its current dilapidation, is still a strong partner.

The political and economic difficulties of Nigeria have retarded the evolution of research in West Africa. Had Nigeria grown more rapidly, it is likely that it would now produce world class research and be the regional pole on yam, cowpea, and production systems management, at the least. That it has not done so has swollen the

Center's overall effort in the region and maintained it in areas that might otherwise have been devolved.

Nigeria's agricultural, economic, and political importance lead the Panel to conclude that the Centers' focus on it is appropriate and has to continue. The short-term aspects of the work should be the subject of constant internal review in the major Centers, but the country's long-term importance is undeniable.

We note that the argument that Nigeria is too expensive is dated. Nigeria was much cheaper than the CFA countries before the devaluation of the CFA in January 1994. The IITA MTP (IITA 1992, p. 102) reported that costs per position at Mbalmayo were 48% more expensive than those at Kano. The Panel's estimate of the difference after the devaluation is 23% in view of the dollar and local currency fractions in costs and the local currency cost increases expected by the Centers. Nigerian costs are expected to be less than in non-African Centers; The CGIAR Secretariat informed the Panel that IITA's unit dollar costs (consisting mainly of Nigeria) decreased 31 % from 1988 through 1992, compared to a decrease of 7.4% for ICRISAT and to increases of 44.8%, 29.4% and 11.6 % for CIMMYT, IRRI, and all Centers, respectively.

The Panel perceives two chief weaknesses in the IARC effort in Nigeria. First, IFPRI has neglected Nigeria. There have been IFPRI farm or consumer surveys in Niger, the Gambia, Burkina Faso, Ethiopia, and Rwanda, but the only research on Nigeria has been aggregate analysis of trade and fertilizer policy, and a paper on growth linkages that is more than a decade old. The Panel recognizes the difficulties of working in Nigeria, but notes that IITA, ILCA, and ICRISAT have surmounted those difficulties. The Panel recommends that IFPRI develop a permanent presence of two staff in Nigeria, preferably at Kano or Ibadan, with the staff having suitable close links to the major Nigerian universities like the ones that IITA and ICRISAT have. One of those staff would be the regional director of a joint social sciences program across all Centers working in West Africa (section 4.6).

Second, the ILCA presence in Nigeria has recently weakened. Given the importance of ruminant livestock in most Nigerian farming systems, and the complex interactions among crops, animals, pastures, and trees, research on animal agriculture is necessary to raise productivity. Though Nigerian scientists should be able to supply much of this research there will be a significant international component. The ILCA program in Nigeria has been unable to provide it in the past because of the neglect of senior management and now because of the uncertainty concerning management, staff, and resources of ILRI. The Panel recommends that: (i) the ILCA Kaduna program be transferred to Ibadan in order to give adequate size and stability to international livestock research in Nigeria; and (ii) ILRI commit itself to a long-term, stable, substantial (at least 5 principal staff) group working in close collaboration with IITA and ICRAF at Ibadan.

3.2. Private Sector Research

The Centers' efforts in West Africa conform in principle to the traditional division of labor between the public and private sectors in agricultural research and

extension. The Centers recognize the primacy of the private sector in transferring profitable technologies where the value added of incremental research is low and in generating technologies where the value added of research is appropriable by private agents. Accordingly, they do little on patentable innovations, such as machines, tools, and specialized livestock. They do some work on hybrids (maize and sorghum), but little compared to varieties (millet, sorghum, maize, rice, cowpea, groundnut and others) or vegetatively propagated crops[3].

Do feasible private alternatives now exist to compensate for the lack of effective public agricultural research? Are these alternatives likely to assist growth much in the near term? Would these alternatives indicate any change in the role of the Centers?

Natural intensification and farmer experimentation. An important alternative is the natural process of intensification and farmer experimentation with novel practices in adopting new crops, animals, and farming methods. In West Africa, this has been a major form of technology generation and transfer in perennial and semiperennial crops (coffee, cocoa, oilpalm, cassava), annual crops (maize, cotton and groundnut), trypanotolerant livestock (N'Dama and Baoule cattle), processed livestock feeds (oil cakes and molasses in many countries), and mechanization (hand tools, grain mills, oil presses, animal traction). While this experimentation is valuable, some of its stimulus to growth is already spent (e.g., the introduction of novel rainfed crops) or will simply stimulate extension of agriculture onto new land (e.g., mechanization and trypanotolerant livestock) without necessarily raising yields. Natural intensification is likely to continue, but as a complement for public research, not as a substitute.

Organized Private Research. Panel observations and other evidence indicate that private research whether foreign or domestic, is now negligible. There is some research embodied in farm inputs, such as veterinary drugs. Other inputs with research content are fertilizer, pesticide, and machinery use (including tools drawn by animals) in which applicability, rates, timing, and other recommendations to farmers reflect information derived from public research done in national programs or in their colonial antecedents. Private research cannot dramatically assist agricultural growth in the near term without improbably large new investments.

Barriers to International Trade in Agricultural Technology. The weakness of private sector research in West Africa is due in part to public policy. David Gisselquist's research on policy barriers to international trade affecting private generation and transfer of agricultural technology has important implications for the IARCs because it dulls the traditional public/private division of labor (Gisselquist, 1992).

Gisselquist observed that many countries interfere with the private generation and transfer of agricultural technology by excluding imported inputs, failing to defend

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[3] Other hybridizable crops of importance in West Africa, such as oilpalm and vegetables, are outside the Centers' mandates.

intellectual property, setting up nettlesome standardization requirements, and restricting domestic and foreign movement of even simple innovations. He argued that such barriers:

- slow the transfer of finished technologies, such as seeds, machines, fertilizers and other chemicals, and irrigation equipment across farming situations;

- hamper the flow of knowledge, including plant breeding materials, and slow the rate of agricultural growth;

- implicitly inflate the return to low-input technologies by taxing inputs; and

- implicitly inflate the return to public research and extension.

His general conclusion is that elimination of those barriers would accelerate agricultural growth without additional research, public or private. These findings are highly relevant to West Africa. We make the following recommendations based on them.

- The donors of the CGIAR, the international monetary agencies, and private companies should intensify pressure on West African countries to liberalize their markets for agricultural inputs and for intellectual property. Some of this pressure should include externally-assisted efforts to develop producers' organizations that are truly independent of government interference. Liberalized markets necessarily include unfettered arrangements for distribution of Center materials to private companies and producers' organizations. Centers should not be involved in this pressure because of possible conflicts of interest.

- Here we rephrase a point made about long-term perspective (Annex 2). Ignoring the eventual role of the private sector illustrates the failure to distinguish between true natural science research problems and others that are caused by bad policies demanding little or no natural science research for a solution. Specifically, research planning in the Centers must have a long-term vision about input costs and supply. While the distorting effects of input subsidies (e.g. fertilizer in Nigeria, water and pesticides in several countries) are manifest, the effects of non-tariff technology trade barriers may be invisible because they prevent the emergence of technology markets. Ex-ante analysis must recognize that the apparent return to low input agriculture, especially in the drier areas, may be an artifact of input trade barriers. Valuable time can be lost in developing low input practices that are economically sustainable only when market inputs are physically unavailable or overpriced.

- Some of the unwillingness of West African countries to liberalize intellectual property restrictions, and other conditions affecting private research and extension, is probably due to the fear of uncompensated exports of their genetic materials. If TAC perceives that the region is not adequately compensated for genetic exports, and that restrictions on genetic material flows retard development of improved cultivars, then the Panel recommends that it commission a review in collaboration with SPAAR and regional institutions to: (i) identify the materials concerned; (ii) review safeguards, including intellectual property laws, bilateral agreements with private firms, and biosafety

regulations that protect regional countries against such exports; and (iii) recommend safeguards to protect both national and scientific interests.

3.3. The IARCs

The IARCs spent in 1992 some US$55 million on about 2,157 senior-staff months (SSM) in West Africa. Of the total SSM, roughly half was at IITA, 14% at ICRISAT, and nearly 11% at WARDA. While practically all IARCs are active in West Africa, 80% of the spending (Table 3) was in only four Centers: IITA (40.9%), ICRISAT (17.0%), WARDA (13.0%), and ILCA (8.9%).

The 1992 breakdown in SSM by CGIAR activity category (Table 4) is: 1) natural resources, 20.3%; 2) germplasm enhancement and breeding, 22.0%; 3) production systems and management, 35.1%; 4) public policy and management, 3.6%; and 5) institution building, 19.0% (Table 3). Those are substantial changes from 1986 (Table 5) when the breakdown was: 1) 13.5%; 2) 19.8%; 3) 49.3%; 4) 7.7%; and 5) 9.7%. The IARCs have also become more centralized since 1986, though this is perhaps transitory; we cannot necessarily infer that greater centralization means coverage of fewer ecoregions and fewer farming systems.

3.3.1. The Impact Study

What does the Impact Study (Jahnke et al, 1985, nine country studies and other relevant thematic chapters) teach us about feasible and efficient reforms in CGIAR commitments in Africa?

The Impact Study found the production effect of agricultural research in Sub-Saharan Africa to have been weak. It concluded "that the discussion of center impacts on agricultural production in tropical Africa cannot focus on any obvious success stories (p. 118)". It did observe that: (i) that many "varieties released ... can be related to center material (cassava, cowpea, millet, pigeon pea, and potato)" (p. 118); (ii) benefits from IITA work in Nigeria on farming systems with intercropping and "the identification of herbicides, insecticides, and fungicides" for the farming systems (p. 119); (iii) animal production innovations such as artificial insemination, pasture species, and pasture seeding techniques; (iv) cassava varieties and the yam minisett technique; (v) hybrids and improved open-pollinated varieties of maize; and (vi) better rice and sorghum cultivars. Some impacts have not been confirmed subsequently, notably those of millet cultivars, intercropping research, animal production innovations, and sorghum cultivars.

TABLE 3: African, West African, and Worldwide Allocations of IARCs, 1992

Center	Total (US$ millions)	SSA (US$ millions)	% SSA in total	West Africa (US$ millions)	% share of SSA	% share of West Africa total
CIAT	27.1	5.7	21.0%	0.4	1.5%	0.7%
CIMMYT	28.4	5.1	18.0%	0.6	2.1%	1.1%
CIP	16.1	3.1	19.3%	1.8	11.2%	3.3%
ICLARM	4.2	0.4	9.5%	0.2	4.8%	0.4%
ICRAF	11.8	11.6	98.3%	1.6	13.6%	2.9%
ICRISAT	27.3	12.2	44.7%	9.4	34.4%	17.0%
IFPRI	9.6	3.9	40.6%	2.4	25.0%	4.3%
IIMI	6.7	0.7	10.4%	0.9	13.4%	1.6%
IITA	22.7	22.7	100.0%	22.6	99.6%	40.9%
ILCA	19.0	14.3	75.3%	4.9	25.8%	8.9%
ILRAD	13.7	7.3	53.3%	0.2	1.5%	0.4%
INIBAP	2.5	0.9	36.0%	0.4	16.0%	0.7%
IPGRI	8.2	2.2	26.8%	0.4	4.9%	0.7%
IRRI	28.8	1.2	4.2%	0.8	2.8%	1.4%
ISNAR	7.1	2.8	39.4%	1.4	19.7%	2.5%
WARDA	6.3	6.3	100.0%	7.2	114.3%	13.0%
Total	239.5	100.4	41.9%	55.2	23.0%	100.0%

Source: Desk Study, p. 27.

TABLE 4: Activities of Major CGIAR Centres in West Africa, 1992 (Senior Staff–Months)

Country	CGIAR ACTIVITY CATEGORY: Conservation and management of natural resources	Germplasm enhancement and breeding	Production systems and management	Economics and public policy	Institution building	Total	% of AEZ	% of West Africa
HUMID LOWLANDS (HULWA)								
Benin	24.0		60.0			84.0	8.8%	6.5%
Cameroon	30.0					30.0	3.1%	2.3%
Ghana					12.0	12.0	1.3%	0.9%
Cote d'Ivoire	10.8	25.9	38.4	4.9	36.0	116.0	12.1%	8.9%
Nigeria	107.9	192.7	244.0	13.5	146.1	704.2	73.5%	54.2%
Sierra Leone	1.8	4.3	5.2	0.7		12.0	1.3%	0.9%
Sub–total	174.5	222.9	347.6	19.1	194.1	958.2	1.0	0.7
% of HULWA	18.2%	23.3%	36.3%	2.0%	20.3%	100.0%		n.a.
% of West Africa total	13.4%	17.1%	26.7%	1.5%	14.9%	73.7%		
SEMIARID LOWLANDS (SALWA)								
Burkina Faso			12.0			12.0	3.5%	0.9%
Gambia			2.2	0.9		3.1	0.9%	0.2%
Mali	36.7	8.4	6.0	12.0	18.4	81.5	23.9%	6.3%
Niger	49.2	45.8	77.7	14.0	34.4	221.1	64.7%	17.0%
Senegal	3.6	8.6	10.4	1.4		24.0	7.0%	1.8%
Sub–total	89.5	62.8	108.3	28.3	52.8	341.7	100.0%	26.3%
% of SALWA	26.2%	18.4%	31.7%	8.3%	15.5%	100.0%		n.a.
% of West Africa total	6.9%	4.8%	8.3%	2.2%	4.1%	26.3%		
TOTAL	264.0	285.7	455.9	47.4	246.9	1,299.9		n.a.
% of WA	20.3%	22.0%	35.1%	3.6%	19.0%	100.0%		n.a.

Source: Desk Study, Table 3a.

TABLE 5: Activities of Major CGIAR Centres in West Africa, 1986 (Senior Staff– Months)

Country	CGIAR ACTIVITY CATEGORY					
	Conservation and management of natural resources	Germplasm enhancement and breeding	Production systems and management	Economics and public policy	Institution building	Total
HUMID LOWLANDS (HULWA)						
Benin	8.3	4.0	6.5	0.2	9.1	28.0
Cameroon	13.8	107.8	140.8	12.9	29.1	304.4
Ghana	15.6	53.1	54.4	7.4	44.3	174.7
Cote d'Ivoire	39.3	8.0	82.9	18.3	6.2	154.7
Nigeria	37.6	99.3	202.2	29.3	60.5	428.8
Sierra Leone	20.6		81.1	0.5	2.7	105.0
Sub–total	135.1	272.1	568.0	68.5	151.8	1,195.6
% of HULWA	11.3%	22.8%	47.5%	5.7%	12.7%	100.0%
% of West Africa total	7.3%	14.7%	30.7%	3.7%	8.2%	64.7%
SEMIARID LOWLANDS (SALWA)						
Burkina Faso	39.7	33.8	36.6	2.6	10.8	123.5
Gambia	1.2	6.2	75.3	35.2	1.5	119.4
Mali	14.9	11.7	99.0	0.9	7.7	134.2
Niger	23.6	27.4	46.7	13.0	1.0	111.6
Senegal	34.8	14.0	86.5	21.6	7.3	164.2
Sub–total	114.2	93.0	344.0	73.3	28.3	652.9
% of SALWA	17.5%	14.2%	52.7%	11.2%	4.3%	100.0%
% of West Africa total	6.2%	5.0%	18.6%	4.0%	1.5%	35.3%
TOTAL	249.3	365.1	912.1	141.9	180.2	1,848.5
% of WA	13.5%	19.8%	49.3%	7.7%	9.7%	100.0%

Source: Desk Study, Table 3B.

