CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Review of Systemwide Programmes with an Ecoregional Approach

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

This report comprises:

(a) Extract from *Summary of Proceedings and Decisions*, CGIAR International Centers Week, 25-29 October 1999, Washington, DC

(b) Letter from TAC Chairman transmitting the Report of the Review of Systemwide Programmes with an Ecoregional Approach

(c) TAC Commentary on the Report of the Review of Systemwide Programmes with an Ecoregional Approach

(d) Transmittal Letter from Panel Chair to TAC Chair

(e) Report of the Review of Systemwide Programmes with an Ecoregional Approach

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
June 2000

From: The Secretariat November 1999

CGIAR International Centers Week
October 25-29, 1999
Washington, DC

Review of Systemwide Programs with an Ecoregional Approach [1]

Ted Henzell, Chair of the Panel commissioned by TAC to review CGIAR systemwide programs with an ecoregional approach, presented the findings and recommendations of the Panel's review of eight programs. The Panel's most important conclusion was that the principles underlying the ecoregional approach are valid and of continuing high priority for the sustainable improvement of agricultural productivity. The longer-established ecoregional programs have conducted significant research related to the problems of tropical deforestation, sustaining high production of food grains in Asia, and providing more sustainable management practices for endangered environments like the hillsides and mountains of Latin America. The Alternatives to Slash and Burn Agriculture program has gone farthest in utilizing the holistic ecoregional approach to research. There has also been excellent progress in developing partnerships with national agricultural research systems. However, several areas of natural resource management require improvement, including broadening and strengthening the holistic frameworks and increasing the commitment to strategic dimensions.

The Panel offered a number of recommendations. Mr. Henzell highlighted the following:

- Research on sustainable improvement of productivity should remain a high priority for the CGIAR.
- The revised framework for natural resources management research should be organized around major problems of international relevance, use holistic systems approaches that combine human and technical elements to address the problems on multiple scales, and measure progress against specific performance indicators.
- Systemwide activities should be subject to special reviews and in-depth "sunset" reviews.
- Systemwide programs should be selected according to the following criteria: the problem (or opportunity) is of major importance to CGIAR goals; no single Center has a natural advantage in terms of its mandate; and there is high potential for efficiency gains from combined Center efforts.

Speaking on behalf of TAC, Elias Fereres praised the Panel for assuming such a challenging task. TAC regards the findings useful for its overview of the diversity and strengths of approaches used as well as areas requiring change. TAC recommended greater attention should be placed on poverty and human aspects in research geared toward the sustainable improvement of productivity.

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[1] Extract from: *Summary of Proceedings and Decisions*, CGIAR International Centers Week, Washington, DC, 25-29 October, 1999.

Plenary Discussion

The Group endorsed the TAC Panel's report on systemwide programs with an ecoregional approach and agreed with TAC that the ecoregional approach remains valid for the CGIAR and its partners. Members felt that such research should be focused on major problems of international significance which are related to sustainable improvement of productivity. They also noted that procedures for monitoring progress and performance indicators should be strengthened; and that program governance is not well defined. While broad support for the approach and its principles is evident, the earlier presumption that problems be defined in terms of established agroecological zones (ecoregions) has been supplanted by one that features problem identification and selection (with the criteria recounted earlier) but keeps the existing agro-ecological zones for reference purposes. The Group requested TAC to follow up on issues raised by the review and report to the Group on progress in addressing them at MTM2000.

Consultative Group on International Agricultural Research (CGIAR)

TECHNICAL ADVISORY COMMITTEE
Donald Winkelmann, Chairman

1st October 1999

Dear Mr. Serageldin,

It is my pleasure to transmit to you the report of the Review of Systemwide Programmes with an Ecoregional Approach. The review was conducted during April-July 1999 by a Panel chaired by Dr. Ted Henzell, Australia. The attached report was considered by TAC at its 77th meeting held in The Hague in September 1999, in the presence of the Panel Chair. Please find attached the Panel's report and TAC's commentary on the review.

TAC is pleased with this thorough analysis of Systemwide Programmes with an Ecoregional Approach. The Committee recalls that it committed itself to reviewing Systemwide activities during the last round of setting CGIAR priorities and strategies to evaluate lessons from new collaborative approaches of the CGIAR in uncharted territories, recommended by TAC in the mid 1990s. Thus, this review of Ecoregional Programmes follows the First Review of the Systemwide Genetic Resources Programme carried out in 1998. Other Systemwide activities with a thematic approach will be reviewed in due course before the next setting of CGIAR priorities and strategies during 2001-2002.

A preparatory desk study was instrumental for the Main Phase of this review. It brought together relevant information from the centres and others on the Ecoregional Programmes. Field visits to selected programmes, allowing in-depth evaluations of several of the eight ongoing Ecoregional Programmes, were conducted in Asia, Africa and Latin America.

The Committee is pleased to learn that the principles of the Ecoregional Approach in the CGIAR are still valid but recommends that greater attention should be placed on poverty and human aspects in research geared towards the sustainable improvement of productivity. TAC noted as well the Panel's strong comment about partnerships that have been formed with NARS. The Panel emphasizes issues of problem focus, planning, performance indicators, impact monitoring and governance, among other themes in its report.

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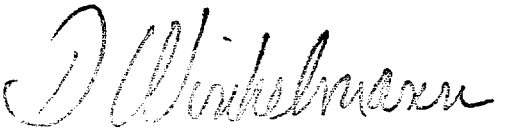
TAC's views on these and other issues are further elaborated in the attached commentary.

On behalf of TAC, I would like to thank Dr. Henzell and his Panel for a comprehensive report. I look forward to a fruitful discussion at ICW'99.

Sincerely yours,



Donald L. Winkelmann
TAC Chair

TAC COMMENTARY ON THE REVIEW OF SYSTEMWIDE PROGRAMMES WITH AN ECOREGIONAL APPROACH

The review process

The report of the Review of Systemwide Programmes with an Ecoregional Approach was discussed at TAC 77 in the presence of the Panel Chair, Dr. Ted Henzell. TAC wishes to thank the Panel for assuming an extremely challenging task, the first of its kind, to review such a broad array of Systemwide programme types. The findings are useful in their overview of the diversity of approaches used, as well as of the strengths and the areas requiring change.

The review does not cover all the ecoregional work done in the centres. Site visits were made to several Systemwide Programmes; others were included in the desk-study only. For instance, the On-farm Water Husbandry programme of WANA, under review at the time by the ICARDA EPMR, was included in the desk-study only. The review does not, therefore, cover every variation in approach and is not all-inclusive.

Lessons learned

What follows are TAC's perceptions of the major lessons to be drawn from the review. In reporting these findings, TAC will follow the Panel's abbreviation of "Systemwide programmes based on an ecoregional approach" with "ecoregional approach".

- The "approach" remains valid for the CGIAR and for many of its partners. TAC adds for emphasis that, for CGIAR Centres, the "approach" must explicitly take into account poverty and the human dimensions of problems.

- Such research must be focused on major problems related to the sustainable improvement of productivity which are of international (but not necessarily global) relevance. Too, but sometimes overlooked, in problem identification, CGIAR research must offer promising solutions.

- Procedures for monitoring progress and performance indicators were found to be lacking in many programmes. Timetables and "sunset" clauses are also missing. These are deemed to be essential and should be determined at the start of every programme.

- Programme governance is not well defined in most programmes. The difficulties observed by the Panel in the operation, management and governance of the programmes are partly associated with the size and diversity of the collaborative research activities. There is a need for clear delineation of partner responsibility, for programme leadership and for resource contributions. Procedures for programme review should be put in place from the start. Accountability through centre management to the appropriate centre Boards and to the CGIAR through TAC should be made clear for both funding and for programme output.

- All such programmes have been successful in the development of strong alliances with a wide variety of partners. TAC notes, however, that the principle of subsidiarity should apply to these programmes. Moreover, TAC adds that while complementarities among centres make the System more efficient, the added benefits seem to decline as the number of centres increase beyond a few.

- Several programmes were thought to place excessive emphasis on methodologies as compared with research results that would themselves lead to impact. The balance should be carefully outlined in setting out desired results at the start of the projects. Some would claim, however, that the proper test of a methodology includes its promise for impact, so that even efforts to develop methodologies must include attention to impact.

- The original TAC characterization of ecoregions, based on zones of similar climate and natural vegetation has proven, in most cases, to be not useful in operation. Many programmes successfully use socioeconomic and agroecological information as suggested by the identified problem set; all have a defined geographical region. The term "region" or "regional" is a more descriptive term for some programmes and should be used, where appropriate, to reduce confusion in terminology. Given the various ways in which "ecoregional" is currently used, the Panel recommends that it be dropped as a technical term.

  Beyond this counsel, the Panel notes confusions emerging from the characterization of the "approach" and from related terms applicable to research on natural resources. Perhaps the major consequence of the evident lack of precision and clarity has been a reluctance to fund such work, possibly because of uncertainty arising from the vocabularies being used.

- TAC suggests the following idiomatic changes: that "ecoregional research" and "ecoregional approaches" be dropped as technical terms, that INRM be applied to circumstances in which both biophysical and social/economic dimensions are combined (TAC notes that CGIAR usage included both in NRM but this seems not to be generally true), and that multi-centre rather than Systemwide be applied when two or more centres combine in INRM research.

Comments on specific recommendations

TAC notes that the report made thirteen recommendations, three on them on operational matters and the other ten on the future of the ecoregional approach. The Committee endorses the recommendations of the Panel and offers the following suggestions and comments:

- **Recommendation 1.** Where the work on other Systemwide Programmes or of individual centres overlap that of an Ecoregional Programme and is relevant to the problem focus of that programme, the work should be integrated. Future reviews, whether EPMRs or Systemwide reviews, should include that interaction, and consider the consolidation of programmes with similar objectives.

- **Recommendations 2-3**. The CGIAR Secretariat has agreed to review the existing rules to Centres for accounting for all financial and other resources and for the allocation of costs between co-ordination and R&D activities, identify areas where clarification is

needed, and develop guidelines where there are gaps. The financial estimates for Systemwide Programmes are part of the CGIAR budget matrices. The Secretariat will look into ways by which the estimates for Systemwide INRM activities could be more clearly presented.

- **Recommendation 7.**The extent of "mainstreaming" of an INRM "approach" will depend on each centre's mandate. The broad range of methodologies, which will be used with different approaches, limits the appropriate generalization to basic concepts. Future centre and Systemwide Programme reviews will include that assessment. TAC believes that "sunset" reviews should be further considered and discussed before becoming a general method of operation.

- **Recommendations 8.** TAC agrees that a conceptual framework for integrated programmes combining sustainable production systems with INRM and having socioeconomic dimensions and a regional scale is essential for appropriate programme planning and management. Such a framework should lay out the elements to be included, and those to be specifically excluded, depending on the degree of holism necessary in the programme. The framework could be modified as elements are added or deleted during the course of the work. TAC is now working with the CDC on a more coherent framework. The process for its articulation is highly participatory, with the intent that there will be broad consensus and buy-in on the basic principles by every centre.

- **Recommendation 9.** TAC notes that poverty and human aspects are not sufficiently covered in the programmes. Perhaps this is because the programmes reviewed have given more explicit consideration to natural resources than to poverty. TAC suggests that ways for balancing these concerns should include stronger focus on poverty variables and on "users" role in the management of natural resources.

- **Recommendations 10.** A requirement and conditions for scaling within benchmark sites and of extrapolation from them is being built into the evolving framework for INRM. TAC believes that recent technological developments in the area of computer modelling coupled with those in remote sensing and GIS, offer excellent opportunities for efficient extrapolation of research results in the area of ecoregional research. Such advances are critical for the development of international public goods by the CGIAR Centres in the area of NRM, an issue of substantial difficulty in the past. TAC anticipates the need for expert assistance with selected aspects of more effective INRM work.

- **Recommendation 11.** TAC will continue to work with the CDC/CSE to suggest avenues for exchange of information. Electronic means will most likely form the backbone of that effort. It will have to occur around several scientific focal areas of the INRM research.

- **Recommendation 13.** While the anticipated framework with its guideline is not intended to be a screening mechanism for Systemwide INRM programmes, TAC agrees that in light of the need for a clear problem/opportunity focus, some of the more broadly-constituted ecoregional programmes should be more sharply focused, discontinued, or be taken into the portfolio of a centre. It will not be possible to accomplish this by March 2000 as recommended by the review, but a more focused review of some of the existing programmes will be possible before the 2002 cycle within the concepts of the new framework. That process can begin with the March 2000 TAC 78.