Note: Data for Guinea, Liberia, Equatorial Guinea, Togo, Chad, Cape Verde and Mauritania have been excluded from the 1986 data because they were unavailable for 1992, reducing the 1986 total by about 8%

TABLE 6: Activities of All CGIAR Centres in West Africa, 1992 (Senior Staff–Months)

Country	CGIAR ACTIVITY CATEGORY: Conservation and management of natural resources	Germplasm enhancement and breeding	Production systems and management	Economics and public policy	Institution building	Total	% of AEZ	% of West Africa
HUMID LOWLANDS (HULWA)								
Benin	24.0		60.0			84.0	9.1%	6.6%
Cameroon	30.0					30.0	3.2%	2.4%
Ghana					12.0	12.0	1.3%	0.9%
Cote d'Ivoire	10.8	25.9	4.0	4.9	36.0	81.6	8.8%	6.4%
Nigeria	107.9	192.7	244.0	13.5	146.1	704.2	76.2%	55.6%
Sierra Leone	1.8	4.3	5.2	0.7		12.0	1.3%	0.9%
Sub–total	174.5	222.9	313.2	19.1	194.1	923.8	100.0%	73.0%
% of HULWA	18.9%	24.1%	33.9%	2.1%	21.0%	100.0%		n.a.
% of West Africa total	13.8%	17.6%	24.7%	1.5%	15.3%	73.0%		
SEMIARID LOWLANDS (SALWA)								
Burkina Faso			12.0			12.0	3.5%	0.9%
Gambia			2.2	0.9		3.1	0.9%	0.2%
Mali	36.7	8.4	6.0	12.0	18.4	81.5	23.9%	6.4%
Niger	49.2	45.8	77.7	14.0	34.4	221.1	64.7%	17.5%
Senegal	3.6	8.6	10.4	1.4		24.0	7.0%	1.9%
Sub–total	89.5	62.8	108.3	28.3	52.8	341.7	100.0%	27.0%
% of SALWA	26.2%	18.4%	31.7%	8.3%	15.5%	100.0%		n.a.
% of West Africa total	7.1%	5.0%	8.6%	2.2%	4.2%	27.0%		
TOTAL	264.0	285.7	421.5	47.4	246.9	1,265.5		n.a.
% of WA	20.9%	22.6%	33.3%	3.7%	19.5%	100.0%		n.a.

Source: Desk Study, Table 3C.

TABLE 7: Fixed Assets of the IARCs in West Africa, Net Book Value, 1992 (US$ '000)

	ICRAF	ICRISAT	IITA	ILCA	CENTERS WARDA	OTHER	Total	% of AEZ	% of West Africa
HUMID LOWLANDS (HULWA)									
By country:									
Benin			4,268				4,268	9.5%	6.6%
Cameroon	118		962			73	1,153	2.6%	1.8%
Ghana							0	0.0%	0.0%
Cote d'Ivoire			373		11,158	221	11,752	26.2%	18.3%
Nigeria	6	1,319	25,496	598	39		27,458	61.1%	42.6%
Sierra Leone			2		293		295	0.7%	0.5%
Sub-total	**125**	**1,319**	**31,101**	**598**	**11,490**	**294**	**44,927**	**100.0%**	**69.8%**
% of HULWA	0.3%	2.9%	69.2%	1.3%	25.6%	0.7%	100.0%		
% of West Africa total	0.2%	2.0%	48.3%	0.9%	17.8%	0.5%	69.8%		
By asset category:									
Buildings/infrastructure	6		24,156	321	8,846	47	33,376	74.3%	51.8%
Vehicles	74		1,278	132	738	111	2,333	5.2%	3.6%
Farm equipment	2		927	57	660		1,646	3.7%	2.6%
Laboratory equipment	31		2,694	35	813		3,573	8.0%	5.5%
Office equipment	25		1,052	53			1,130	2.5%	1.8%
Housing	6		236		433		675	1.5%	1.0%
SEMIARID LOWLANDS (SALWA)									
By country:									
Burkina Faso	98					35	133	0.7%	0.2%
Gambia							0	0.0%	0.0%
Mali	42	2,472		247			2,761	14.2%	4.3%
Niger	29	15,966		164		14	16,173	83.1%	25.1%
Senegal	82				251	65	398	2.0%	0.6%
Sub-total	**250**	**18,438**	**0**	**411**	**251**	**114**	**19,465**	**100.0%**	**30.2%**
% of SALWA	1.3%	94.7%	0.0%	2.1%	1.3%	0.6%	100.0%		
% of West Africa total	0.4%	28.6%	0.0%	0.6%	0.4%	0.2%	30.2%		
By asset category:									
Buildings/infrastructure	9	17,326		260	140		17,735	91.1%	27.5%
Vehicles	184	187		19	47	66	503	2.6%	0.8%
Farm equipment	2	281		47	12		342	1.8%	0.5%
Laboratory equipment	3	976		43	34	26	1,082	5.6%	1.7%
Office equipment	52	987		42		61	1,143	5.9%	1.8%
Housing					18		18	0.1%	0.0%
TOTAL	**375**	**19,757**	**31,101**	**1,009**	**11,741**	**408**	**64,391**		
% of WA	1%	31%	48%	2%	18%	1%	100%		

Source: Desk Study, Annexes 5 and 6.

Potential impact in West Africa in 1985

The Study described innovations that it believed to have the potential for impact[4]. These were: (i) IITA cowpea varieties; (ii) IITA zero tillage practices for the humid zone; (iii) IITA maize varieties resistant to maize streak virus and downy mildew; (iv) IITA cassava clones; (v) IITA biological control of cassava mealybug and green mite; (vi) ICRISAT, new sorghum and millet varieties; and (vii) ILCA, enhanced knowledge of African livestock production systems, addition of forage legumes to farming systems, and crossbred dairy cows.

Biological control of cassava mealybug (CM) has been profitable and would carry the entire cost of IITA for many years under certain assumptions (Norgaard, 1988)[5]. IITA varieties resistant to maize streak virus have had a strong economic impact, as have IITA cassava materials.

A major impact not foreseen in Jahnke's study was scientific impact through publications and training, in which IITA and ICRISAT have been very strong. A strong impact is now visible in ISNAR assistance to national programs, which has helped to improve the political commitment to, and the organization and efficiency of, national research[6].

Some projected impacts have not materialized.

Crop improvement. IITA cowpea varieties, of interest in the early 1980s, have not been adopted by farmers and the IITA cowpea program has since been redesigned in consequence (IITA, 1993). ICRISAT sorghum and millet varieties are used on a small area and have produced no major economic benefits in West Africa (ICRISAT, 1992a).

Mechanization and land management. The Impact Study mentioned only zero tillage, on which research has had no measurable effect. Other research initiatives--a sand fighting tool and a wheeled tool carrier in the semiarid tropics, watershed management, strip cropping with Andropogon in dry areas, alley farming, animal traction for valley bottoms--have produced no measured incremental benefits.

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4 We stress that we are reporting here what Jahnke's study said about the potential for impact to give the accepted 1985 view on the subject. We are not here discussing what the Centers actual impact was in 1985 or now.

5 IITA has now derived better field estimates of the benefits of biological control, that confirm Norgaard's results (Neuenschwander and Hammond, 1989).

6 A related benefit will eventually derive from ICRISAT and WARDA application of quantitative economic criteria in research priority setting.

Legumes in the farming system. Alley farming, an Asian innovation studied and promoted in Africa by IITA, has not been adopted by farmers (for mulch, fodder, weed control, or labor savings) despite promising experimental evidence and economic analysis indicating that it would be profitable. Fodder banks, which at one time were projected to have economic benefits sufficient to pay for the total cost of the ILCA subhumid zone program in Nigeria, have not been adopted widely in that country (Hassan, 1993).

The Impact Study adduced three general lessons.

► Exotic plant materials did not work for direct use by farmers or for crop improvement. This is well known in rice, millet, and sorghum, though it would have been a lesser consideration in cowpea and yam.

► National authorities did not give enough importance to creating a positive policy environment for agricultural growth.

► An integrated technology transfer system--involving research, extension, and the private sector--had not matured except for some industrial crops.

The Study argued that several basic changes were needed to have more impact.

► Scientists should use more local materials in breeding programs, thereby incorporating more of their characteristics (vigor, pest resistance, photosensitivity, consumer preferences)[7].

► Research should seek response to low input levels, apparently as a way of making higher output more independent of uncertain input markets.

► More work should be done on biological nitrogen fixation, both to improve soil properties and to make higher output independent of input markets.

► More should be done on simple mechanical innovations, to raise labor productivity, relieve drudgery, and to permit land management that would otherwise be impossible.

Are these basic changes really novel and are they likely to have impact?

► Local materials were in fact often used in earlier programs (eg, French millet work in Niger, sorghum in northern Nigeria) without leading to widespread genesis and adoption of improved cultivars. ICRISAT and IITA confirm that local materials are now widely used in crop improvement research as sources of, inter alia, disease resistance and as checks in studies of processing quality (eg, for cassava, Silla et al, 1993).

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[7] NARS scientists met by the Panel made the same observation on several occasions.

However, local materials are often of limited potential for crop improvement. For example, the variability in millet cultivars native to western Niger is small.

▸ Response to low inputs is an economic and extension issue. Available planting materials and livestock can respond profitably to more purchased inputs (eg, fertilizers and concentrate feeds) than are now used by African farmers; the reason that they do not is that such inputs are often rationed or are not available at all. To take the most important input, mineral fertilizer, actual application levels are much lower than utility-maximizing levels. Second, there is a mountain of information on low input levels from experiments and demonstrations. The practical application of this information is not a research question, but an economic and extension one, and the payoff to further research will be negative unless planting materials change rapidly to allow higher output/input ratios (Crosson and Anderson, 1994).

▸ Research on biological nitrogen fixation is not novel as much was done in the past on cropping systems with cowpea, groundnut and, to a lesser extent, Stylosanthes and Acacia. In some instances farmers use natural sources of nitrogen anyway (eg, acacia trees), in addition to nitrogen from leguminous field crops grown in mixes or rotations.

▸ Simple and complex mechanical innovations alike have been proposed (eg, Dumont 1957, p. 59) studied and used throughout tropical Africa for years. They include plows, seeders, weeders, carts, hand tools, threshers, grinders, mills, presses, and other processing implements. While their benefits are evident, the hand of the IARCs in generating them has not been powerful as these machines result from private innovation and technology transfer.

The Panel argues that the Centers, and other historic or current research, have long put these basic changes into practice or that they are not natural science research issues. This is not to denigrate those changes as sources of gain. It is to say that the gains would now be marginal, do not always require international research, and do not suggest any obvious reforms of the IARCs in West Africa.

Effects of IARC spending on the national programs

One Impact Study paper (Evenson, 1987) asked "whether the CGIAR Centers have influenced the size and character of the national research programs"; and whether CGIAR and national research have had any impact on crop productivity (p. v). He answered these questions with a 25 country sample, of which six are African and Ghana and Nigeria are West African. While his results are somewhat dated (1962-82) and were not derived from a wide sample of West African countries they are relevant because they: (i) include the biggest nation, Nigeria; and (ii) have predictive value about the evolution of NARS-IARCs relations in West Africa based on the experience of Asia and Latin America.

His relevant findings about the first question were: (i) "IARC investment stimulated national research investment in most commodities" (p. 56); (ii) IARC investment stimulated African research on cereals in general and on maize, millets, and sorghum specifically, but reduced it on staples; (iii) some negative effects of IARC

investment on national research investment were observed and require further research; (iv) "investment in IARCs stimulates more national system investment than will a comparable amount of direct aid" (p. 57); (v) IARC impacts tended to lower the marginal effect of national research in the same climate, indicating some substitution between IARC and national research; and (vi) IARC results were both substitutes and complements for national research outside the climate of their central location.

Estimated interactions (p. 53) between IARC research and national research were always negative for cereals in general and for maize, millets, and sorghum specifically in Asia and Latin America, while they were positive in both groups of commodities for Africa. This means that interactions between IARC and national research became negative in the more developed low-income countries. It bears the possible implication that the positive marginal effect of the IARCs on African national research in cereals, maize, millets, and sorghum may turn negative as African national programs become stronger[8].

His findings about the second question are: (i) IARC investments have been highly productive; (ii) those investments have been more productive than national research; (iii) IARC impacts are greater for countries in the same climate as the IARC central location (p. 55); (iv) IARC research was productive in Africa on maize, millets, and sorghum and on cereal crops in general, though not on staples in general; the latter result is apparently due to lack of impact on cassava and yam (p. 53).

4. THE ISSUES

4.1. Size of the CGIAR Commitments

The IARCs 1992 commitments in West Africa were about US$55 million or some 25-30% of the total of NARS plus IARCs. This is perhaps the highest regional share in the world and is higher than can be justified on allocative efficiency grounds. Reasons for this overinvestment are: (i) weak national capacity; (ii) unusual importance of livestock; (iii) a complex set of technical problems (section 2.1); (iv) inability to transfer wheat, rice, and potato germplasm from abroad on the same wide scale that has been done elsewhere, making it imperative to concentrate on difficult crops like millet, sorghum, and rainfed maize; (v) rice is mainly rainfed, grown in disparate environments, and hence more costly to improve than irrigated rice in Asia; (vi) yam is rare elsewhere making West Africa necessarily the focus with attendant high fixed costs; (vii) almost complete dependence on a single food grain legume, cowpea, the others (beans, chickpea,

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[8] Evenson's analysis included none of the francophone countries of West Africa, so it cannot be used to speculate about the effects of CIRAD support to agricultural research there.

pigeon pea, lentil, faba bean, mung bean and the other grams) being of no importance in the region. Cowpea is a multipurpose crop--grain and leaf for food, leaf for fodder, a soil cover and a weed suppressor--that has been particularly difficult to improve; and (viii) political Balkanization, which raises costs of political and economic interaction.

We expect these commitments to stay high. Reasons iii (unusually complex problems), iv (inability to transfer results), v (rainfed rice), and vii (cowpea) are unlikely to change much in the medium-term and will accordingly justify more agricultural research in West Africa than might be indicated by congruence analysis.

▸ The failure of Nigeria's national program to thrive prevents the IARCs from devolving yam and cowpea research fully (reasons (vi) and (vii)). This is also unlikely to change in the medium-term.

▸ The recent reorganization of international livestock research is expected to reduce the resources allocated to West Africa for that sub-sector. The Panel makes specific recommendations about the allocation of the remaining livestock research resources (Section 5).

▸ National capacities are growing in some of the larger countries. The Panel has specific recommendations about activity categories that would both reduce IARC commitments and shift resources among categories (Section 4.5).

▸ The commitment figures do not generally include costs incurred elsewhere on behalf of West Africa such as those at ICRISAT Asia Center. Moreover, the commitment figures are costs and therefore do not reflect the additional ("spillover") benefits West Africa receives from work done elsewhere by many Centers.

4.2. Duplication and Gaps

Duplication within and across Centers can occur among research on commodities, themes or climates at one time, among facilities at one time, and on commodities over time. Overlap with national programs is discussed in section 4.5 on devolution and in section 4.10.1 on NARS views on IARC interactions.

Duplication on commodities. The Desk Study, the written responses of the Centers to the Desk Study, and the Panel's visit to West Africa permit the conclusion that there is no significant duplication of research on commodities. Adequate collaborative agreements exist between CIMMYT and IITA on maize, between CIAT and IITA on cassava, and sweet potato was transferred from IITA to CIP some time ago. IITA has limited rice research to pre-breeding activities and a comprehensive agreement exists between WARDA and IRRI[9]. ICRAF is the lead institution in a Sahel agroforestry network that includes ILCA and ICRISAT in addition to national and regional partners.

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[9] We say nothing further about the WARDA/IRRI relation given that there has been an Inter-Center Rice Review.

The substance of the Centers' responses to the Desk Study was that charges of duplication were exaggerated and we accept that.

Duplication on themes and climates. Duplication occurs on striga, some plant diseases and insects, soils, agroforestry, and economics and public policy studies. This is inescapable from several perspectives. From a practical point of view, one example is that ICRISAT has agroforestry research at Niamey because trees are a necessary part of the ecoregional approach to the semiarid zone. It is unavoidable from a commodity and an ecoregional perspective because different themes manifest themselves diversely in different crops; eg, striga biology and control in sole crop millet in the Sahelian zone differ from striga biology and control in intercropped maize in the moist savanna. Serious and constructive mechanisms exist to reduce the costs of unnecessary duplication. In the natural sciences, Center staff are in close contact on common themes, through networks, joint experiments, scientific meetings, exchange of breeding materials, field visits, use of common methods, and sharing of laboratories, farms, and village research sites. The problem in the social sciences is not so much duplication on themes and climates as lack of leadership. The Panel has made a recommendation to develop this leadership (Section 5).

Duplication of facilities. The Panel reviewed possible duplication at two sites: near Kano in northern Nigeria (ICRISAT, IITA, IIMI) and near Yaounde in the Cameroon (IITA and ICRAF). Near Kano, IITA and ICRISAT now have an effective working agreement to collaborate in administration and communications. ICRISAT has merged its Kano city office with that of IITA. The two work together at Bagauda. The Panel concluded that there was no duplication worthy of mention near Kano and that relations between IITA and ICRISAT staff there looked excellent.