SDR/TAC:IAR/99/8

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

REVIEW OF SYSTEMWIDE PROGRAMMES

WITH AN ECOREGIONAL APPROACH

Review Panel: Ted Henzell (Chair)
Derek Byerlee
Nicolas Mateo

Site Visits: Gelia Castillo
Elias Fereres (TAC Resource Person)
S.S. Johl

Ekkehard Kürschner (Consultant/Desk Study)
Shellemiah O. Keya (Panel Secretary and Resource Person)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

AUGUST 1999

Dr. Ted Henzell
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Queensland 4075
AUSTRALIA

Dr. Donald L. Winkelmann
Chair
Technical Advisory Committee
Consultative Group on International Agricultural Research
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Santa Fe, NM 87501, USA.

31st August 1999

Dear Dr. Winkelmann,

I am pleased to submit to you the Report of the Panel that conducted the Review of Systemwide Programmes with an Ecoregional Approach.

Throughout, the Panel gathered strong support for continued application of the basic principles of the ecoregional approach and for natural resources management (NRM) being a high priority for the CGIAR. There have been very useful achievements already by the longer-established ecoregional programmes, for example in characterizing production environments and initiating selected strategic research. Excellent progress has been made by the collaborative research consortia in developing partnerships with NARS.

While the original vision may not have been fully realized yet, these findings provide a very sound basis for the future and indicate where changes will be necessary, at Centre and at System level. They also gave the Panel confidence to develop a set of positive recommendations and suggestions on how to implement future NRM research effectively in the CGIAR, on specific aspects of the research, and on strengthening collaboration.

As is evident from the above paragraphs, the Panel looked beyond the current performance of the programmes to the intentions of the CGIAR when it adopted the ecoregional approach in 1990, with an external environment of international agricultural research markedly different from that of today. Also, the Panel was aware of the fact that this Review took place at a time of change and reflection in the CGIAR.

A major aim of the Review was to see what could be learned from the experience of the past five years. One major lesson seemed to be that the ecoregional approach had been widely misunderstood. The Panel's advice on that point is not to spend too much time on re-definitions but to be much more precise in future about the researchable problems of sustainable natural resources management that are likely to be of greatest importance in attaining the CGIAR's goals.

The Review turned out to be a challenging task, being the first of its kind since the initiation of systemwide programmes, except for the Review of the Systemwide Genetic Resources Programme. The latter provided only partial guidance on how to review systemwide

programmes. I would like to mention just three aspects of the process which was followed by this Review.

Firstly, the preliminary desk study, which included data from a survey of major stakeholders, proved very useful as a basis for discussion during the field visits. It identified virtually all the major issues that emerged during the entire Review. The selective field visits were essential as a reality check. Quite detailed reports of each of the three visits are attached. The Panel records its special thanks to the coordinators who arranged the visits and helped check the visit reports.

Secondly, the main phase of the Review was carried out at ISNAR and the Panel Chair was based there for several weeks before that. The Director General, Dr. Stein Bie, and the people of ISNAR provided invaluable assistance, not least by their willingness to join in discussion as the Review progressed. Melina Tensen made sure that the Panel received excellent support throughout the whole process.

Thirdly, this Review serves as another step in testing the value of electronic communication in conducting CGIAR reviews. The Panel met as a group for only six working days, and the rest was done by E-mail. Subsequently, the Secretariat took up the challenge of compiling the report by reconciling a series of revisions coming from different Panel members. An advanced draft was circulated for comment to Centre Directors, TAC Members and some others with special knowledge of the ecoregional approach. This proved very instructive, and I hope we have done justice to their many constructive suggestions.

I wish to thank Panel members Derek Byerlee and Nicolas Mateo for their invaluable contributions. The fact that they had both worked in CGIAR Centres and had been associated with the initial stages of ecoregional programmes provided additional insights. The expertise that the other distinguished panelists contributed to the field visits is gratefully acknowledged. Special thanks are due also to Shellemiah Keya who acted as Panel Secretary to the Review and to Ekkehard Kuerschner who was consultant to the TAC Secretariat for the Review. The teamwork was excellent throughout.

Finally, all Panel members join me in expressing appreciation for the opportunity to be part of the Review Panel. We hope that the Report will be useful to TAC and the CGIAR as a whole. In compiling this Report, the Panel tried hard to retain the vision that generated so much interest when the ecoregional approach was first mooted, while being realistic about what might be feasible with the resources available to the CGIAR and its partners in the next few years. We trust that we have succeeded.

Yours sincerely,

Ted Henzell

Ted Henzell
Chair, Review Panel

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ACRONYMS

AARINENA	Association of Agricultural Research Institutions in the Near East and North Africa
AHI	African Highlands Initiative
APAARI	Asian-Pacific Association of Agricultural Research Institutions
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASB	Alternatives to Slash and Burn
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical
CIFOR	Center for International Forestry Research
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 dévéloppement
CONDESAN	Consortium for the Sustainable Development of the Andean Region
CORAF	Conseil Ouest et Centre Africain pour la recherche et le développement agricoles
DMI	Desert Margins Initiative
Ecor(I)Asia	Ecoregional Initiative for the Humid and Sub-humid Tropics and Subtropics of Asia
EIARD	European Initiative for Agricultural Rsearch for Development
EPHTA	Ecoregional Programme for the Humid and Sub-Humid Tropics of Sub-Saharan Africa
FAO	Food and Agriculture Organization
FARA	Forum for Agricultural Research in Africa
FORAGRO	Foro Regional de Investigación y Desarollo Tecnológico Agropecuario
GEF	Global Environment Facility
GFAR	Global Forum on Agricultural Research
GIS	Geographical Information System
GMP	Global Mountain Programme
GTOS	Global Terrestrial Observing System
IBSRAM	International Board for Soil Research and Management
ICARDA	International Center for Agricultural Research in the Dry Areas
ICIMOD	International Centre for Mountain Agriculture Development
ICLARM	International Center for Living Aquatic Resources Management
ICRAF	International Centre for Research in Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
IGBP	International Geosphere-Biosphere Programme
IIMI	International Irrigation Management Institute (now known as IWMI - International Water Management Institute)
IITA	International Institute of Tropical Agriculture

ILRI	International Livestock Research Institute
IRAD	Institute of Agricultural Research for Development
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
IVC	Inland Valley Consortium
NARS	National Agricultural Research Systems
NATP	National Agricultural Technology Project
NCAP	National Centre for Agricultural Economics and Policy Research
NRM	Natural Resource Management
OFWH	On-farm Water Husbandry
PCARRD	Philippine Council for Agricultural Research and Rural Development
R&D	Research and Development
RRB	Red River Basin (Vietnam)
RWC	Rice/Wheat Consortium
SPAAR	Special Programme for African Agricultural Research
STAP	Scientific Technical Advisory Panel
SWNM	Soil Water and Nutrient Management
TAC	CGIAR Technical Advisory Committee
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WANA	West Asia-North Africa Region
WARDA	West Africa Rice Development Association

SUMMARY AND RECOMMENDATIONS

The ecoregional approach is aimed at the sustainable improvement of agricultural productivity. It is conceptually holistic, combining human and technical dimensions and linking productivity and natural resource management (NRM) concerns.