The Panel did not meet IIMI staff in northern Nigeria (there were none at post during the Panel's visit after the departure of a principal staff member). From discussions with IITA, ICRISAT and IAR staff about IIMI's role, the latter did not seem well integrated into the activities of IAR or into those of the other IARCs in northern Nigeria. We have no recommendation other than to endorse the IIMI External Review's observation that "there is a need to rationalize and justify IIMI's West African program so that more knowledge generation and institutional strengthening can be demonstrated." (TAC Secretariat, 1994, p. 44).

There is some duplication between IITA and ICRAF at Nkolbisson and Mbalmayo. This is explained by the history of IITA in Cameroon, where it had a large bilateral program that closed in 1992. The quick expansion of ICRAF within the national program (IRA) has caused some duplication. ICRAF has apparently decided that facilities within IRA at Nkolbisson, partially independent of those of IITA at Mbalmayo, are needed for the time being so as to be more closely integrated with IRA. Although it is obviously better that IITA and ICRAF work together in the Cameroon, it would be hard to argue that this duplication is a serious cost. The Panel estimates, based on information provided by IARC staff in Cameroon, that the cost of duplicate facilities (labs, offices, and fencing) is about US$500,000, or some US$12,500 in annual depreciation. This issue, including the eventual disposition of the physical facilities, should be taken up by the current IITA review.

Duplication over time. The Panel is concerned about duplication of research over time. IARCs sometimes repeat earlier studies; examples are intercropping agronomy in northern Nigeria, crop residue and rock phosphate management in Niger, Striga research, the proposed farming systems characterization in northern Nigeria, and the proposed IFPRI/ILRI research on livestock economics. We suspect, though we cannot prove it here, that there is duplication over time in crop improvement, notably in work on biotic stresses.

The standard remedy for duplication is to recommend yet another coordinating mechanism. But those mechanisms--networks, scientific meetings, joint trials, field visits, literature reviews--exist and do not seem to have uprooted the problem of temporal duplication. The problem is one of management of scientists, not an institutional one. We consider it improbable that there are any broad recommendations that can solve this problem across Centers. It has to be solved within Centers through aggressive review of research proposals before they begin and of research results as they become available.

Gaps. The list of gaps is surprisingly short. Our interviews with NARS scientists and managers suggested that the most serious gaps they perceived in the Centers' portfolio were on cotton, tree crops (mainly coffee and cocoa), and research on irrigation wand water management. The question of work on cotton, coffee and cocoa has been raised often in the past and we have nothing to add; there appear to be good sources of research from national, bilateral, and commercial sources on these crops.

► **Irrigation and water management**. NARS staff mentioned on occasion that more work on irrigation and water management is needed, an argument advanced by IIMI in its reply to the draft report. We do not believe that this is justified. Many of what seem to be technical or social research questions are in fact problems of public policy for irrigation and water management, for which solutions are available from areas of the world with longer and deeper irrigation experience. Examples are marginal cost water pricing, strong property rights, efficient water markets, and the transfer of public irrigation to private farmers. There are many ready sources of information on these issues that do not require local research beyond what the national programs can provide.

4.3. Organization and Governance

4.3.1. The Ecoregional Approach and the Commodity Focus

The key innovation of ecoregional research has been said to be "linking the natural resources base to commodity production research". In judging Center conformity with the approach, our operational definition was that it should: (i) focus on the possibilities of the whole environment (the system), not just on selected commodities; (ii) emphasize interactions among subsectors and resources, such as crops and livestock or trees and soil fertility; (iii) examine the growth of agricultural systems over time; and (iv) account systematically for natural resource and environmental costs. We cite only salient examples in what follows.

► **Focus on possibilities of the whole environment**. The MTPs of IITA and ICRAF are most clearly stated in the terms of the ecoregional approach, but the work of the other major Centers is quite consistent. WARDA has made the explicit choice of discrete farming systems for its work. The location of the ICRISAT Sahelian Center, and the evolution of work there among ICRISAT, ILCA, ICRAF and others also conforms to this part of the standard.

► **Focus on interactions among components**. There are many instances of IARC research that effectively study interactions among components. Prominent ones include alley farming in IITA and ILCA (Nigeria), IITA's Plant Health Management Division (Benin), ILCA and ICRISAT work on crop-livestock interactions (Niger and Nigeria), and studies of agroforestry at Ibadan, Niamey, and the Cameroon.

► **Resources and environmental costs**. IITA has long studied soil erosion in the humid zone. ICRISAT has worked on management of crop residues with respect to maintenance of the soil resource at its station near Niamey and in adjacent villages. ICRISAT is now studying the relation between agricultural intensification and parasitic weed infestations in semiarid Mali. ICRAF's West Africa program is well-conceived to look at these costs. There are many other examples.

► **Growth over time**. Much of the interesting work in this area, notably in the environmental economics literature, is done outside the Centers and does not appear to be well reflected in their programs. With rare exceptions (e.g. Ehui and Spencer, 1993, on sustainable agriculture in the humid zone) growth over time has not been a major concern in the West African Centers.

Do crop specific mandates impede the ecoregional approach? A past answer may have been "yes" but it is now "no". The best evidence is the programs of IITA and ICRAF. IITA's cassava studies include biological pest control, a long-term collaborative effort on production systems, crop improvement and crop management. At Ibadan, IITA and ILCA study interactions among cattle grazing regime, maize cultivar, and crop management. ICRISAT works on agroforestry at Niamey and Bamako, as ILCA has for some time at Ibadan. The leading technology proposed by ILCA for central Nigeria, fodder banks, directly exploits links between crops and livestock in improving the land resource, while easing the transition to settled stock raising.

Should the Centers move farther away from a commodity focus?

There are unacceptable costs in moving farther away from a commodity focus. The basic incentive reason for a commodity focus is that farmers produce commodities after all, not environmental goods. A second reason is that commodity research has positive environmental effects by creating technical incentives to use high potential areas and not low potential ones. A good example is the selective intensification hypothesis--the idea, being tested by WARDA and CIAT, that intensification of the main technologies for the major crops (e.g. rice, pastures, vegetables) on high productivity areas will reduce population pressure on lower productivity, more environmentally fragile, areas. Another good example is ICRAF's MTP for the humid lowland tropics and the semiarid lowlands of West Africa, which gives cogent reasons for its choice of commodity species and

shows how those species fit into the ecoregional model. Third, it is possible to achieve benefits of the ecoregional approach through commodity research. For example, there are environmental gains from the biomass effect of higher crop yields through: (i) longer soil cover into the hot, dry season, thereby reducing wind erosion; (ii) longer supply of crop residues into the dry season, thereby reducing grazing pressure on marginal pastures and browse; (iii) heavier soil cover when rainfall is intense, thereby reducing water erosion; and (iv) more crop residues restored to the soil, thereby replacing organic matter lost to cultivation.

4.3.2. Centralization, Administration Costs, and Staff Composition

TAC has recently discussed alternative institutional arrangements for the Centers in West Africa. The discussion appears to be a response to criticisms that: (i) the current structure is too centralized; (ii) its administration costs are too high; and (iii) its interactions with partners are not as efficient as they could be.

How centralized are the IARCs in West Africa?

The major IARCs in West Africa were more centralized in 1992 than in 1986, as defined by a diversity index[10]. The index was 0.66 in 1992 and 0.87 in 1986, as calculated from the data in Table 4. Desk Study data show that 71.2 % of all West Africa CGIAR scientists were in Niger and Nigeria in 1992, compared to 29.2 % in 1986. (It is understood that not all IITA staff in Nigeria are at Ibadan, but most are). The closure of the IITA project in the Cameroon explains some of the difference between 1986 and 1992.

What are the costs and benefits of centralization?

Costs. One cost of centralization is excess effort on the commodities and farming systems where scientists live. Its possible significance is indicated by the publications of IITA and ICRISAT, by far the most important West African IARCs; they show that staff location affects research location, as indicated by where the published trial was conducted. The ICRISAT Sadore site represents perhaps 5 % of the West Africa semiarid tropics, but produces a much higher share of publications. The Panel talked about this cost with ICRISAT groundnut scientists at Niamey. They note, correctly, that they have trials elsewhere in Niger and outside that country, which do not necessarily lead to published papers but which are a valuable counterweight to centralization.

A second possible cost of centralization is the neglect of information, embodied in local plant materials for crop improvement, in data about hot spots for resistance screening, in the knowledge of national scientists and farmers, and in the characteristics of farming systems. Such costs may be high because of the variability in

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[10] The diversity index is $(1-(\Sigma_i((x_i/X)^2)))$, where x_i is the number of scientists in a country and X is the total number of scientists in a region. An index of 0 means no diversity, or all staff at one site, and an index of 1 means full diversity.

regional farming systems and in the relative paucity of existing information about West African agriculture before about 1970. Every national program visited by the Panel stated that international research ignored some characteristics of local materials. ICRISAT millet improvement is said, by some NARS staff interviewed by the Panel, to have neglected local materials, who argued that this neglect explained that Center's lack of impact (see section 4.10.2). IITA admitted that most farmers in northern Nigeria could not use its cowpea bred for solecropping with high pesticide inputs (IITA 1993a) and that this was partly due to a misperception of how those materials fit into the cropping system[11].

Benefits. The main benefit is that the facilities and staff at a central site--what is sometimes called critical mass--stimulate scientific output above what can be achieved by small groups of scientists. A second benefit is economies of scale in support facilities and social amenities. Many Center products--e.g., training and methods--are largely independent of where they are developed, but cannot be generated without support facilities. A third benefit--which we admit to be vague and hard to distinguish from the economies of scale effect--is that scientists in larger central programs have better incentives for productivity than do those in smaller orbital programs.

Centralization is an issue only for IITA and ICRISAT as the other Centers are too small in West Africa to be affected by it. We do not think that it is a problem for IITA given its work in Benin, Cameroon, Cote d'Ivoire, and the spread of its activities across the varied climates of Nigeria itself; the last point is crucial and is often forgotten by IITA's critics. With due regard for the benefits of centralization, we do think that ICRISAT's effort in the Sahel has been too centralized, not because of size in and of itself, but because of the principal site location at Niamey.

4.3.3. Administration Costs

One assertion is that administration costs are too high in some Centers relative to the others. The Desk Study found significant differences among Centers in relative administration costs. The minima were IIMI and ILRAD (none) and the maxima were WARDA, IFPRI, IITA, and ICRISAT (28, 33, 38, and 43 % respectively). The range might indicate savings were the expensive centers to adopt the management practices of the cheap ones.

The high administration cost centers are those with fixed assets, with the exception of IFPRI. How much do fixed assets contribute to administration costs? We first divided the cost of administration (column (1) in Table 8) by the total cost of the other three components (research, research support, and institution building), giving column (3); we then subtracted the annual amortization of each Center's fixed assets from its administration costs (column (2)) and divided the remainder by the total cost of the other three components, giving column (4) below. Though this adjustment does not affect

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[11] One cultivar was TVX3236, which the Impact Study counted as having "made a widespread impact" (Jahnke et al, 1985, p. 71).

the rankings, it does make the burden of administration at ICRISAT, IITA and WARDA look a bit lighter.

Table 8
Effect of fixed asset amortization on administration costs

	Total	Less Amort-ization	Relative to total of other 3 categories	
	(US$ thousands)			
	(1)	(2)	(3)	(4)
ICRISAT	4,032	3,169	76%	59%
IITA	8,620	7,131	62%	52%
IFPRI	800	800	50%	50%
WARDA	2,000	1,455	38%	28%
CIP	400	387	29%	28%
ICLARM	28	28	23%	23%
ICRAF	210	138	16%	10%
IPGRI	55	44	15%	12%
ILCA	628	546	15%	13%
ISNAR	170	170	14%	14%
CIMMYT	46	46	9%	9%
IRRI	52	27	7%	4%
Total/ average	17,042	13,942	45%	37%

Note: CIAT, IIMI, ILRAD and INIBAP reported no administrative costs.
Source: Table 4.

The Panel believes that some of those savings are spurious because some Centers provide services to others that are not reflected in the Desk Study averages. At Ibadan, IITA provides administrative services to ILCA, IRRI, ICRAF, and CIP. At Niamey, ICRISAT does the same for ICRAF, IFDC, and IFPRI. We expect that the same will eventually occur in the Cameroon as other Centers join ICRAF and IITA. At Bamako, Kano, and Cotonou, ICRISAT or IITA give administrative aid to individual Center staff. The Panel concludes that a more accurate accounting of inter-center transfers would reduce some of the apparent dispersion in administrative costs[12].

While part of the range among Centers is an artifact of different reporting practices--e.g. putting research costs under administration and vice versa--and another

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[12] The Panel is not recommending more work to estimate these costs.

part is due to hidden transfers among Centers, it appears that administration costs of ICRISAT, IFPRI, and IITA are still high. In the instance of IFPRI, which has no fixed assets in West Africa, the high value is caused by its practice of calculating full overhead costs, a practice which is apparently not adhered to by some of the other Centers.

Another assertion is that administration costs are higher than those of like institutions in the industrial countries. TAC has remarked (1994, p. 14): "The share of center governance and management costs in several centers seems to be high relative to comparable institutes outside the CGIAR." According to this reasoning, savings could be had by adopting the management practices of such like institutes.

The Panel does not have the resources to evaluate this argument in detail, as it would require a careful sampling of relevant like institutes, but it will say the following. (i) Some CGIAR administrative costs are dispensations to partners. The Centers manage donor funds for collaborative research with national or regional programs. They organize foreign travel, stipends, local transport and visas for trainees beyond what is accounted as training expenditures. The Centers organize various meetings and are, inevitably, the donor of last resort for minor expenses of all kinds. These costs appear as administration, yet they cannot be eliminated without harming partner relations. IITA training costs, in particular, are reported in its core expenditures for administration and general operations but include information services, which that Center contends is research support, not administration. (ii) Other administration costs are a fact of life in the tropics because of the high unit costs of transport, communications, information, banking, water, and power. High unit costs swell the share of administration because that activity uses more of those services than does research. (iii) With respect to infrastructure costs, TAC (1994, p. 17) notes that some Centers incur zero costs of physical plant operation because they use rented facilities in comparison to six others having infrastructure costs of more than 10% of total cost. This is not a just comparison unless the rented facilities are free.

4.3.4. Staff Composition

Another governance issue is staff composition. Some Panel interviewees recommended that the Centers have an explicit policy of hiring more regional scientists.

The Panel strongly discourages an explicit regional staffing policy because it would interfere with the scientific independence of the IARCs. Moreover, no policy is necessary as regionalization of internationally recruited staff is occurring anyway, for good reasons. Those reasons include the greater numbers of qualified regional staff who, in the francophone countries, are becoming more competent in English. That regional staff stay longer in the region and in one center is a significant benefit because it reduces learning and other fixed costs per scientist. Regional staff are sometimes more effective because they have better language skills. These market forces will promote a progressive regionalization of scientists without an explicit staffing course.

4.4. An Alternative Organization?

TAC has outlined an alternative "to an ecoregional approach for research in West Africa [that] would consist of a decentralized network of the CGIAR activities" (TAC Secretariat, 1994: p. 26). A "coordinated set of decentralized but focused

programs" ... would allow for a CGIAR presence in all the major agroecological zones of west and central Africa, a better integration of CGIAR research activities, and for a coordinated network program in both the francophone and anglophone countries of the sub-region" (Ibid).

The Panel contends that the "decentralized network" alternative would be inefficient for three reasons. We assume that a decentralized network would consist of administratively separate partners (eg, international scientists, NARS, non-governmental organizations, the private sector) with access to common funds in place of the center model.

▸ We note TAC's point (TAC, 1994, p. 6) that the original objectives of the CGIAR did not refer to Centers as such. But institutions like the Centers exist partly to minimize the information and procedural costs needed to allocate resources and to impose accountability. Any institution or decentralized network incurs the same costs. Minimizing them in a network requires agreed rules on size and activities. As the network grows it becomes harder to impose those rules without a stable bureaucracy. The evolution of the Centers as independent entities, instead of acephalous programs, is a telling example of how the costs of information shape institutions.

▸ Institutions also exist to minimize the costs of uncertainty about markets, or in this example, about the resources available and accountability. A decentralized network, unless it has fixed rules like those of a more structured institution, risks being subject to arbitrary decisions as a way of managing uncertainty.

▸ The suggested benefits of the decentralized network approach--presence in all ecoregions of West Africa, integration of CGIAR activities and a coordinated program of anglophone and francophone activities--are already gained in the Centers or in related efforts, notably that of SPAAR. Networks, collaborative trials and joint studies (e.g. COSCA) give substantial presence across the various ecoregions. CGIAR activities are integrated in a plethora of consultations among Centers and with their partners. While coordination among anglophone and francophone activities is not what it might be, the evolution of relations between the two groups of countries is rapid enough that no major change in the roles of the Centers is needed to promote it.

4.4.1. A Common WARDA and IITA Board

The Panel proposes a common Board of Trustees for WARDA and IITA as a means of harmonizing research between the two institutions[13]. It should not be yet another regional organization because of the risks of political interference. The Panel recommends that (i) a Common Board be created from the existing Boards of IITA and WARDA; (ii) two ICRISAT, one IRRI, and one ICRAF Board members serve as ex-oficio members of the Common Board; (iii) the size of the Common Board not exceed

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[13] In an earlier draft of this Report, we committed the error of justifying this common Board in terms of cost savings, which we now recognize to be unimportant.

half that of the combined existing Boards of IITA and WARDA; and (iv) the WARDA Council of Ministers serve in an advisory capacity to the Common Board, without specific recognition in the constitution of any Center except WARDA.

4.5. Devolution

The evolution of some national programs logically shifts the comparative advantage of the Centers in germplasm enhancement and breeding, production system and management, and institution building.

4.5.1. Germplasm Enhancement and Breeding

Germplasm enhancement and breeding (CGIAR activity category 2) took about 19.8% of Center commitments in 1986 and 22.0% in 1992 (Table 4)[14]. This compares to 49.3% and 35.6% for production systems and management (Category 3) in 1986 and 1992, respectively. Resources allocated to Category 2 are insufficient despite the shifts among categories from 1986 to 1992.

- Germplasm enhancement and breeding have been and continue to be the main sources of total factor productivity gains from international agricultural research.

- The natural resources benefits of research in Category 2 are important, as discussed in section 4.3.1.

- The national programs can now do much more in Category 3, as discussed in section 4.7.

- Even if institution building is (properly) understood as being mainly training, competing suppliers--bilateral development projects and universities in particular--exist. The Centers have a specific comparative advantage in some aspects of training, and ISNAR has one in institutional development, but neither is exclusive. It should be possible to transfer resources from Category 5 to Category 2.

There are two other major issues in Category 2 in addition to the quantity of resources: overall research strategy and the degree to which commodity commitments can be devolved to national or regional programs.

Research Strategy

Opportunity costs of hybrids vs varieties. Hybrid and variety development share costs--farm overhead, labs, computing, support staff--that can be reallocated among research products and the intermediate products of differing strategies can be adapted to variety or hybrid breeding. Hence the tradeoffs of one strategy against the other in terms of short-run financial cost may not be very large.

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[14] The shares for all Centers in 1992 (Table 5) do not differ.

The tradeoffs in terms of long-run economic cost may be much greater. The assumption that hybrids are too expensive for small farmers has retarded improvement of maize, sorghum, and perhaps millet. Yet the yield gain from hybrids may now be too large to ignore. ICRISAT staff at Kano argue that a stable yield gain of 25 percent of sorghum hybrids over varieties is feasible in farmers' conditions, a gain which would easily pay for the additional seed and, if projected on even a small area, would pay aggregate research costs.

The assumption that hybrid seed is too risky for small farmers has also been used to justify emphasis on varieties. However, the risks of seed supply are best judged by the farmers themselves, not by international researchers. It is inefficient for the IARCs to neglect hybrids as a research strategy on the grounds that seed supply is uncertain given that they are necessarily less well-placed than farmers to judge the costs of uncertainty over time.

While we understand the argument that private sector companies will generate hybrids in the long-run--and have specifically said what we think the system can do to encourage private sector development for all types of agricultural technology (section 3.2)--in the short run we contend that there should be more emphasis on hybrids.

Finished vs intermediate products. There is a broad consensus that Center crop improvement programs should not produce finished materials. At the same time, the small national programs are too weak to do so. That weakness, which also occurs sporadically in many countries that are otherwise strong, puts pressure on the Centers to help the weaker countries by providing them with finished materials (and other assistance) that they would not normally furnish. This is a specific instance of the small country problem.

The longer-term way to help weak countries is through bilateral programs that emphasize academic training, which is how the stronger national programs developed their capacities in the first place. The shorter-term solutions are through regional networks on the SPAAR model (eg, millet, cowpea, and sorghum) which give materials at various levels of testing and through relations with larger national programs (eg, Nigeria with Togo and Benin, Senegal or Mali with Mauritania, the Gambia, and Guinea-Bissau, Ghana with Sierra Leone). The need to assist the weaker national programs by providing finished materials should not broadly justify provision of finished products to national programs.

4.6. Devolution of Specific Commodities

Devolution of research to national programs has long been a system objective. An example is the transfer of faba bean to Morocco from ICARDA after the 1988 EPR of the latter. What are the possibilities for devolution of germplasm enhancement and breeding in West Africa?

Candidates for devolution should: (i) be important in West Africa, but less important elsewhere, to maximize the benefits to regional research while minimizing the

costs of research foregone outside the region; (ii) have existing regional research capacity, to avoid a lengthy transition to new institutions with high initial costs; and (iii) have existing regional research results, to promote confidence among the donors providing the necessary transitional finance.

Taking the major Center crops of the region--millet, sorghum, rice, maize, groundnut, cowpea, cassava, and yam--rice, sorghum, groundnut, and cassava can be excluded because of their extraregional importance. Maize has been devolved to IITA, which has small programs in crop improvement and management of the crop. IITA has already considered abandoning humid forest zone maize research (but not savannah maize research) and the Institute's next external review should investigate this possibility (section 5 on recommendations about individual Centers). Millet is not a good candidate for devolution partly because of its extraregional importance but mainly because years of effort have not produced really significant field results, suggesting that more basic research is needed. A revised role for the IARCs in millet is already evolving in the SPAAR framework.

Arguments for devolution of cowpea. Cowpea is a more logical candidate. West Africa produces much of the world's cowpea and Nigeria is perhaps the leading world producer. There is regional research capacity and there have been some (limited) results. Cowpea is almost never the major crop in a farming system. The institutional basis for devolution exists in the SPAAR framework for the Sahel. The Panel interviewed NARS and IARC staff about the possibility of devolving cowpea research to a national program in the region. The chief barrier to devolution was said to be lack of money.

Arguments against devolution of cowpea. The most telling financial argument against devolution is that the cost of international cowpea research is small. IITA staff also report that the NARS are unable to carry out strategic biotechnological research on insect problems in cowpea and that significant cowpea germplasm exchange outside West Africa might be disrupted if full responsibility for the crop were to be abandoned by IITA. Cowpea is said to be growing in importance as a legume in cereal-legume (green manure) rotations in irrigated farming areas of Asia and international research is thought to be needed for those areas. Panel interviewees noted that the attempt to devolve yam research from IITA to Nigeria had failed; while this unsuccessful precedent does not mean that the effort is impossible, it does suggest that the essential condition of a strong and stable national program has not been met.

The Panel recommends that cowpea germplasm research not be devolved to the region. The cost savings--3.25 SSYs annually in IITA's 1994-98 MTP in a total of 99 SSYs (IITA 1992, p. 117) --are small compared to the foregone benefits of research on the crop within and outside West Africa. IITA's cowpea responsibilities do not interfere with national or regional activities in West Africa. They produce benefits outside the region that could not be captured by other existing arrangements. The Panel's recommended devolution of production systems and management research (category 3) to the region would in effect devolve much cowpea research because that crop is by far the most important grain and dual purpose legume.

4.7. Production Systems And Management Research

The leaders in production systems research (CGIAR activity category 3--Production System Development and Management) are IITA, ICRISAT, and WARDA who contributed about 385 SSM to the 1992 total of 456 SSM. The 1992 ecoregional breakdown was 74% humid and 26% semiarid (62% and 38%, respectively, in 1986). The 1992 total was less than half of the 1986 figure of 912 SSM (Table 9).

Should more of activity 3 be devolved to the national programs? The case for devolving this activity is stronger than that for devolving a commodity. First, many efforts in category 3 have failed to produce appreciable benefits in output: prominent examples are ICRISAT operational-scale trials at Niamey, IITA alley farming research at Ibadan, and ICRISAT intercropping work in Mali[15], ILCA systems characterization in Mali, and the SAFGRAD farming systems effort in West Africa. This argues for shifting the work to where it is cheaper. Second, activity 3 is often site-specific and does not produce international benefits. Third, the national program can now do the work. In many instances, what the Centers do is not different from what national programs do.

The Panel recommends that activity category 3 be the subject of an explicit devolution policy in IITA and ICRISAT. WARDA's size imposes on it a mode of operation that amounts to such a devolution in practice; were WARDA to expand in this category, then this recommendation ought to apply explicitly to WARDA as well. ICRAF and ILCA are special cases because they work on trees and livestock, in which it is recognized that the national programs are weaker and in which, moreover, there is less that the Centers can do in activities 1 and 2. The other centers either have no work in category 3 (IPGRI, IFPRI, ISNAR), or do little in West Africa (ICLARM, IIMI, CIP, CIAT, CIMMYT).

We earlier anticipated several objections to this recommendation.

► "IARC research in category 3 produces output benefits." Yet the Impact Study and Centers' accounts of their impact in West Africa show that it has not. A recent symposium (Oehmke and Crawford, 1993) on research impact in Africa refers almost exclusively to crop improvement, not to production systems or crop management. A careful review of humid West and Central Africa concludes that "evidence of adoption of specific cultural practices recommended by research is extremely scant" (Bosc and Freud 1993, p. 6), gives examples of the shift to monocropping from intercropping, plant spacing, weeding, and harvesting. A detailed study in a highly productive irrigated environment of Mexico where HYVs of wheat are universal (Traxler and Byerlee, 1992) shows the same thing. We do not denigrate the value of better understanding of complex production systems, which requires category 3 research, but it has been very difficult to convert that understanding into higher output through production systems and management research and the IARCs have to recognize this.

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[15] There are reports of some adoption of improved intercropping techniques in central Mali.

TABLE 9: Ecoregional and Country Distribution of CGIAR Activity 3 in West Africa, 1992 (Senior Staff–Months)

Country	CGIAR ACTIVITY CATEGORY 3 Production systems and management All Centers	Production systems and management IITA, ICRISAT, WARDA	Total all categories	% of AEZ total	% of West Africa total
HUMID LOWLANDS (HULWA)					
Benin	60.0		84.0	6.3%	4.6%
Cameroon			30.0	0.0%	0.0%
Ghana			12.0	0.0%	0.0%
Cote d'Ivoire	38.4		116.0	4.0%	3.0%
Nigeria	244.0		704.2	25.5%	18.8%
Sierra Leone	5.2		12.0	0.5%	0.4%
Sub–total	347.6	290.3	958.2		
% of HULWA	36.3%	30.3%	100.0%		
% of West Africa total	26.7%	22.3%	73.7%		
SEMIARID LOWLANDS (SALWA)					
Burkina Faso	12.0		12.0	1.3%	0.9%
Gambia	2.2		3.1	0.2%	0.2%
Mali	6.0		81.5	0.6%	0.5%
Niger	77.7		221.1	8.1%	6.0%
Senegal	10.4		24.0	1.1%	0.8%
Sub–total	108.3	94.6	341.7		
% of SALWA	31.7%	27.7%	100.0%		
% of West Africa total	8.3%	7.3%	26.3%		
TOTAL	455.9	384.9	1,299.9		
% of WA	35.1%	29.6%	100.0%		

Source: Desk Study, Table 3A.

► "If this work does not produce benefits, then why should anyone do it?" The net benefits can be greater in the national programs, which cost less. Moreover, if the Centers deemphasize part of this category then the question of continuing with it becomes an internal issue for the national systems.

► "Complementarities among crop improvement research, production systems and management research require them to be done jointly in one institution." Those complementarities, deriving from the strong interaction between crop improvement and system management in tropical agriculture, are important. Failure to understand them explains some of the delay in extending modern agriculture to West Africa. Centers adopting pertinent aspects of the open center model, however, can achieve those complementarities at lower cost by collaboration between national and international institutions in which the latter have principal responsibility for crop improvement and the former for production systems and the interactions between new plant materials and cropping practices (section 5).

► "It has already been done." For West Africa, the number of IARC SSM in category 3 was 912 in 1986 and the 1992 figure was 420. CIMMYT's response to financial stringency has been to "protect ... plant breeding ... at the expense of crop management research, training, networking, and various support activities." (CGIAR 1994a, p. 2).

► "There is little to devolve because IITA and ICRISAT spending for category 3 is small to begin with; the cuts from 1986 to 1992 for category 3 reduced it to a strict minimum." Objections 4 and 5 are valid. They impose a careful interpretation of the recommendation. Spending on category 3 is small because of funding cuts in the two leading Centers. Therefore, the additional envelopes for IITA and ICRISAT above their bases, if they are available in the current MTP periods, should not be allocated proportionately across the five categories. They should be distributed almost exclusively to categories 1 and 2 (Conservation and management of Natural Resources and Germplasm enhancement and breeding). If the 1994-98 MTPs of IITA and ICRISAT are maintained at the base envelope, then reallocations should be made from Category 3 in ICRISAT Asia Center to Categories 1 and 2 in West Africa.

What should be the mechanism to devolve Category 3? The cuts in Center funding for category 3 naturally mean that there is less to devolve, but the principles need to be stated clearly. The Panel proposes that:

► The rule should be to emphasize strategic and process-oriented research in the IARCs in Category 3, and to devolve site-specific production systems research. Examples of strategic and process oriented research include studies of mechanisms to transfer nutrients among crops, trees, and animals.

► Centers and national programs develop long-term joint programs in which the IARCs are broadly responsible for categories 1 and 2 and the NARS are responsible for category 3.

► Those programs have strict calendars to shift tasks among partners.

► During the transition periods, the Centers' funding would be from their own core, with appropriate reallocations from category 3, including transfers from Asia in the case of ICRISAT.

► The NARS funding would be from special projects developed, maintained and managed entirely by themselves.

► A competitive process for allocating funds is undesirable. It would cause more problems than it would solve because of differing capacities of the NARS and because of different access to Center facilities for joint work. Mali and Nigeria might reasonably be expected to win every competition. Niger and Nigeria might have preferential access to IITA and ICRISAT. Without true competition, a consensus approach like the SPAAR model is best to allocate sites, responsibilities and funds.

► To ensure accountability without a fully competitive allocation process, the category 3 activities under this new mechanism, including those of the NARS, would be evaluated with current external review procedures. NARS participation would be conditional on full agreement and cooperation with external review procedures, including the possibility that funding would be eliminated for non-performance.

► Given the development of the national programs, and the volume of existing knowledge about regional agriculture, cropping systems work in all the IARCs should be much more basic, with development of computer models of multiple cropping (sequential, catch, relay, mixed and row) and soil-water-plant interactions, to reduce the cost of field resources needed for actual experiments.

4.8. Institution Building

The root institutional weakness of the NARS is flimsy political commitment to research and extension. It manifests itself in: (i) inability to nurture strong national institutions to replace the departed colonial ones; (ii) lack of qualified staff (though this is improving quickly); (iii) arbitrary political interference in national institutions, for example rapid turnover of unqualified managers and institutions larded with administrators; (iv) weak and variable funding, especially of operating costs, as seen in the decline in average spending per scientist at a time of rapid growth in numbers of scientists; and (v) indifference or hostility to non-public institutions, such as private seed companies and farmers' organizations, that elsewhere promote agricultural technology generation and transfer.

What are the Centers doing directly about institutional development? With the evident exception of ISNAR, the IARCs do little in institutional building as such in West Africa. Much of what is termed capacity building is really training and information. IITA's 1994-98 MTP proposes US$200,000 annually for organization and management counseling, or 0.8% of its 100% base envelope; the remaining US$2.075 million in Category 5 (8.4% of the base envelope) is for training, conferences, and information services (IITA 1992, p. 117). ICRISAT's 1994-98 MTP proposes nothing for organization and management counseling but 15.6 % of the MTP total for institutional

building, most of which is training, information, and networks (ICRISAT 1992, Table 3). The Panel expects no significant savings from cutting Centers' activities in institution building as such.