The eight ecoregional programmes reviewed were: (i) Desert margins programme for sub-Saharan Africa (DMI); (ii) Programme for the warm humid and sub-humid tropics of sub-Saharan Africa (EPHTA); (iii) Programme for the humid and sub-humid tropics of Asia (Ecor(I)Asia); (iv) On-farm water husbandry programme for West Asia and North Africa (OFWH); (v) Programme for rice/wheat based cropping systems in the Indo-Gangetic plain (RWC); (vi) Programme for enhancing agricultural research effectiveness in Tropical America (CIAT's); (vii) Alternatives to slash and burn agriculture programme (ASB); and (viii) Sustainable mountain agricultural development programme - now Global mountain programme (GMP). About half the activities had commenced, or were in an advanced stage of planning, when the CGIAR initiated its ecoregional programmes. It is on these activities that the Panel's assessment is mainly based.

The Panel's most important conclusion is that the principles underlying the ecoregional approach are valid and of continuing high priority for pursuing the sustainable improvement of agricultural productivity.

This summary presents, firstly, an assessment of the performance of the programmes against the terms of reference of the review, then some other conclusions, and finally the Review Panel's proposals for the future.

Sustainable Improvement of Productivity

The longer-existing programmes have conducted very significant research in relation to the problems of tropical deforestation, of sustaining high food grain yields in Asia and of providing more sustainable management practices for endangered environments like the hillsides and mountains of Latin America.

Important new research has been done by programmes to characterize their regions and research sites. Another valuable achievement has been their publications, particularly of conference/workshop proceedings, annual reports, reports to donors and popular literature. Practical benefits have been gained from enhanced technology transfer and adaptation.

The Alternatives to Slash and Burn Programme has gone further than the others in relating its research sites to the whole area over which the problem occurs, and in scaling up to the global level its findings on the trade-offs between carbon sequestration and biodiversity on the one hand, and agricultural productivity on the other. This is very helpful for the global debate on sustainability issues.

But the full power of the holistic ecoregional approach to research, especially its human and policy dimension, has not been fully explored. The programmes judged to have come closest to the ideal are the Alternatives to Slash and Burn, the programme for enhancing agricultural research effectiveness in Tropical America being mainstreamed into CIAT's research agenda and the Rice-Wheat Consortium. In general, there is scope for greater investment in innovative strategic research on NRM.

The Panel found good evidence of effective NRM and productivity linkages in the research of several of the reviewed programmes, particularly at the applied level.

Outside the research in the eight ecoregional programmes, the work of the natural resource Centres (CIFOR, ICLARM and ICRAF) seems to embody ecoregional principles more completely than that of other CGIAR Centres. For example, CIFOR deals holistically with one of the world's most extensive natural resources, tropical forests, which are also a major source of environmental services, particularly water resources.

Value Added by the Programmes

The programmes have made excellent progress in developing partnerships with national agricultural research systems. There is considerable potential to build on this good foundation in the future. The facilitation units of collaborative research consortia have played a vital role in developing partnerships in several of the programmes.

The most successful ecoregional programmes have been the ones with a clear focus on a major problem, strong leadership at the top capable of articulating a vision of how a problem should be addressed, plus effective facilitation of collaboration at the research level.

The Review Panel was unable to obtain hard data on value added. Its collective judgement was that the cost effectiveness of implementation of the programmes has been increased significantly by the participation of a range of partners, which has brought with it complementary resources, capabilities and expertise.

Other Conclusions

A number of useful lessons can be learned from the experience of the first five years of implementing ecoregional programmes. Many of the deficiencies seem to have stemmed from the lack of a clear general understanding of the meaning of the ecoregional approach.

Despite this uncertainty, the principles of the ecoregional approach have taken a firm hold in the CGIAR community. This is extremely positive for the future.

The Future

The Panel's advice for the future is directed largely to NRM issues. The Panel strongly advocates continued implementation of ecoregional principles by the CGIAR, and offers suggestions and makes recommendations for updating the conceptual framework, without spending too much time on definitions, and for giving a more pragmatic problem/opportunity focus to the System's natural resources research.

A revised framework has been proposed for NRM research, organized around major problems or opportunities, using a holistic systems approach and measuring progress against specific output indicators. The framework should be applicable to all CGIAR research on the sustainable improvement of productivity.

The Panel recognizes that much further work is needed to develop the framework and to provide specific guidelines for its implementation. It recommends the commissioning of a multidisciplinary task force of experts to assist TAC in this purpose.

Other recommendations deal with: evaluating the performance of collaborative NRM research programmes through the CGIAR's external review processes; strengthening strategic research and social science research; addressing methodological issues of scaling within benchmark sites and of extrapolation from them; and conducting workshops for the regular exchange of information, experiences and lessons learned in collaborative NRM research.

The Panel believes that the greater part of the natural resources research in the System can be managed and supported at the Centre level in future. The traditional strength of the CGIAR has been in leadership and management at that level. Only in the few exceptional cases, where the research problem or opportunity is of major importance on a global or regional scale, should the CGIAR support a combined System effort. Special action will still be required in those cases to overcome the communication and funding problems identified by this Review

Three of the recommendations relate to operational matters and the remaining ten to what the CGIAR might do in future, especially in natural resource management (NRM) research.

Operational Matters

1: That future reviews of the non-ecoregional Systemwide Programmes examine the extent of their interaction with pertinent Ecoregional Systemwide Programmes.

2: That the CGIAR Secretariat, in consultation with TAC and Centre Directors, provides clear rules to Centres for accounting for all financial and other resources committed by Centres and their partners in collaborative programmes, and for the allocation of costs between co-ordination and R&D activities.

3: That financial estimates for selected Systemwide natural resource management activities be included as additional columns in the budget matrices of the CGIAR, as part of a co-ordinated approach to donors.

4: That the CGIAR reaffirms research on the sustainable improvement of productivity as being a high-priority activity, which should include providing leadership on selected aspects of research on major NRM problems.

5: That the CGIAR and its Members adopt a revised framework for NRM research comprising three elements: (a) research should be organized around major problems (or opportunities) of sustainable NRM that are of international relevance, (b) it should use holistic systems approaches that combine human and technical elements to address the problems on multiple scales, and (c) it should provide for its progress to be measured against specific performance indicators.

6: That the principles underlying the revised framework be applied by all CGIAR Centres involved in NRM research for the sustainable improvement of productivity.

7: The CGIAR's external review processes should explicitly focus in future on how well the revised approach has been mainstreamed into the work of Centres. System-level activities should be subject to special external reviews and in-depth 'sunset' reviews.

8: That TAC commission an expert task force to assist it in developing and implementing the revised conceptual framework for NRM research in the CGIAR.

9: That a special effort is required to strengthen collaboration with strong partners in strategic research on biophysical and social science and policy aspects of NRM. The frequently observed imbalance between biophysical and social science research must be redressed.

10: That, in relation to methodology, special attention should be given to harmonizing the inter-related issues of scaling within benchmark sites and of extrapolation from them. Robust techniques are needed that can be applied within the financial and human resource constraints of national systems, using minimum data sets.

11: That regular workshops should be arranged under the aegis of the Centre Directors' Committee for the exchange of information, experiences and lessons learned in NRM research, especially that conducted within collaborative research consortia. In addition, attention should be given to filling gaps amongst NARS partners in the special skills needed for conducting research on NRM.

12: That three criteria be adopted for the selection of programmes to be supported at the System level: (a) the problem (or opportunity) is of major importance in relation to CGIAR goals, (b) no single Centre has a natural advantage in terms of its mandate, and

(c) there is a high potential for efficiency gains from the combined efforts of two or more Centres.

13: If guidelines have not been fully developed in time, a preliminary selection of Programmes that merit continuation at the System level should be made by TAC in March 2000, when it reviews the Research Agenda for 2001.

CHAPTER 1 - BACKGROUND AND PROCESS

1.1 Introduction

This first Chapter gives a very brief background to the development of the ecoregional approach and the conduct of the Review. Chapter 2 summarizes the eight Systemwide Programmes with an ecoregional approach (henceforth referred to as ecoregional programmes) and outlines related CGIAR research. Chapter 3 presents the Panel's response to the terms of reference followed by its conclusions on some wider issues. The future of the ecoregional approach and of ecoregional programmes are dealt with in Chapter 4, but most of the chapter is a broader discussion of how one of the chief original aims of the ecoregional approach, strengthening NRM research in the CGIAR, might progress in future. Reports of field visits are given in Annexes III-V and contacts for additional information are given in Annex VIII.

1.2 Evolution of the Ecoregional Approach

1.2.1 Within the CGIAR System

The CGIAR faced a number of challenges during the 1980s. The Green Revolution was showing signs of having run its course and its limited impact on rainfed agriculture was becoming apparent, especially in Africa. There was growing concern, both inside and outside the System, about the long-term sustainability of agriculture. The concept of NARS being 'clients' of the CGIAR was out of date and it was accepted increasingly that they should be treated as full partners.

The CGIAR responded very positively to these challenges. TAC undertook a painstaking analysis of issues and options in consultation with stakeholders. As a result three changes came about: the System expanded to include ICLARM, ICRAF, IIMI and a new Centre which later became CIFOR; the ecoregional approach was adopted; and it was decided to seek collaboration and partnership with NARS.

The ecoregional approach was first presented to the Group in the report on "A Possible Expansion of the CGIAR" (TAC/CGIAR 1990). At International Centres' Week in 1990, the CGIAR endorsed the concept of ecoregional activities as a means of integrating resource management with productivity concerns, the "twin pillars of the CGIAR". The approach was subsequently elaborated upon in the paper "An Ecoregional Approach to Research in the CGIAR" (TAC/CGIAR 1991). In the summary of that paper a reference is made to "expanded research on resource management in the CGIAR" and "major threats to the sustainability of agriculture". In the text, three key principles for the organization of ecoregional research were identified: a systems approach, multidisciplinary teams and cooperation with other institutions.

TAC's writings on the ecoregional approach were reviewed by Gryseels and Kassam (IFPRI 1994). Their synthesis was that research may be characterized as ecoregional *if it* meets the following general criteria:

- conducts research on the technical and human dimensions of problems in the sustainable improvement of productivity;
- addresses landscape units in the agroecosystem of a priority agroecological zone;
- has effective and clearly identifiable partnership linkages with NARS and other research agencies of the region, and shows the complementarity of functions across the partners; and
- fosters close linkages with global strategic commodity/subject matter research activities.

TAC recognized that there were inherent advantages in organizing research on physical and biological aspects of conserving and managing natural resources, including biodiversity, along agroecological zones. Altogether six ecoregions with a high priority for the System were listed.[2]

There is now a significant amount of literature on the ecoregional approach. It consists of the reports of working groups (such as that of TAC and Centre Directors in 1992-93), conferences (organized by SPAAR and ISNAR, for example), CGIAR task forces (one specifically on ecoregional approaches), and additional strategic studies (TAC/CGIAR 1997a, note two such references in Annex IX). These deal mainly with explaining the concepts and the operational processes needed to put them into implementation. While Panel Members have read many of these documents, a complete review of the literature was beyond their scope. Some of the landmarks in the evolution of the ecoregional approach are listed in Annex VII.

Programme funding for Systemwide initiatives was first proposed to the CGIAR and endorsed at International Centres' Week in 1993. Subsequently, seven ecoregional programmes and a cross-ecoregional programme on alternatives to slash and burn agriculture were recommended for funding during 1994-1998. These eight programmes are the subject of this Review. About half of them were based on activities that already existed or were at an advanced stage of preparation before the CGIAR initiated the mechanism of Systemwide programmes.

A significant development in the framework for improving CGIAR-NARS linkages occurred in the course of 1995-1996 with the establishment of the Regional Fora of NARS and the Global Forum on Agricultural Research. Regional fora include the Asian-Pacific Association of Agricultural Research Institutions (APAARI), the Forum for

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[2] In sub-Saharan Africa for the semi-arid Tropics, and for the warm humid and sub-humid Tropics (including inland valleys); in West Asia-North Africa for the sub-Tropics with winter rainfall; in Asia for the warm arid and semi-arid Tropics and sub-Tropics, and for the warm sub-humid and humid Tropics, and in Latin America/Caribbean for the sub-humid and humid Tropics and sub-Tropics. In addition, one cross-ecoregional programme on alternatives for slash and burn was recommended. Because of the acute resource and poverty issues in mountainous regions, programmes there were justifiable if linked through an inter-regional mechanism.