What should the Centers do about institutional development? The IARCs neglect of institution building as such is wholly justified. With the evident exception of ISNAR, the Centers have no comparative advantage in institution building, which requires greater resources, a wider perspective, and political reforms that they cannot effect. Examples of what the IARCs cannot do are in the Senegal - Second Agricultural Research Project, which is supported by the World Bank and is representative of the deeper institutional changes needed to make national research more effective. The project: (i) provides major financial support to the NARS; (ii) strengthens administrative and financial management of the NARS; (iii) strengthens linkages among research, extension and farmers; (iv) establishes a commercial production company to manage revenue-earning activities of the NARS; (v) funds special projects that arise unexpectedly; and (vi) prepares a detailed staff development plan.

A rare exception is research station development. In three instances of which the Panel is aware (Cinzana, Mali; Bengou, Niger; and Kano, Nigeria) such assistance has been: (i) specifically requested by the national program; (ii) the beneficiary of special funding; and (iii) done at a site useful to the Center's research. These individual opportunities will necessarily become less common as the facilities in each country mature. They should only be part of broad Center assistance to station development through ISNAR.

4.9. Training

Several reviews have detected possible savings in consolidating similar training activities. This argument has merit and it is one on which the Centers are acting. As noted in the Desk Study, there have been some joint training courses, and a Training Directors proposal to make IARC training more cost-effective. The Training Directors of IITA and ILCA have written a proposal for an "Inter-Center Training Program for sub-Saharan Africa". The proposal seeks to: (i) establish common procedures for managing CGIAR training in West Africa; (ii) provide training on integration themes (eg, crop-livestock-tree interactions); and (iii) share facilities for training and publications. The subject seems adequately treated by these initiatives and we have nothing to add.

4.10. Relations with Partners

The principal partners are the national agricultural research institutes, always the main branch of the NARS, farmers, private companies, NGOs, and universities, both national and foreign, and independent research institutes. Are IARC relations with partners efficient? We define efficient as: (i) informing the Centers about what the NARS do and need in full and timely fashion; (ii) creating a partnership in which the presence of the Centers does not smother the national associate or displace what the national programs

can and should do on their own; and (iii) maintaining scientific freedom and standards in the Centers without excessive bureaucracy.

4.10.1. Summary of NARS' Views on IARC Interactions

The Panel met NARS administrators and scientists in Mali, Burkina Faso, Niger, Nigeria, Benin, Ghana, and the Cameroon to have their views on relations with the IARCs. We first report, in a slightly altered paraphrase, written remarks from the Institute of Agricultural Research and Training (IAR&T) of Nigeria, because they represent many other comments, before summarizing Panel interviews with other NARS representatives.

Observations of IAR&T, Nigeria

1. Geographic mandate of IARCs is too broad (example of IITA).

2. IARCs fail to recognize contributions of national programs.

3. IARCs fail to use farming system research (eg, earlier IITA work on mechanization and high-input using cultivars).

4. IARC staff are sometimes unreceptive to views of national program scientists.

5. There is a lack of formal interaction between IARCs and NARS.

6. Discriminatory conditions of service between national and international scientists in the IARCs are a disincentive for the former to work in the IARCs.

7. Incursion of IARCs into the national extension system creates problems for the NARS, e.g. in providing free inputs in an unsustainable manner.

8. Donor politics affect research (e.g., reduction of soybean research due to pressure from a donor).

9. There are duplicative efforts because of donor influence (eg, CORAF and SAFGRAD).

10. There are high administration charges levied by the IARCs on donor funds used in collaboration with NARS.

4.10.2. Observations of other NARS in Panel Interviews

We summarize these remarks by a few chief themes, defining areas in which one might expect minor or major disagreement between the IARCs and the NARS.

Role and mandate of IARCs

Minor or no disagreement expected

1. IARC research should be basic/strategic or applied.

2. An appropriate role of the IARCs is to develop new research methods.

3. Extension (eg, varietal release) is a national role.

4. Exchange of scientists between NARS and IARCs is necessary to strengthen collaboration.

5. Active involvement of NARS is needed in formulation of the research agenda of the IARCs.

5. IARCs should assist the institutional development of national programs.

Major disagreement expected

1. Agronomy, including adaptation trials and crop utilization, should be handled largely by NARS with IARCs collaborating. The Panel believes that the highly site-specific character of agronomy makes it a candidate for devolution to the NARS and has proposed a mechanism to do this (see section 4.5).

2. There has been a lack of local partnership in breeding programs (eg, in Burkina). Finished products, not breeding materials, are sent to NARS for testing. There are conflicts over materials to include in trials. IARC breeders are not open enough to local materials in collaborative trials. The Panel makes no recommendation about this point. We believe that the NARS view is not well justified or is something of minor importance that it can be dealt with in the existing IARC-NARS consultation mechanisms in West Africa.

3. IARCs too often duplicate what the national programs do. The national program of Niger cited the example of crop residue management, and cropping practices agronomy.

Collaboration with national programs

Major disagreement expected

1. The IARCs have failed to heed national needs. Examples cited in Mali were impact evaluation and natural resources research.

2. Competition for research funds with the IARCs has damaged the national programs.

Organization of the IARCs in West Africa

Minor disagreement expected

1. Bilateral programs are necessary at an initial stage in the growth of the NARS.

2. Program instability has damaged the IARCs (Mali, citing case of ILCA).

Governance

Minor or no disagreement expected

1. Regional centers should be established to address problems across ecological zones (eg, West Africa).

Major disagreement expected

1. The regional centers should be manned by nationals. There is a need to strengthen research by involving nationals.

2. IARCs are too independent.

3. There is no functional means of linking IARCs to national priorities. Board representation is inadequate. External reviews every 5 years are too infrequent. Annual program reviews and other seminars and workshops are partial. Malian scientists state that they had too little input into ILCA research programs.

4. IARC recruitment of regional scientists sometimes favor inexperienced over experienced staff.

Other issues

Minor disagreement expected

1. CGIAR should pressure NARS governments to allocate adequate funds to research.

Funding

Minor disagreement expected

1. The funding of the IARCs should be conditioned on results.

2. A more competitive funding system is required.

3. The CGIAR should work on new crops, such as cotton, other cash crops in the humid zone, or novel species.

Impact

Major disagreement expected

1. There has been little effect of IARC-generated varieties. The examples of IITA and ICRISAT (Burkina) and ICRISAT research on millet in Niger were cited.

2. Livestock research has been very weak (Burkina and Mali).

Relations with other NARS partners

Major disagreement expected

1. **Contacts with farmers**. Center contacts with farmers should not compete with national research and extension. But it is undesirable to set strict and general rules that would not unnecessarily interfere with good science by center staff. The main reason is that farmer contacts, usually through surveys and on-farm experiments, provide valuable information to the IARCs. After all, if one really accepts the criticism that the IARCs have neglected local farming systems, the only just rebuttal is to study those systems.

2. **The private commercial sector**. National programs in some instances have sought to limit IARC contacts with the private commercial sector on the grounds that the IARCs are working for the NARS, not for profit-making companies.

Panel's comments on those views

The Panel has tried to make a careful evaluation of these observations without going over the details of each instance, and without taking sides. We present here only our comments on the major disagreements (previous section), referring to other sections where we have made recommendations. We have at each point tried to synthesize recommendations that would be broadly applicable to all Centers in West Africa.

Major disagreements about the Role and Mandate of the Centers in West Africa

1. **Agronomy/production systems research**. The Panel has recommended a mechanism for devolution of category 3 (section 4.7.).

2. **Partnership in breeding**. Conflicts in breeding are perhaps more frequent than in other fields because of competition for scientific rewards. That competition is the root of this disagreement. But there is a wide variety of existing mechanisms to eliminate it or manage it at any rate and we see no reason to propose others. There is, in particular, enough commonality between the WARDA model and those used by IITA and ICRISAT that nothing would be gained by imposing the former model on the other Centers.

3. **Duplication.** The national program of Niger cited the examples of crop residue management and cropping practices agronomy, which have been discussed in the comments on Category 3 research.

4. **Institutional development**. The Panel has made specific recommendations about training and other actions in the general rubric of institutional development (section 4.4.3).

Major disagreements about collaboration with national programs

1. **The IARCs have failed to heed national priorities.** The principal criticism made by national program staff to the Panel is that the Centers do not consider national priorities when establishing their programs. After serious consideration, we have decided that the criticism is not generally valid enough to warrant a generic change in the operation of the Centers.

▸ Many formal mechanisms exist and the subject has been discussed exhaustively. ICRISAT has a written agreement with INRAN, which also has parallel agreements with ICRAF and ILCA, among others. IAR has written agreements with ICRISAT and with IITA. IITA publishes the results of a week-long meeting with Nigerian research directors in which priorities are thoroughly covered (IITA 1993b). In Nigeria, all ICRISAT staff are part of IAR programs (eg, farming systems research, cereals, and food science) that are governed by committees that meet twice-yearly to review and plan work.

▸ There will always be conflicts about priorities, but these can only be efficiently resolved case by case.

▸ The international mandate of the Centers is not always going to be perfectly consistent with national mandates in the regional; this is the reason for its existence.

2. **Competition for research funds with the IARCs has damaged the national programs.**

▸ We see more justice in this argument and Evenson's results bear the possibility that this damage could worsen as the NARS grow. That we find some merit in this argument should not be construed as saying that the way to strengthen the NARS is to limit competition for funds; what needs to be done is to strengthen their ability to compete. We have recommended a new mechanism to jointly allocate funds for production system and management research (section 4.7.).

Major disagreements about Governance

1. The regional centers should more often be staffed by nationals at the scientific level.

▸ The Panel has explicitly rejected this suggestion (section 4.3.2).

2. There is no functional means of linking IARCs to national priorities.

► Some NARS said Board representation is inadequate. The risk of increasing regional Board representation is of course that of political interference and the Panel does not accept it.

► Other NARS said external reviews every 5 years are too infrequent. These external reviews are complemented by many other reviews, some with external participation. The external reviews, and the visits of Panels like this one, impose costs on the Centers that should not be increased further.

► Joint work is the best functional means of linking the different levels of the research system. The proposed devolution of much of Category 3 to the NARS from the IARCs is such a means in addition to the many existing ones.

Impact

Major disagreement expected

1. **There has been little effect of IARC-generated varieties.**

► This is a Sahelian observation and ICRISAT accepts that it is at least partly true. We have made a recommendation about ICRISAT's crop improvement programs (see section 5.6.1).

► While it is too early to gauge the success of the new WARDA, we have discussed the criterion by which that Center's impact should be judged (Annex 1 on WARDA).

2. **Livestock research has been weak and has had no production impact.** This observation was made in Burkina, Mali, and Nigeria. IER in Mali condemned the ILCA/Mali semiarid program (1975-1985) for having produced only publications in lieu of results that might lift productivity.

► The system as a whole has to concede that this is true. The Panel discusses the reasons why and makes some recommendations in Section 5 on the future of ILRI.

Relations with other NARS partners

Major disagreement

1. **Contacts with farmers**. There is in fact no major disagreement with the principle that Center contacts with farmers should not compete with national research and extension, but there are many specific squabbles. We conclude strongly that it is inefficient to set strict and general rules about contacts with farmers because they would interfere with good science by center staff. Farmer contacts, usually through surveys and on-farm experiments, do provide valuable information to the IARCs; after all, if one really accepts the criticism that the IARCs have neglected local farming systems, their only just rebuttal is to study those systems.

2. **Contacts with the private commercial sector**. National programs in some instances have sought to limit IARC contacts with the private commercial sector on the grounds that the IARCs are working for the NARS, not for profitable companies. The Panel makes two recommendations here, one about markets for intellectual property and the other about genetic resources exports (section 5).

4.11. Impact Analysis

Impact analysis (IA) is any technique used to measure the consequences of a center's work on commodity output, information, or its partners. Ex-post IA gauges impact of known technology or information on actual output at the farm or aggregate level. A common application is to estimate the fate of planting materials. The standard procedure is to gather farm data to: (i) estimate the area covered by new material; (ii) calculate the additional yield of the new material compared to traditional materials or to previous generations of improved materials; (iii) value the calculated incremental output at market or international prices; and (iv) compare that value to the costs of the research and extension needed to generate it. A variant is a study of cassava mealybug control under the auspices of IITA (Norgaard, 1988) which used more qualitative estimates of yield effects.

Gathering base data. The main techniques are household surveys and rapid appraisal. The former usually: (i) has fewer sample units; (ii) employs more formal sampling procedures; (iii) asks more questions and in more detail; (iv) is less fixed on agricultural technology; (v) employs more quantitative methods, notably econometric, optimization, and simulation; (vi) may last for several years in the same households; and (vii) may cost more per sample unit because of the longer lag to produce results. IITA, ICRISAT, IFPRI, and WARDA have collected farm data at varying sites and locations, and have analyzed some of it with a view to estimating ex-post research impact.

Trials and information analysis. Economic analysis is done of station or farm trials. This can include analysis of breeding programs, distribution of intermediate materials, and publications analysis. Statistical analysis is done of the production function for publications and of the effect of publications on the rate of commodity or total output growth.

Analyses of scientific impact. Scientific impact, defined as the growth in the production of knowledge, is distinguished from production impact, for two reasons. First, scientific impact offers a check on progress in technical variables that cannot be easily measured on farm for cost or statistical reasons. Such variables could include average disease scores in a crop improvement program, yield potential, and estimates of genetic heritabilities of animal traits. Second, there are sometimes good reasons outside the research domain that some truly profitable farm technologies are not adopted. Where those reasons exist, they impede the research system from judging the true rate of technical change and justify scientific impact as a legitimate scale.

4.11.1. Ex-ante Impact Analysis

Ex-ante IA measures the weight of a technology that has not been adopted, but whose cost, productivity effect, and adoption can be projected with some precision. It is typically an aggregate technique because of the need to calculate the adoption parameters required to repay the costs of research and extension. There has been, however, at least one farm-level application by ICRISAT to the demand for striga control methods on sorghum in Mali.

The Panel perceives some weaknesses in this area.

▸ The Centers active in West Africa, with the prominent exception of ICRISAT and the lesser one of WARDA (e.g. Becker and Diallo, 1992), do not use impact evaluation, ex-ante or ex-post, to allocate resources.

▸ Impact work is dissociated from food and agricultural policy in general[16]. A prime example is the failure of the commodity/ecoregional Centers to absorb the lessons from IFPRI's work on cereals policy for conclusions about the size, nature, or priorities of national or international research.

▸ The Centers do not evaluate the scientific impact of their work. They have nothing, for example, as straightforward as CIMMYT's work on wheat varieties (CIMMYT, 1993) or as exotic as the literature on the benefits of conserving biodiversity.

▸ The principal long-term village studies, those of ILCA and ICRISAT in Niger, are not well coordinated despite having similar purposes and common methods in the same production system[17].

▸ The ICRISAT village-level studies--done in Mali, Niger, and Burkina Faso at various times since 1980--have no comparative focus in assisting impact evaluation, nor do those of ILCA (Mali, Niger and Cote d'Ivoire).

▸ Calculations of losses to insects, diseases, parasitic weeds are too simple, arbitrary, or both. The treasury of information available from station observations has never been systematically exploited for any commodity or pest.

It is difficult to separate observations about impact analysis from those about economics research in general and so we may be accused of exceeding our terms of reference in this matter. For that reason, we add several remarks that seem pertinent before presenting our recommendations.

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16 ISNAR series on structural adjustment and agricultural research, with chapters on Burkina Faso and Ghana (Tabor, forthcoming 1995).

17 IFPRI had village studies in Niger with a different purpose, requiring a discrete sample.

► IITA, ICRISAT, WARDA and ILCA have few economists in West Africa, making it difficult to work on many issues and isolating the economists to some degree. Economics and policy research (CGIAR Activity Category 4) took only 7.7% of major IARC staff time in 1986 and 3.6 % in 1992. We are not recommending that staffing for this activity be expanded, but it has to be managed innovatively and that does not seem to be the case now.

► Regional economics capacities are weaker than in South Asia or Latin America. Center economists must have a larger presence in West Africa.