Agricultural Research in Africa (FARA) with mechanisms for sub-regions such as the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA), the Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) and the Foro Regional de Investigacion y Desarollo Tecnologico Agropecuario (FORAGRO). Also, a greater recognition of the potential of regional mechanisms to facilitate and foster linkages with and among NARS developed within the donor community (EIARD 1996).

1.2.2 In other organizations

Several internationally-led activities have perspectives and methodological approaches worded similarly to the ecoregional approach of the CGIAR. These include aspects of the International Geosphere-Biosphere Programme; the Global Terrestrial Observing System, which is located at FAO; and the Man and Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization. However, none of these programmes seems to have attempted as holistic a coverage of the sustainable improvement of productivity or to have as strong a research orientation as the CGIAR's ecoregional approach. The opportunity was taken during the Review to ask about models of successful implementation of the ecoregional approach in agricultural/NRM research in industrialized countries. Very few examples came to light.

Few donors seem to have modified their funding procedures to support ecoregional research. The Netherlands, the Swiss Agency for Development and Cooperation (these two established the Ecoregional Trust Fund - ISNAR (1996)), the International Development Research Centre, Canada and the International Fund for Agricultural Development are among the major donors supporting ecoregional programmes. Others, such as the Department for International Development, United Kingdom, have taken a different approach and explicitly incorporated a natural-resource research strategy into their overall programme portfolio. The European Union (EC) supports research in NRM at various Centres and has promoted regional cooperation in Africa.

1.3 The Review Process

The complete Terms of Reference for the Review are given in Annex II and relevant sections are repeated in Chapter 3. The commissioning of this Review was foreshadowed in the report "CGIAR Priorities and Strategies for Resource Allocation During 1998-2000" (TAC/CGIAR 1997b). It highlighted the need to monitor the progress of the ecoregional programmes and to document the lessons emerging from that experience, in order for the System to have early warning of opportunities to improve the approach.

The process adopted in the Review was firstly, for the TAC Secretariat to carry out a desk study, secondly, for Panel members to visit selected programme activities and thirdly, for some Panel members to meet at ISNAR to draft the report. The writing was completed by the use of Email and the penultimate version was circulated widely for comment.

Before and during the Review, a number of people, in addition to those listed in the Annexes, were consulted in view of their knowledge of the ecoregional approach and of ecoregional initiatives/programmes. They included present and former Centre Directors General, Deputy Directors General and Directors of Research, members of current and recent External Programme and Management Reviews, senior managers of aid agencies and scientists in advanced research organizations. Some members of the Panel had access to the unreleased report by Dr. M.P. Collinson "A Study of Progress in the Ecoregional Initiatives: Emerging Issues and Future Directions". The help of all these people is gratefully acknowledged.

1.3.1 The desk study

The preparatory desk study (TAC Secretariat 1999) was carried out from September 1998 to February 1999 to gather relevant information and to provide an initial analysis of the state of each of the Systemwide Programmes with an ecoregional approach. A formal survey was conducted to ascertain stakeholders' opinions as to how well the Programmes had performed in conducting research on the technical and human dimensions of problems in sustainably improving agricultural productivity in ecoregions. Stakeholders were also asked for suggestions as to how the efficiency and effectiveness of the ecoregional approach could be improved. To facilitate the exchange of information with stakeholders during the Review, WebPages were posted at the TAC WebSite. Judging by the number of hits recorded, this innovation was well received.

The main conclusions of the desk study are listed in Annex VI. They were fully taken into account in conducting the main phase of the Review. In fact, the desk study identified nearly all the major issues that emerged later. Data from the survey have been quoted in pertinent sections of this report.

1.3.2 The main phase

The Panel did not visit all the ecoregional programmes. Those selected for the field visits were the longer-established ones, because they were expected to have gathered sufficient experience to allow the major issues in implementing the ecoregional approach to be identified. It was also decided that each major region should be represented.

- For Asia, the Rice-Wheat Consortium was visited in India by a Panel comprising Drs. G. T. Castillo, S. S. Johl and T. Henzell (see Annex III);
- For sub-Saharan Africa emphasis was placed on the humid forest site at Yaoundé, Cameroon (EPHTA, including IVC, and ASB). Briefings on the general operations of ASB and on AHI, as well as on other ecoregional activities of ICRAF and the ILRI were received during the visit to Nairobi. The Panel was comprised of Dr. T. Henzell and Dr. S.O. Keya; Dr. J. Lynam assisted the Panel in Nairobi (see Annex IV). A social scientist was engaged to join the Panel but had to withdraw at a late stage.
- For Latin America the Latin American Ecoregional Programme, hosted by the Centro Internacional de Agricultura Tropical (CIAT), CONDESAN and the Centro

Internacional de la Papa (CIP), was selected. The Review Panel was comprised of Dr. D. Byerlee and Dr. N. Mateo, together with Dr. E. Fereres of TAC (see Annex V).

Site visits were conducted between 19 April and 12 May 1999, and a group consisting of the Panel Chairman and Secretary, plus Drs. Byerlee, Mateo and Kuerschner, convened to draft the report at ISNAR, The Hague, from 4 to 11 June 1999. A draft was circulated for comments on 21st July 1999 and the report was completed during August.

CHAPTER 2 - IMPLEMENTATION OF THE ECOREGIONAL APPROACH IN THE CGIAR

2.1 The Ecoregional Programmes

This Chapter provides a brief overview of, and commentary on, the eight ecoregional programmes (see box), followed by information concerning other ecoregional research in the CGIAR. Those seeking additional details of the programmes are referred to Annexes III-V and to the list of contacts in Annex VIII.

List of Ecoregional Programmes

i. Desert margins programme for sub-Saharan Africa (DMI).
ii. Programme for the warm humid and sub-humid tropics of sub-Saharan Africa (EPHTA).
iii. Programme for the humid and sub-humid tropics of Asia (Ecor (I) Asia).
iv. On-farm water husbandry programme for West Asia and North Africa (OFWH).
v. Programme for rice/wheat based cropping systems in the Indo-Gangetic plain (RWC).
vi. Programme for enhancing agricultural research effectiveness in Tropical America (CIAT's).
vii. Alternatives to slash and burn agriculture programme (ASB).
viii. Sustainable mountain agricultural development programme - now Global Mountain Programme (GMP).

The Panel did not have the information needed to draw conclusions about progress in the research being conducted in the DMI, OFWH, ASB in South America and Ecor (I) Asia, apart from, publications from SysNet.

2.1.1 Overview of the eight programmes

2.1.1.1 Desert Margins Initiative (DMI)

In 1995, a two-and-a-half year planning process began for the DMI with a global workshop convened by ICRISAT. This was followed by sub-regional consultations in west, east and southern Africa. During 1998, the DMI became operational in six of the nine member countries (Burkina Faso, Mali, Niger, Kenya, Botswana and South Africa), though research is still in the early stages of development. The objective of the DMI Programme is to promote innovative and action-oriented dryland management research to arrest land degradation. The DMI operates as a research consortium overseen by an elected Steering Committee chaired by ICRISAT. The research coordinator is based with ICRISAT in Niger. Several international centres, including ILRI, are involved in the DMI.

Much of the initial investment in the DMI has been directed not to a priority research problem but to the documentation of existing transferable technologies and to the characterization of benchmark sites. Despite the publicity and international recognition given to desertification, it seems to have been difficult to find a major new problem

concerning NRM that could serve as a focus for implementing the ecoregional approach. Perhaps the developmental problems of these marginal lands are too complex for any approach focusing on NRM. Poverty reduction in marginal lands requires that attention be given to a variety of sources of income going beyond agriculture (TAC Secretariat, 1996).

2.1.1.2 Programme for the Warm Humid and sub-Humid Tropics of sub-Saharan Africa (EPHTA)

EPHTA is made up of three research consortia: humid forests, moist savannas and inland valleys. Details are given in Annex IV.

Humid Forest and Moist Savanna Consortia IITA convened the initial task force for this part of EPHTA. Several planning meetings, workshops and conferences were held during 1995 and 1996, culminating in the launching of the programme in 1996/97. Although EPHTA is structured as two consortia, its work is conducted mainly within six benchmark areas. The humid forest benchmark area of southern Cameroon also serves as the forest margins benchmark site for ASB. EPHTA aims to increase productivity and food security through the use of sustainable production and postharvest systems, while minimizing natural-resource degradation. It operates under the regional umbrella of the Conference des Responsables de Recherche Agricole de l'Afrique de l'Ouest et du Centre (CORAF).

The humid forest consortium has been strongly influenced by its close ties with ASB. Most of the research being done by the two consortia appears to have evolved from pre-existing NRM research by IITA and its NARS partners. Approximately half of the scientists in IITA's Resource and Crop Management Division work in the humid forest consortium. It is still early days for these consortia, but the practical application of existing information has been enhanced in the course of characterizing the benchmark areas. Commendable progress has been made at the humid forest benchmark area in developing research partnerships with national and CIRAD scientists, and a high degree of farmer participation has been achieved at the village level. New research includes studies of weed control. The chief deficiency of these two consortia appears to be that they have yet to explore the full scope of the ecoregional approach, especially the political, economic and institutional components of its human dimension.

Inland Valley Consortium (IVC) The term inland valleys refers to the upper reaches of river systems. With support from the Netherlands Directorate General for International Cooperation and the French Cooperation, IVC was launched in April 1994 for an initial period of five years, with WARDA as its host and convening Centre. The founding membership was made up of seven NARS and four international organizations. ILRI, FAO and three NARS joined at a later date. The second five-year phase was launched in April 1999; IWMI became an additional member and CORAF became co-chair of the Regional Steering Committee.

IVC seems to have been primarily a new venture, though it was influenced by some pre-existing research on inland-valley systems. Its major scientific achievement has been in characterization of the inland-valley ecoregion and key research sites. There are also examples of IVC National Coordinators providing influential policy advice to national policy-makers in West Africa. WARDA's membership brought with it excellent partnerships with countries in the region, and scientific support in areas such as Geographical Information System (GIS). The major limitation of the IVC as an ecoregional activity appears to be in its restricted coverage of the social sciences, other than economics, and of strategic aspects of NRM linked to productivity. These deficiencies are being addressed in the second phase.

2.1.1.3 Programme for the Humid and sub-Humid Tropics of Asia (Ecor (I) Asia)

The establishment of Ecor (I) Asia was an outcome of the adoption of Systemwide programmes by the CGIAR. A two-year planning process in 1995-96 developed a research and development (R&D) framework and identified pilot-study regions. Agricultural diversification and soil erosion were identified as its two major research themes; the agricultural diversification theme is coordinated by IRRI. Its main objectives are to develop sustainable NRM practices and methodologies for ecoregional land-use planning. A pilot site to address the first objective was established in the Red River Basin (RRB) of Vietnam in 1997. The Ecoregional Working Group, which functions as the Steering Committee for Ecor (I) Asia, is comprised of representatives from the International Board for Soil Research and Management (IBSRAM), seven NARS, other Centres and Advanced Research Organizations.

The soil-erosion theme has been implemented by IBSRAM and the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), through the management of a soil erosion consortium, one of four regional consortia established by the Soil, Water and Nutrient Management Systemwide (SWNM) Programme. The major achievements of Ecor (I) Asia to date have been the outputs from SysNet (three of its four pilot sites are in Ecor (I) Asia's ecoregion, the other is in RWC's ecoregion), and the bringing together of a wide diversity of interests in the RRB to conduct research using ecoregional principles. SysNet has already published several reports and its Land Use Planning and Analysis System will be introduced to the uplands of the RRB later this year. A highly participatory approach is being adopted in the identification of land-use and NRM problems. However, as the Panel was unable to obtain first-hand information from a visit, it was unable to assess the progress of research by Ecor (I) Asia, other than through the SysNet publications.

2.1.1.4 On-farm Water Husbandry (OFWH) Programme for West Asia and North Africa

The OFWH was one of the four ecoregional programmes, along with DMI, Ecor (I) Asia and EPHTA (but not IVC), that was developed after the CGIAR's decision to initiate Systemwide Programmes in 1994. Following an initial planning workshop in 1995,

of water use in agricultural production in dry areas, through optimal management of rainfall, fresh water and non-conventional water resources. Some project funds have been received during the past two years to carry out case studies in Egypt, Morocco, Iraq, Jordan and Pakistan in the areas of supplementary irrigation and water harvesting as well as remote sensing. This research is organized within the Centre's regular project portfolio under its Natural Resource Management Programme. Since this ecoregional programme was not selected for a site visit, the Panel expects that more insight will be obtained on its progress and the development of NRM research at ICARDA from the ongoing EPMR. ICARDA's mandate region is the same as one of TAC's six priority ecoregions.