► Some of the Centers' programs duplicate what the development banks or the universities do.

In light of these weaknesses, we recommend that IFPRI be named as a strong convening Center for socioeconomics, policy and public management research (CGIAR activity category 4) in West Africa in order to integrate the microeconomic focus of the commodity centers with its own policy focus. The mechanism is that: (i) all Center social science programs in West Africa, including those of ISNAR, would be prepared in a common process; (ii) an IFPRI staff member, one of two to be based preferably in Nigeria, manage the process; (iii) all special project funding for those programs, including post-doctoral fellows and students, be prepared jointly; and the regional effort not compromise the size of IARC efforts in Category 4. We understand that relevant collaboration already exists between IFPRI and ILCA on livestock policy research, and between IITA and its COSCA partners, but do not believe that this collaboration has produced the quality and coverage of research needed. The proposal creates the potential for a conflict of IFPRI's interest as the convenor and as a research institute, but the other participating Centers will just have to fight for their interests in this category.

In opposing the preceding recommendation, IFPRI argued that "pulling all social science work into a system-wide effort with IFPRI as the convenor is unlikely to likely to result in insufficient microeconomic analysis needed to be undertaken in close interaction with biological sciences." IFPRI did suggest it could be a "convenor of social and policy research that does not fall into the category of micro work ... in close collaboration with biological scientists". ICRISAT contended that "social science leadership is developed within each Center to respond to Center priorities and the demands of multidisciplinary research".

We maintain the original recommendation. We add that: i) much of the basis of policy research is in fact microeconomic work in collaboration with the natural scientists; after all, if one wants to estimate the effects of fertilizer subsidies, it is imperative to know the response functions and if one wants to incorporate micronutrients as a crop improvement factor, then it is imperative to know about the systems in which those crops are grown; ii) it is entirely possible to maintain the microeconomic and multidisciplinary focus of social science work in the commodity Centers under the general responsibility of IFPRI; in fact, one of the weaknesses of current arrangements is the lack of such integration; iii) making IFPRI a limited convenor is not likely to have an effect on the behavior of the commodity Centers and bears the risk of encouraging the latter to abandon this area altogether; and iv) what is needed is a series of studies--ranging from

economic analysis of experiments to policy analyses across countries--developed and managed jointly under the leadership of IFPRI that would make up a regional program.

5. RECOMMENDATIONS

Here we repeat the main questions and summarize the Panel's answers and recommendations with appropriate illustrations from individual centers. Where we lack adequate information on some issues to present justifiable recommendations, we note the issue as one for future external review in the recommendations about individual centers in the following section.

5.1. The Evolution of the National Programs and the Role of the Centers

In view of the growing strength of the national programs, the Panel recommends shifting more Center effort to basic and strategic research.

Conservation and management of natural resources; and Germplasm enhancement and breeding (Categories 1 and 2). The Panel recommends that IITA and ICRISAT shift resources into these categories out of Category 3. The other Centers, including WARDA, do so little in West Africa that this recommendation cannot practically apply to them.

Production systems and management research (Category 3). The Panel recommends that activity category 3 be the subject of an explicit devolution policy in IITA and ICRISAT in order to augment work in Categories 1 and 2.

Institution building (Category 5). The Panel recommends that the activities of the IARCs, with the exception of ISNAR, in Category 5 be limited to training and information because the Centers lack comparative advantage in institution building as such. It recommends that the Centers restrict their activities in capacity building of national programs to a strict minimum, with the obvious general exception of training.

5.2. Duplication

The Panel concluded that duplication on commodities, as might be said to have existed on maize, cassava, or rice in the past, is not a significant inefficiency. The appearance of duplication on themes--striga, cropping systems, soils, economics and public policy, to cite a few examples--occurs because the variability of common problems across the region makes it inevitable. The Panel found numerous collaborative mechanisms to avoid real duplication on such themes, concluded that this form of duplication was not a major cost to the system, and recommended no novel steps to eliminate this form of duplication. There probably was some duplication of training, but the Centers have recently begun to harmonize training activities.

5.3. The Ecoregional Approach and Alternative Organizations

The Panel contends that the "decentralized network" alternative would be inefficient for three reasons because (i) it would not reduce information costs so as to impose accountability and scientific performance; (ii) it would create too much uncertainty about resource availability and accountability; and (iii) the suggested benefits of the decentralized network approach are already gained in the Centers or in related efforts, notably that of SPAAR.

5.4. Governance

Should center boards become political bodies? The Panel found occasional support for this among national programs, but not general support.

Board size. Several interviews argued that consolidation of some Boards would be effective. The obvious regional example is IITA and WARDA, as those of ILCA and ILRAD have been merged. The Panel therefore recommends a common Board of Trustees for IITA and WARDA, with ex-officio representation of ICRISAT, ICRAF and IRRI (section 4.3.2) as a means of bettering the integration of research among those four Centers.

Staff composition. Some NARS staff proposed that the IARCs should hire more regional scientists. The Panel strongly discourages any such policy because it might lead to political appointments and debase the quality of Center scientists.

5.5. Relations with Partners

National programs (section 4.5.1). The contacts with national programs are on the whole efficient. The Centers have many mechanisms to inform themselves about national activities, to receive input into their research planning, and to collaborate substantively on common problems.

5.6. Center-Specific Recommendations

This section lays out the analysis, recommendations and suggestions for external reviews of the leading Centers, excepting WARDA, which is discussed in Annex 1.

5.6.1. IITA

Maize improvement. The next external review of IITA should make a definitive recommendation about devolving humid forest maize research to one or several national programs. IITA has already considered this internally, so there is information for a prompt decision.

Interactions with tree crop research centers. Professor Carl Eicher has written that "IITA should develop scientific partnership with tree crop research centers in the NARS in West Africa" (Eicher, 1992, p. 30). The Panel has the admittedly superficial impression that IITA has already done so, but it is a point that the next external review can easily verify.

5.6.2. ICRISAT

The Niamey site. A grave problem in the institutional culture of ICRISAT was always the domination of Hyderabad over West Africa. That domination forced the selection of the Niamey site and the insistence on research directions that should have been known to be fruitless (eg, the operational scale on-station trials that were mechanically copied from India to Africa). Much of the lack of production impact of ICRISAT in West Africa is due to the concentration at Niamey, which prevents effective work on sorghum and groundnut and relegates millet work to a fringe of the mandate area. Being in western Niger isolates millet improvement from such management issues as intercropping, mechanization, complex cropping patterns, and rotations because it works in a farming system which is quite unrepresentative of major systems in the West Africa SAT. Niamey is unlikely ever to be a regional center of academic excellence, in the way that Zaria would obviously have been. We are well aware that being at Niamey does not restrict operations to western Niger, but location determines much of what scientists do and Niamey is not a fully representative location[18].

ICRISAT has started to fix this error. It has built regional sorghum programs in Nigeria and Mali. It is moving groundnut staff to Bamako and Kano. It has sought to widen the prospective benefits of research at Niamey by building a training and information center and by broadening collaboration with ILCA on crop-livestock management, with ICRAF on agroforestry, and with IFDC and others on soils and land use. The Panel recommends that the ICRISAT research resource allocation model be continuously applied to the benefits and costs of the Center's investment at Niamey with the specific objective of justifying it not only within ICRISAT, but across IARC and NARS partners in the region. The Panel recommends that ICRISAT sorghum work should be strengthened in Nigeria. It now consists of only a breeder, an entomologist and an agronomist and lacks capacities to do more basic work. The planned transfer of ICRISAT groundnut staff from Niamey to Kano should be strengthened by addition of new staff.

Despite the decisive and correct steps taken by ICRISAT management to shift emphasis in West Africa, there remain two fundamental problems that do not appear to be adequately treated by ICRISAT; the first problem affects ILCA as well.

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[18] ILRI, in commenting on this paragraph in the draft report, contended that the Panel's remarks on the location of the ISC "will not improve the location of the CGIAR's immovable investment at Sadore" and "that criticism of past decisions is not helpful". The really important investments--staff--are of course movable and, in criticizing past decisions, we are trying to help the system avoid violating the second rule of medicine: if something isn't working, stop doing it.

Crop and livestock management. There is still too much crop and livestock management and characterization research in the IARCs. That research (CGIAR category 3) has little expectation of additional benefit because it often duplicates what farmers already know, what they can easily learn without research, what is a matter of extension, or what the national programs can do. The Panel is highly confident in its critique of this first problem and the report is definite about what to do about it (section 4.4.2).

Crop improvement. We are less confident in our critique of the second problem. The breeding work of ICRISAT has not produced materials for general or even location-specific use in West Africa and so we begin from that fact, which ICRISAT, in a 20 page reply to the draft report, did not really dispute. A millet breeder in the national program in Niger said that ICRISAT had made no progress since the late 1970s. Interviews with ICRISAT staff and national staff, reading on the subject and previous knowledge suggest that a more basic approach is needed. While we do not like to recommend additional reviews, we do not have the technical competence to say what to do about ICRISAT crop improvement work in West Africa. The Panel recommends a very high-level review of ICRISAT's crop improvement programs in West Africa, including that of CIRAD for sorghum, one that brings independent biological scientists with no previous connection to ICRISAT staff, management, or Board.

5.6.3. ILRI

ILRI is, of course, uncertain about its mid-term program in Africa. It is hazardous to speculate about what it will do. Nonetheless, we get the profoundly depressing feeling that the CGIAR needs yet another rethinking of what it is trying to do with livestock research in West Africa.

Effects of the new ILRI Mandate on CIRDES and ITC

The expansion of ILRI's mandate outside Africa, and the contraction of its resources from the sum of those of ILCA and ILRAD, means that ILRI will do less in West Africa than ILCA and ILRAD did. That fact and the completion of major ILCA and ILRAD work--the Malian Delta program, the trypanotolerance network, the subhumid zone studies in central Nigeria, various studies at ITC--implies greater responsibilities for national and regional efforts, including those of ITC and CIRDES. Growing roles for CIRDES and ITC without CGIAR funding are consistent with devolution and with a greater strategic element in the ILRI mandate, given that CIRDES and ITC work is applied. CIRDES and ITC do not have the financial base or scientific stature to join the system and the Panel does not recommend any CGIAR support to CIRDES or ITC, but they should be encouraged to compete for funds allocated by ILRI (ILRI, 1994, p. 25).

ILRI Program

The interactions of animals with crops, pastures, trees, and land and water resources impose a research organization in livestock distinct from that in crops. Scattering staff--1 in Bobo-Dioulasso, 1 in Bamako, 2 in Kaduna, 2.5 in Ibadan, 3 in Niamey--has not produced and will not produce usable results. A small bilateral crops program (eg, ICRISAT in Mali in the 1980s) of a breeder and an agronomist can succeed

because it can distribute materials for testing. It can execute a large diverse program with low supervision costs per experiment, which is impossible with livestock studies. A small animal research team in an analogous fashion cannot succeed unless system characterization is all that is sought and that now can be done more cheaply by the national programs.

Concentrating on animal production per se--genetics, especially--will not pay except in rare circumstances (eg, ranches or specialized dairy small holdings in the cool highlands) that are irrelevant for most African producers. The focus has to be on primary production for greater feed output. ILCA now has 2.5 staff (1 at Niamey, 1.5 at Ibadan, 0 at Bobo-Dioulasso, 0 at Kaduna, 0 at Bamako) working on primary production. This is not enough.

The ILRI presence at Bamako--one staff doing only liaison with national and regional programs--should be converted into a scientific post at Niamey or Ibadan because it is too expensive in isolation. Liaison offices of this type are only relevant for the germplasm Centers (the IRRI INGER coordinator at IITA is a good example) in which a lone scientist can have a full program managing the distribution, conduct, and analysis of trials. A strong indicator is that some national and regional programs visited by the Panel were unaware of the liaison office.

The ILRI group of two scientists in central Nigeria is too small to be effective. It requires more staff to achieve critical mass, better physical facilities for program continuity, and close interactions with national or international crop scientists. There are at least three alternatives for that group.

► Merge ILRI/Kaduna into NAPRI (National Animal Production Research Institute). NAPRI staff told the Panel that the chief barrier to an effective ILCA program had been discontinuity and argued that continuity could be achieved by basing ILRI staff at NAPRI. The Panel rejected this suggestion on the grounds that, while continuity, critical mass and interactions with crop scientists are problems, an ILRI program in NAPRI would not have a specific international comparative advantage--it would not add anything different to what NAPRI does, as staff of the latter stated forcefully to the Panel.

► Merge ILRI/Kaduna into the ICRISAT/IITA work near Kano, in order to benefit from interactions among the three. The Panel rejected this because the strong national program at Zaria--Ahmadu Bello University, IAR, and NAPRI--could provide staff, facilities and results that can interact with ILRI as ICRISAT and IITA would at Kano without moving the program, so that the logical alternative is to merge ILRI/Kaduna into NAPRI, which we have already rejected.

► The Panel recommends that the ILRI/Kaduna positions be transferred to Ibadan to achieve critical mass, reduce administration costs, and facilitate study of crop-livestock-tree interactions with IITA and ICRAF. This will raise the ILRI principal staff number at Ibadan to 4.5 from 2.5 (2 animal scientists, 1.5 forage scientist, 1 economist). Relations between IITA and ILRI have improved and administration costs have already been reduced in consequence.

5.6.4. IFPRI

IFPRI has neglected Nigeria in favor of Burkina Faso, Niger, Senegal, and the Gambia. The Panel understands that the funding cycle has not lately permitted IFPRI to post staff in the region, though this may change as new special projects develop, including one in Ghana. However, even when IFPRI had 12 staff in West Africa, it had none in Nigeria. Moreover, its Washington staff have written little on Nigeria. Whatever may be the reasons for that past neglect, the Panel recommends that IFPRI post 1 or 2 permanent scientists at Kano or Ibadan, with the staff having the same links to the Nigerian universities that IITA and ICRISAT have. One of those scientists would be the regional coordinator of the social science work.

IFPRI replied to the draft report that: i) it did not consider that policy research now had a positive expected impact in Nigeria; ii) it vigorously seeks possibilities for additional work on Nigeria; and iii) it has developed a joint research proposal with Nigerian institutions. IFPRI has further objected to the recommendation of putting staff with a regional coordination role in Nigeria, apart from doing research on that country from abroad, because of logistical difficulties and because qualified Nigerians can be brought to IFPRI, and to other external institutions.

▸ IFPRI's reply is admirably frank in stating that additional work on Nigeria is not justified in terms of expected net benefits. Nonetheless, we believe that political difficulties make it imperative to work on Nigeria because such difficulties often express themselves in bad policies. We are unsympathetic to the logistical difficulties argument because the other Centers manage to surmount it. While we accept that it is not essential that the regional coordination be based in Nigeria, our basic recommendations remain that IFPRI needs to do more on that country and that regional coordination is needed in the social sciences.

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HOW APPLICABLE IS THE WARDA MODEL TO THE OTHER CENTERS?

WARDA is distinct from the other IARCs in West Africa. It (i) is an intergovernmental organization subject to regional governance; (ii) has a supracongruent allocation (Inter-Center Rice Review); (iii) nurtures unusually close relations with the NARS and has announced the intention to become an "Open Center"; and (iv) has defined its program with respect to the evolution of land use and farming systems.

WARDA has presented an Open Center Model which may be more broadly applicable in West Africa. Its features would be:

1. An ecoregional mandate that refers explicitly to cropping systems (WARDA undated, p. 2).

2. A limited regional mandate, relinquishing extra-African responsibilities to other centers (eg, the WARDA/IRRI relation).

3. A Task Force approach in which the scientific agenda is driven by regional research needs (WARDA undated, p. 3), a more equal partnership with the NARS fosters "a stronger sense of ownership" of programs by the latter, and task sharing is based on comparative advantage, planned and implemented through thematic groups (the Task Forces).

4. An Open Center model, defined by WARDA as "a permanent institutional framework within which to attract, focus and facilitate the efforts of a range of collaborators working together in partnership." The Open Center provides critical mass in research "through a combination of a small core group of WARDA scientists conducting research over a range of key disciplines to provide continuity and partners from other institutions ..." Another aspect of the model is allowing national and other collaborators to use Center facilities. An example is work on "The Sustainable Use of Inland Valley Agrosystems in Sub-Saharan Africa" (WARDA undated, p. 5).

5. Greater regional representation on the Board, and in the staff, management, problem definition, and resource allocation.

There is much to recommend in this model. It defines the ecoregional approach in an operational manner. It anticipates the rising environmental costs of intensification. It recognizes the interactions that necessitate a cropping systems focus. The national programs support it; they praise the Task Forces over similar arrangements in the other Centers for promoting an efficient exchange of information about researchable problems among WARDA and national scientists and for sharing responsibilities and money more equitably.

How do the activities of other West African Centers differ from those of WARDA?

Ecoregional mandate. Allowing for minor differences in terminology, ICRISAT, ICRAF and IITA have ecoregional mandates covering the same breadth of problems that WARDA's has. ILCA's mandate has been interpreted to permit studies of crop-livestock

(and sometimes tree) systems in the principal climates of Sub-Saharan Africa. IITA and ICRAF have interactions with institutions working on non-Center crops (e.g., tree crops). The Panel found no material differences in the mandates or programs of IITA, ICRISAT, ILCA, and ICRAF that would justify any change to approximate the WARDA model in terms of proximity to the ecoregional notion.

No extra-regional responsibilities. IITA has abandoned extra-regional responsibilities for maize, sweet potato, and for cassava outside Africa. Professor Carl Eicher has recommended (Eicher 1992, p. 29) that IITA abandon East Africa, in favor of West and Central Africa, but this is undesirable given the common crops, smallholder production systems, and environmental questions in the three subregions.

The Task Force approach. The main elements are: (i) response to regional needs as expressed by the national programs; (ii) task sharing based on a collaborative common definition of comparative advantage; (iii) a greater allocation of responsibility to the NARS member of the partnership than is said to occur in other Centers; and (iv) joint decisions about funding. With the exception of joint decisions about funding, the Panel did not find this approach to differ materially from the practices of the other major centers. (Section 4 of the main report discusses center consultations with national programs at some length). It concludes that--with due attention to the costs of consultation and to the costs of a more explicit political approach to decision-making--the Centers now consult justifiably and efficiently with national program partners.

The Panel accepts that "joint decisions about funding" can be an efficient innovation because it allocates resources based on comparative advantage, reduces duplication, fills gaps, and promotes accountability. Nonetheless, the Panel cannot conclude that "joint decisions about funding" is so novel or applicable that it merits general application as a new operating rule. First, it is not new because funding decisions about training are already intrinsically joint given that trainees funded by Centers are invariably nominated by their NARS. Second, it is not new because the Centers already manage funds jointly with national partners in an extensive set of collaborative research projects. Third, it is not generally applicable without perilous changes in the Centers' independence given that sizable fixed investment decisions (e.g., buildings) are difficult to make jointly on scientific grounds alone and so political criteria are inevitably applied. One imagines with some difficulty the Centers making site location decisions largely on political grounds, the way the CILSS members do, to give one pertinent illustration. Fourth, it is not generally applicable to staffing, always the greatest fraction of research cost. Recruitment, evaluation, and promotion decisions are inherently most efficient within a single institution because of the costs of acquiring the long-term knowledge needed to manage staff. (Minimization of such costs is of course one of the reasons that large institutions emerge as economically efficient entities.)

The Panel concludes that the benefits of joint decisions about funding can be harvested with flexible and practical procedures developed through collaboration among partners, not by the imposition of rigid rules. Joint decisions about funding will become less relevant in research agencies, and more the preserve of donors, as the national programs become more able to compete for common funds. However, as long as the national programs depend on the Centers, or on others like them, for access to donors, then joint decisions about funding are a feasible institution to weaken the unwarranted grip of the stronger partners over the money.

The Open Center Model. The Open Center model does not differ significantly from what ICRISAT does at Niamey, or from what IITA does at Ibadan. They: (i) are permanent; (ii) attract staff from different collaborators, including other IARCs, regional and foreign universities and networks; (iii) support NARS work, notably degree students from African universities; (iv) operate in several key disciplines to achieve critical mass without necessarily having all the disciplines based in the convening center[1]. There are many more disciplines at Niamey and Ibadan than at Bouake because of the larger programs at the former.; and (v) are continuous because they are permanent. It is premature to speculate about the evolution about the IITA/ICRAF activities in the Cameroon or about the ICRISAT/CIRAD/ICRAF programs in Bamako. In both instances, there is the danger that the Centers will become isolated from national and other partners, a fear that was strongly expressed by Malian national program staff, but one lesson of WARDA's current structure is that it is possible to have very good relations with the NARS while maintaining independence.

The Open Center Model and WARDA's future. There has been speculation that becoming an Open Center is WARDA's path to expansion through diversification out of rice. This move would be consistent with WARDA's character as a regional research pole, and with the ecoregional approach. If WARDA seeks to expand beyond the special justification for rice in West Africa, then it is hard to see how it differs from being an outstation of IITA and the question of consolidating the two should be raised again.

Governance. WARDA establishes a precedent for other regional centers (eg, CIRDES, ITC) in the limited sense of having a partly political character, not in the sense of eventual entry into the CGIAR. WARDA and IITA are appropriate precedents for the evolution of ICRISAT as an African Center in mandate, but not in governance since the risks of political interference with staffing, priorities, operations, and funding of regional institutions are too great.

Costs. WARDA seems, on the basis of information presented in the Desk Study, to have lower relative administration costs than IITA and ICRISAT which are the most directly comparable Centers in West Africa. The contrast between ICRISAT and WARDA, both CFA countries, certainly bears investigating. It is possible that the Open Center model has hidden costs of administration--for example, multiple reports for multiple donors--among partners at a site that need to be considered by external reviews.

How WARDA should be evaluated. WARDA should be evaluated on results, not on the good feelings engendered by its excellent collaboration with national programs. Collaboration is admirable but it is not field results, only a (possible) way of achieving them. Results must always be the basic point in any decisions about WARDA's effectiveness.

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[1] There are many more disciplines at Niamey and Ibadan than at Bouake because of the larger programs at the former.

CREATING A LONG-TERM PERSPECTIVE

The Centers are under pressure to get quick results because it is sometimes held that quick results are feasible through adaptive research without basic or strategic research. Behind the notion that adaptive research can pay quickly are the erroneous presumptions that external technologies can be directly productive in Africa and that no research has been done in Africa. Pressure for quick results distorts the priorities of the IARCs away from their evolving comparative advantage and forces them into competition with the NARS precisely where the latter have begun to assert themselves.

The only way to resist this pressure, and to avoid the hazards it poses to the integrity of the IARCs, is to develop a long-term perspective in the IARCs and sell it to the donors, regional governments, NGOs and others. What does this mean?

► Estimating the benefits of strategic and basic research to counter the dangerously misguided clamor for quick results at the expense of deeper scientific understanding. The Panel saw no evidence that such estimates are being made. One prominent instance is the interesting projections of the future economic benefits needed to pay for ILRAD. The tart exchange of opinions concerning the relevance of those projections obscured the fact that ILRAD--and those other Centers confronting the same critique--have not replied quantitatively or even in the same economic terms.

► Identifying the scientific impact of research, whether it has field impact or not. The Panel's reading of Center efforts to measure impact is that they consist largely of the standard adoption studies with inadequate attention to scientific impact. While field impact is obviously the most relevant indicator, and while the standard studies are meritorious, scientific impact has also to be measured to gauge the intellectual and intermediate effects of research. The Panel saw no evidence that this is being done systematically, although IITA staff have begun some steps in this direction.

► Stopping some enterprises that exist at least partly because money is, or might be, on offer. A limited set of examples might include:

► ► The IITA Cameroon bilateral project, which was closed in 1992.

► ► The Desert Margins Initiative. It is hard to see how further emphasis on arid, low potential areas can be justified when current efforts in those areas have had a low payoff. The poverty argument for this additional emphasis is not strong given the low populations in arid West Africa.

► ► Some of IFPRI's West Africa program, which needs to be reoriented towards the larger countries.

► ► All of IIMI's West Africa program, in which the Center executes special projects in Burkina Faso, Niger, and Nigeria with somewhat imprecise links to national or international research.

► ► That part of ISNAR's work which consists of consulting for the World Bank. While we praised ISNAR's work with national programs, and while national scientists interviewed by the Panel appreciated ISNAR's efforts, the latter want a long-term intellectual direction. Those who disagree must answer the question: what will ISNAR do in West Africa when the initial round of Bank-funded agricultural research projects is completed?

With the exception of the Desert Margins initiative, which is in a major Center, the short-term initiatives we have criticized are in Centers with marginal weight in West Africa. This is not an accident. ISNAR, IFPRI, and IIMI have global, flexible and largely non-technical mandates that lend themselves to greater freedom and creativity in their implementation because they are not rooted in one ecoregion or group of commodities. When funds are scarce, greater freedom has in some instances led to initiatives without a broader purpose. The Panel sees this criticism as being in the terms of reference of the external reviews, and the point was indeed made by the recent IIMI review, but the problem has resurfaced on so many occasions that one wonders how seriously the Centers take the criticism.

► Developing a consensus to distinguish between true natural science research problems and problems caused by bad policies which require little or no natural science research for their solution. Irrigation research is the prime example. Removing the costs of weak property rights and cheap water pricing on irrigation efficiency would often provoke such a supply response with existing technologies that additional natural science research is unnecessary or can be cheaply invented by the farmers themselves. A second and more general example is that the Centers seem unaware of the Crosson-Anderson distinction of productivity gains from higher yields on undegraded lands and gains from restoration of degraded lands. Restoration gains can sometimes be had by improving property rights or bettering input pricing policies without natural science investigations. The Panel observed that the historical antipathy between natural and social scientists is as sharp as ever in some places, an antipathy that prevents development of this necessary consensus.

SYSTEMWIDE ISSUES

TAC commented that the draft report "raised significant issues which go beyond the sub-region". It asked that a section of the final report be devoted to "analysis of general systemwide issues to provide a clear basis for the associated recommendations". We believe that the main text of the final report justifies the recommendations on the systemwide issues in West Africa. In this annex, we summarize the chief systemwide issues and indicate what further analysis or actions the system might consider beyond West Africa. This is not a comprehensive treatment.

The main systemic issues raised by the report are: i) CGIAR relations with small NARS and the institutional implications of the particular characteristics and needs of small countries; ii) CGIAR efforts in marginal rainfed areas; iii) the future of production systems and management research (Category 3); iv) the future of institution-building efforts (Category 5) by the Centers other than ISNAR; and v) studies of CGIAR Commitments in other Regions. The first four share the aspect of reflecting the intense pressure on the Centers to do everything, everywhere, for everybody.

Relations with small NARS. We argue that a significant Center presence (defined not entirely arbitrarily to include a breeder, a pathologist, an entomologist, an agronomist, and an economist) in a small country[1/] is too great a commitment relative to the expected benefits of research. A group of five staff would exceed the entire presence of most of the Centers in West Africa today. This argument depends on the justifiable assumptions that most, if not all, of the team's work is devoted to the host country, with few spillovers to other situations; and that the weakness of the host country's research and extension services causes the Center presence to substitute for what the national system would ordinarily do. We further argue that the basic need of the small country is academically trained people, without which physical and institutional investments are wasted. We note, moreover, that there are many sources of technical assistance and knowledge transfer available to small and large developing countries alike that did not exist even 20 years ago.

This chain of reasoning leads to the conclusions that: i) the Centers should avoid long-term and large physical presence of staff in small countries; ii) other interactions--germplasm exchanges, joint trials, training, professional meetings, study tours--are obviously vital; iii) Center research has to be designed to produce spillovers with these countries in mind, as ICRISAT is specifically attempting to do; iv) the role of ISNAR can be crucial in the initial phase of institutional development, but it has to be recognized that other institutions--universities, private firms, the development banks, regional organizations and SPAAR--can offer the same services in many instances; and v) Center boards, Center management, and the external reviews have to be careful about the level of commitments to small countries, most importantly where the Centers involved are not

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1/ In West Africa, they are Mauritania, the Gambia, Guinea Bissau, Sierra Leone, Liberia, Togo, Benin, and Chad.

crop germplasm centers (e.g. ICLARM, ISNAR, IFPRI, ILRI, ICRAF, CIFOR) because of the higher fixed costs of research outside the crop area.

CGIAR Commitments in Marginal Rainfed Areas. The impact of agricultural research in marginal rainfed areas has been weak. This is most noticeable in Africa. We take the Centers' argument that some of the absence of impact is the fault of weak national research, extension and input supply systems. Even so, the basic return is certain to be lower in these zones even when they have better support services compared to zones of cheap irrigation, deeper soils, and less variable climate. The lower expected and realized return should accordingly elicit lower CGIAR investment, even when poverty and environmental benefits are considered. Yet system documents and what might be called the public debate often permit the inference that the marginal lands are the principal target of the Centers' labors.

The Panel found that Center production impact in the marginal areas of West Africa was basically nil, so far. This observation applies mainly to ICRISAT (millet and sorghum) and ILCA (livestock), and partly to IITA (cowpea and maize) and WARDA (rice). To improve overall impact--i.e., the sum of marginal and better areas--we have recommended a shift in emphasis toward category 2 research away from category 3 within the IARCs; shift of category 3 research to the national programs; a deeper scientific re-examination of the objectives, methods, constraints, and results of ICRISAT crop improvement work in the dry areas; and a shift toward the wetter areas by both ICRISAT and ILRI.

Though the issues affect most Centers they do not seem to have been fully analyzed yet, despite the good prospect in the Marginal Lands Initiative led by IFPRI. What is missing is consideration of the other forces driving the growth of human welfare in the marginal areas. Those include growth in the better agricultural areas, which pulls people out of the marginal areas; growth outside agriculture which has the same effect, and the genesis of property rights and other institutions that lift the return on private investment in marginal lands. The Stripe Review on Public Policy ought specifically to consider these issues because they should determine resource allocations to biological research.

Production Systems and Management Research. We have argued that the growth of the NARS capacity--if not their research output--and the general lack of impact of production systems research [2/] justify a deemphasis of Category 3 research in the Centers, and a reorientation of the remaining Category 3 work toward strategic problems. Despite the unhappy reactions from several quarters, we suspect that these recommendations will eventually be implemented, though grudgingly. We further suspect that the greater capacity of the national programs elsewhere will make these recommendations apply *a fortiori* outside West Africa. A more thorough, aggressive, and critical review of the objectives, methods, and results of category 3 research should be a

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2/ To make this point again, ICRISAT reports expected impacts on 11 Category 2 problems (CGIAR 1994b)--millet stem borer in Africa, pearl millet downy mildew, chickpea ascochyta blight, wilt resistance in pigeonpea, groundnut rosette resistance, midge resistance in sorghum, drought resistance in groundnut, drought resistance in chickpea, cold tolerance in sorghum, cold tolerance in chickpea, and pigeonpea hybrids. It reports 1 expected impact in Category 3--windbreaks for soil erosion--and it is not entirely certain that this is a research problem. The paper of Crosson and Anderson (1994) supports this point as well.

permanent feature of each external review; it is easy to be beguiled by the Center's less-than-disinterested reactions and to forget the general lack of impact of this field.

Institution Building (Category 5). We are aware of the vocal interest that asserts the Centers should do more in this area. This interest should be resisted because: i) much of this category is outside the mandate of the Centers, with the specific exception of ISNAR's; ii) there are obstacles to good institutions that the Centers cannot budge; iii) basic Center activities (e.g. multilocational trials) have positive institutional spillovers through knowledge transfer; and iv) there are many adequate competing sources of supply for the products of this Category. Category 5--including training--should be de-emphasized for those reasons and the savings shifted into Category 2. The system, notably through the "Inter-Center Training Program for sub-Saharan Africa", is reacting appropriately in Africa, though we do not know about the other regions. The subject of competing suppliers should be considered systemwide in the next external review of ISNAR.

CGIAR Commitments in other Regions. This study could be usefully done elsewhere, but more cost-effectively. It should be done jointly with the external review of the principal Center of the region (e.g. ICARDA for WANA or IRRI for East Asia) by a member of the Center review; the designated member would not be additional to the Panel, but would replace another normal member. This would allow the person doing the commitments study to be supported by the TAC Secretariat and to interact with the members of the external review at no additional cost. The external review of the major Center would be preceded by a meeting of NARS leaders, like the one held at Bouake, and, if convenient, by a TAC meeting at the same time to introduce the study and to have the benefits of the meeting of NARS leaders at one time.

TERMS OF REFERENCE

A. *Terms of Reference*

The Terms of Reference were:

1. To make an inventory of, and assess CGIAR facilities, personnel, programs, and activities, program expenditure and level of capital investment in the West Africa region.

2. To identify and propose (a) cost-effective options for organizing and operating the future CGIAR presence in the region; and (b) whether the Study should be expanded to other regions, based on the assessment of the usefulness of the West Africa Study to the System.

B. *List of Specific Issues to be Addressed by the Panel*

It was expected that the Study would also deal with the following specific issues:

1. Evaluation of Centers' outputs and methods of impact assessment;

2. Synthesis of NARS views on, and capacity to use, CGIAR delivery mechanisms;

3. Identification of overlaps and gaps in current CGIAR delivery mechanisms and means of amelioration;

4. Strategies/options to increase efficiency and effectiveness of CGIAR delivery mechanisms.

ANNEX 5

LIST OF INSTITUTIONS VISITED AND PERSONS MET

1. MALI (4-6 August 1994)

WASIP/CIRAD, Samanko

Dr. S.N. Lohani, Principal Millet Breeder
Dr. A. Ratnadass, Principal Entomologist
Dr. J. Gigou, Agronomist
Mr. Dramane Doumiba, Administrative Officer
Mr. I. Sissoko, Senior Research Assistant
Mr. D. Sanogo, Senior Research Assistant

INSAH

Dr. Josué Dioné, Economist, Food Security Research
Dr. Laomaibao Netoyo, Ag.Economist, Drought Resistance, Network Coordinator
Dr. Daoulé Diallo Ba, Phytopathologist, IPM Research

IER

Hamadi Dirko, Secretaire Permanent CNRA/IER
Bino Teme, Chef DRSPR
Aboubacar Toure, Chef Programme Sorgho
Amadou B. Cissé, CRRA/Nioro
Mamadou Ouattara, CRRA/Mopti
Aly Kouriba, D/CRRA Kayes
Mèmè Togola, Chef DRZ/IER
Souleymane Camara, Représentant Chef DRFH
Youssouf Manian Diarra, DPAER
Ousmane Moriba Sanogo, Cond/DPAER
Boubacar Traore, P/D/CRRA, Sikasso
NTji Coulibaly, Chef Programme Mais
Amadou Diarra, Chef DRA/IER
Yacouba Ousmane Doumbia, Directeur du CRRA/SOTUBA

2. BURKINA FASO (7-9 August 1994)

CIRDES, Bobo Dioulasso and Banankeledaga

Dr. G. Duvallet, Chief of Epidemiology Programme
Dr. B. Bauer, Chief of Entomology Programme
Dr. Babiné Kanwe, Research Scientist
Dr. Lassina Ouattara, Research Scientist
Dr. Augustin Bassingo, Research Scientist

Ing. Diara Thiombiano, Research Scientist (Agronomist)
Dr. Adamo Ouedraogo, Veterinarian

INERA, Kamboinse

Dr. G. Roger Zambre, Selectionneur Chef du CRAF
Dr. Francois Lompo, Agro-pédologue, Chef Programme ESFINA
Dr. Ouedraogo S., Agroeconomist, Chef Programme RSP
Dr. Guira Moussa, Agronome Arboriculteur CMFPT
Dr. Clementine Dabire, Chef de Prog. Proteagineux
Dr. Gilles Trouche, CIRAD Déligué p.i.
Dr. Amidou Tamboura, Programme, Productions Animales
Dr. Drissa Konate, Programme SOMIMA Virologiste
Dr. Paco Sereme, Phytopathologist, SOMIMA

INERA, Ouagadougou

Dr. P.C. Bélem, Director, INERA

3. NIGER (9-15 August 1994)

ISC, Niamey/Sadore

Dr. K. Harmsen, Executive Director
Dr. J.C.W. Odongo, Principal Scientist (ICRAF), Agronomy
Dr. A. Bationo, Principal Scientist, Soil Chemistry (IFDC)
Dr. J.H. Williams, Principal Scientist, Physiology
Dr. W. Payne, Principal Millet Physiologist
Ms. R.H. Gottfried, Regional Information Officer and Training Coordinator
Mr. Bruno Gerard, Farm Manager/GIS Expert

ILCA, Niamey (ISC Sadore)

Dr. T.O. Williams, Economist
Dr. S. Fernandez, Animal Scientist
Dr. M. Turner, Geographer

INRAN, Niamey

Mr. Toukoura, Interim Director General
Mr. Gauta, Interim Deputy Director General

UNDP, Niamey

Dr. M. Ouattara, ICRISAT Board Member and former INRAN Director General

INRAN, Kolo Research Station

Dr. Haougui Adamou, Plant Pathologist
Dr. Mohamane Moussa

Dr. Seyni Sirifi
Dr. Naino Jika, Chef de Station, Responsable du Departement de Recherches Agricoles (DRA)
Dr. Maiga Seyni, Entomologiste
Dr. Abdourahamane Alou, Agronome/Riz

4. NIGERIA (15-23 August 1994)

IITA/ICRISAT/IAR, Kano

Dr. B.B. Singh, IITA Team Leader, Breeder
Dr. O. Ajayi, Principal Scientist (Entomology) and ICRISAT Team Leader
Dr. R. Tabo, Principal Scientist (ISC), Agronomy
Mr. W.C. Mayaki, i/c IAR Station
Alh. M. Abba, KNARDA Project, Director, Agricultural Services
Mr. I.D. Musa, Deputy Director, MANR
Dr. S.F. Blade, Agronomist/Breeder - IITA (Post Doc.)
Dr. H. Bottenberg, IITA
Mr. C.I. Amafobi, Entomologist, IAR
Mr. T. Terao, Physiologist, IITA/JIRCAS
Dr. E.C. Odion, Agronomist, IAR/ABU
Mr. M. Badawi, Deputy Director, Adaptive Research

IAR, Ahmadu Bello University (ABU), Zaria

Prof. Olugbeni, Director
Prof. L.B. Kaul, Agric. Mechanization
Prof. I.O. Erinle, Horticultural Crops
Prof. Olukosi, Farming Systems
Prof. A.M. Emechebe, Agronomy, and Deputy Director (Research)
Dr. E.N.O. Iwuafor
Dr. O.O. Olufaji, Legumes and Oilseeds
Dr. A.A. Ramalam, Irrigation Research
Dr. L.A. Ega, Deputy Director (Extension)
Dr. A.O. Ogungbile, Farming Systems
Dr. T.K. Atala, Extension Services
Dr. C. Harkness, Visiting Scientist, Plant Breeder
Dr. V.B. Ogunlela, Fibres
Dr. A.D. Akpa, Crop Protection
Dr. J.D. Olarewaju, Food Science & Technology

NAPRI, ABU, Zaria

Prof. E.O. Oyedipe, Director
Dr. M.S. Kallah, Deputy Director
Dr. L.O. Eduru, Assistant Director
Dr. O.A. Osinowo, Extension Research
Dr. C.A.M. Lakpini, Small Ruminants
Dr. M.E. Abdumalik, Rabbit Research
Dr. O.S. Onipade, Forage and Crop Residues
Dr. B.Y. Abubakar, Poultry Research

Dr. A.M. Adamu, Beef Research
Dr. O.W. Ehoche, Dairy Research
Dr. E.O. Otchere, Livestock Systems

IAR&T, Moor Plantation, Ibadan

Prof. A.M. Daramola, Deputy Director Agronomy
Prof. J.O. Ojo-Atere, Pedology
Dr. E.A. Adebowale, Animal Nutrition
Dr.S.A. Shoyinka, Plant Pathology
Dr. P.O. Oyekan, Plant Pathology
Dr. (Mrs.) O. Omueti, Biochemistry
Dr. V.A. Banjoko, Soil Chemistry
Dr. (Mrs.) Y.O.K. Osikanlu, Plant Pathology
Dr. T.A. Fadare, Entomology
Dr. J.E. Iken, Plant Breeding
Mrs. B. Ikhizama, Library
Mr. Amusan, Statistics

IITA/ILCA/IRRI, Ibadan

Dr. L. Brader, Director General, IITA
Dr. J.P. Eckebil, Deputy Director General, International Cooperation
Mr. W. Powell, Deputy Director General, Management
Dr. S.A. Adetunji, Special Assistant to Director General
Dr. F.M. Quinn, Director, Crop Improvement
Dr. J.O. Akobundu, Weed Science
Dr. R. Carsky, Systems Agronomy, Moist Savanna
Dr. N. Sanginga, Soil Microbiology
Dr. Y. Hayashi, Agronomy
Dr. A.M. Manyong, Agric. Economics (Post Doc.)
Dr. M. Gichuru, Soil Fertility
Dr. F.I. Nweke, Agric. Economics
Dr. A.P. Uriyo, International Cooperation
Dr. K. Alluri, IRRI Liaison Scientist, INGER/Africa
Dr. J. Smith, Animal Scientist and Programme Leader, ILCA
Dr. J. Gullay, International Cooperation
Dr. P.B. Thenkabail, Remote Sensing Specialist
Dr. G. Tian, Agronomist (Post Doc.)
Dr. Y.W. Jeon, Post Harvest Technologist
Dr. J. Tonye, Assistant Coordinator, AFNETA
Dr. K. Dashiell, Leader, GLIP/Soybean Breeder
Dr. C. Fatokun, Plant Breeder, Cowpea
Dr. A. Dixon, Plant Breeder, Cassava
Dr. I.N. Kasale, Agronomist/Crop Physiologist (Post Doc.)
Dr. N. Wanyera, Plant Breeder, Yam (Post Doc.)
Dr. R. Asiedu, Leader TRIP/Cassava, Yam Breeder
Dr. I. Ingelbrecht, Molecular Biology, Cowpea

5. BENIN (22-23 August 1994)

IITA, Cotonou, Plant Health Management Programme

Dr. P. Neuenschwander, Programme Leader
Mr. J. Quaye, Administrator

INRAB, Cotonou

Mr. G. Agbahungba, Director, Agricultural Research

CBRST, Cotonou

Mr. A. Nestor, Director General

6. CAMEROON (24-26 August 1994)

IITA, Yaoundé

Dr. S. Weise, Team Leader, Weed/Vegetation Management
Dr. M. Gichuru, Soil Fertility/Agronomy
Dr. O. Ndoye, Agricultural Economics
Dr. D. Baker, Agricultural Economics
Dr. I. Riviere, Crop Ecology (Post Doc.)

ICRAF/IRA, Yaoundé

Dr. J. Ayuk-Takem, Director, IRA
Dr. B. Duguma, ICRAF Team Leader
Dr. D.O. Ladipo, ICRAF Tree Breeder

ICRAF (Team Visiting from ICRAF Hqs. Nairobi)

Dr. R. Leakey, Director of Research
Dr. P. Cooper, Coordinator, Systems Improvement
Dr. Anne-Maria Izac, Coordinator, Characterization and Impact Analysis

7. GHANA (25-27 August 1994)

Ministry of Agriculture, Accra

Dr. A.K. Musi, Director, Animal Production Department
Dr. F. Ofori, Crops Services Extension Department
Dr. S. Korang-Amoakah, Director, Crops Services

CSIR, Accra

Prof. K. Haizel, Senior Technical Advisor
Mr. Byneth, Aquatic Biology Institute
Dr. S.O. Bennett-Lartey, Plant Genetic Resources Institute

CRI, Kumasi

Dr. Seth A.K. Ashiamah, Training Officer, Training & Communication Unit
Dr. Samuel A. Peporah, Resource and Crops Management Division
Dr. Joseph Adjei, Legumes Division
Dr. Isaac O.O. Ansah, Training, Communication & Printing Unit
Dr. J.Y. Asibuo, On-Farm Research
Dr. K.M. Adu, Plant Breeding, Legumes
Dr. Joyce Haleegoah, Socioeconomics Division
Dr. Florence Ansere-Brah, Socioeconomics Division
Dr. K.O. Adu-Tutu, Weed Scientist

8. GAMBIA (28-30 August 1994)

ITC, Banjul

Prof. L. Dempfle, Director General
Dr. B. Touray, Deputy Director General
Dr. S. Osaer
Dr. B. Goossens, Veterinarian
Dr. D.J. Clifford
Dr. R.C. Mattioli
Dr. M. Kassama
Dr. S. Kora

9. UNITED STATES OF AMERICA (8 September 1994)

IFPRI Washington, DC

Dr. Ousmane Badiane, Research Fellow
Dr. Dean A. DeRosa, Research Fellow
Dr. Chris Delgado, Research Fellow
Dr. J. Hopkins, Research Fellow
Dr. C. Farrar, Director of Administration and Finance

ANNEX 6

PANEL COMPOSITION AND BIOGRAPHICAL INFORMATION

Chair

Dr. John McIntire
Senior Agricultural Economist
World Bank
1818 H Street, N.W.
Washington, D.C. 20433
USA

Member

Dr. Bakary Ouayogode
Directeur des Programmes de Recherche
Ministère de la Recherche Scientifique
et de l'Enseignement Professionnel et Technique
B.P.V. 151 Abidjan
Côte d'Ivoire

Panel Secretary

Dr. Philip Kio
Senior Forestry Research Officer
Room NF 721
TAC Secretariat
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla
00100 Rome
Italy

John McIntire

John McIntire is a Senior Agricultural Economist at the World Bank where he has worked on agricultural and rural development and reform in Mexico, Central America and Bangladesh. Dr. McIntire worked on technology assessment and livestock policy analysis for ICRISAT and ILCA for nearly 10 years in Africa before joining the Word Bank. He was a consultant to the Third External Programme and Management Review of ICARDA and a member of the CGIAR Livestock Research Steering Committee.

Bakary Ouayogode

Bakary Ouayogode is Director of Research Programmes and Training at the Ministry of Scientific Research Technology and Professional Training, Republic of Côte d'Ivoire. He commenced his research career as an entomologist at IDESSA, Bouaké, rising to the position of Chief of the Division of Plant Protection. He was a representative of the Imperial Chemical Industries, Plant Protection Division for Central and West Francophone Africa. He participated in the IITA External Grain Legumes Programme Review and was a member of the Second External Programme and Management Review of ISNAR.

GLOSSARY OF ACRONYMS

CFA	Communité Financiere Africaine
CG or CGIAR	Consultative Group on International Agricultural Research
CILSS	Comité Permanent Inter-états de Lutte contre la Sécheresse dans le Sahel
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CIP	Centro Internacional de la Papa
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CIRDES	Centre International de Recherche-Développement sur l'Elevage en Zone Subhumide
CORAF	Conférence des Responsables de la Recherche Agronomique Africains
COSCA	Collaborative Study of Cassava in Africa
GDP	Gross Domestic Product
GNP	Gross National Product
HULWA	Humid Zone of Lowland West Africa
IAR	Institute of Agricultural Research (Nigeria)
IAR&T	Institute of Agricultural Research and Training (Nigeria)
IARC	International Agricultural Research Center
ICARDA	International Center for Research in the Dry Areas
ICLARM	International Center for Living Aquatic Resources Management
ICRAF	International Center for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IER	Institut d'Economie Rurale

IFPRI	International Food Policy Research Institute
IIMI	International Irrigation Management Institute
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Center for Africa
ILRAD	International Laboratory for Research on Animal Diseases
ILRI	International Livestock Research Institute
INIBAP	International Network for the Improvement of Banana and Plantain
INRAB	Institut National de Recherches Agronomique du Burkina Faso
INRAN	Institut National de Recherches Agronomique du Niger
INSAH	Institut du Sahel
IPGRI	International Plant Genetic Resources Institute
IRA	Institut des Recherches Agronomiques
ISC	ICRISAT Sahelian Center
ISNAR	International Service for National Agricultural Research
ITC	International Trypanotolerance Center
IRRI	International Rice Research Institute
MTP	Medium-Term Plan
NAPRI	National Animal Products Research Institute (Nigeria)
NARS	National Agricultural Research System
SAFGRAD	Semi-Arid Food Grains Research and Development
SALWA	Semi-Arid Lowland of West Africa
SAT	Semi-Arid Tropics
SSA	Sub-Saharan Africa
TAC	Technical Advisory Committee of the CGIAR
WARDA	West Africa Rice Development Association