2.1.1.5 Rice-Wheat Consortium (RWC)

The RWC was initiated in 1989 by an agreement between IRRI, CIMMYT and the NARS of India, Pakistan, Bangladesh and Nepal. It was formally accepted as an ecoregional programme for its second phase (1994-1998). At the time of the Panel visit (see Annex III), funding was still being sought for a third phase. The objective of the RWC's research is to sustain the productivity of the rice-wheat rotation on the Indo-Gangetic Plain. RWC's focus is on the four themes of tillage and crop establishment, integrated nutrient management, integrated water management and system ecology/integrated pest management. Crop improvement, socioeconomics and policy analysis are treated as overarching issues. Information is exchanged with China, where the same production system is also very important. RWC policy is set by a Regional Steering Committee which has a majority of NARS leaders and is chaired in rotation by a representative of one of the four countries. China has associate membership of the RWC. There are technical coordinating committees at regional and national levels, and informal committees at the research sites. RWC's facilitation unit is currently hosted by CIMMYT.

The RWC's major initial achievement, predating its ecoregional designation, was to alert participants to evidence of falling factor productivity. It has maintained this focus on sustainable productivity, achieved very effective collaborative research partnerships, and increased the participation of farmers and other beneficiaries. A recent success is the transfer of tillage technology. However, the full scope of the ecoregional approach still has to be exploited. This could be done, for example, by strengthening policy research and broadening its approach to include water and livestock research, and aspects of the social sciences other than straight economics. Collaboration among CGIAR Centres has grown slowly.

2.1.1.6 Programme for Enhancing Agricultural Research Effectiveness in Tropical America (CIAT's)

CIAT began to implement elements of the ecoregional approach while TAC was still refining the concept (TAC/CGIAR 1992, p. 295). New priorities were set for the Centre's mandate region based on environmental criteria, socioeconomic information (including rural poverty) and environmental degradation. As the core of CIAT's future resource-management programme, three agroecological zones were identified: savannas, seasonally wet hillsides and forest margins. These priorities have guided the Centre's

research ever since (Annex V). A Natural Resources Management Programme was created in 1991, but because of a funding crisis the intended scope of CIAT's NRM research had to be scaled down and the vision of transforming CIAT into an ecoregional research centre was not fully realized until about 1997. The ecoregional approach is now viewed as being at the core of the Centre's strategy. All CIAT's research projects, with the exception of crop improvement and associated genebank activities, have an ecoregional approach. There are very effective links between elements of NRM and productivity in CIAT's research on the savannas, and strategic research on soil organic matter within one of the SWNM Consortia. The human dimension features prominently in its work on hillside and forest margins, which are strong on social science research, particularly on participatory methods. Significant progress has also been made in GIS modelling, and in integrating the conservation of biodiversity into the Centre's work.

There is a perception, which needs to be corrected, that CIAT was 'punished' by the donor community during its transformation into an institution using the ecoregional approach. The Panel thinks that this is an oversimplification, and that there were deficiencies in selling the 'vision', in priority-setting (trying to do three agroecological zones at once), and in developing collaborative partnerships. While it may have been hard to find national partners for NRM research in LAC, except perhaps in Costa Rica and a few other LAC countries ("CGIAR Commitments in Latin America and the Caribbean", SDR/TAC:IAR/98/18 Rev. 1, 1999), there were other possibilities, including advanced research institutes in industrialized countries.

2.1.1.7 Alternatives to Slash and Burn (ASB) Programme

The first planning meeting for the ASB was held in 1991 and it was launched in 1992. Phase I was implemented in 1994-1995, Phase II in 1996-1998 and Phase III is set for 1999-2002. The objectives of ASB are to identify, evaluate, and where necessary modify and develop, land-use systems and technologies that lead to sustainable alternatives to slash-and-burn agriculture and to the reclamation of degraded lands. ASB is coordinated by ICRAF and is organized as a global consortium of nine Centres, 39 national institutes, 43 Non-governmental Organizations and 10 advanced research institutes. Research sites are located in eight countries in Latin America, Southeast Asia and sub-Saharan Africa. The three regional benchmark sites in Brazil, Indonesia (Sumatra) and Cameroon each have a hierarchy of steering committees. ASB's global coordination office is at ICRAF's headquarters in Nairobi.

Slash and burn agriculture, ASB's problem domain, is one of the major causes of tropical deforestation. From its beginning, ASB has satisfied all the criteria of ecoregional research (Section 1.2.1) except for that on addressing a priority agroecological zone. However, as its regional research activities have much in common with programmes based on the warm humid and sub-humid agroecological zones, it was accepted on that basis. The Panel's assessment of ASB's achievements is based mainly on information available from the Sumatran site and from the visit to Africa (Annex IV). The ASB sites in South America were not reviewed by the Panel.

ASB has carried out innovative field research, linking NRM with productivity concerns, and combining human and technical dimensions in a holistic way. The policy options which have been formulated to remove constraints to the adoption of alternatives to slash and burn, have allowed the Government of Indonesia to implement new forms of management for community forests. Although work in Cameroon is not as advanced, CIFOR has carried out important research in the country with strong policy implications on the causes of forest-cover change in the humid forest zone.

ASB has defined how representative its research locations in the humid forests of three continents are, and it has gone further than other programmes in scaling up its findings to the global level. This has been done to illustrate the trade-offs that exist between environmental parameters such as carbon sequestration (a means of reducing greenhouse gas emissions) and conservation of biodiversity on the one hand, and agricultural productivity indices such as profitability on the other.

2.1.1.8 Sustainable Mountain Agricultural Development Programme

This programme, later renamed the Global Mountain Programme (GMP), was created in 1997 to provide a focal point in the CGIAR for research in support of Chapter 13 of Agenda 21. TAC originally suggested the programme because none of the mountain programmes were of sufficient priority to merit the support of the CGIAR. The GMP intends to exchange information and experiences between the major mountain systems in Africa, Asia (Hindu Kush and Himalayas) and Latin America (High Andes). Meetings have taken place, but so far the exchange of information has been limited. The two CGIAR components are the AHI and CONDESAN; the International Centre for Mountain Agriculture Development (ICIMOD) is the third member. CIP is the convening Centre for the GMP.

African Highlands Initiative (AHI) AHI was proposed by NARS and Centres in 1992 in response to the need for new R&D approaches in Africa. Phase I ran from 1995 to 1997, followed by Phase II from 1998 to 2000. AHI's objective is to improve the nutritional security and income of the agricultural communities who inhabit the productive, but fragile, ecosystem of the densely populated and intensively cultivated highlands of East and Central Africa. At present, AHI operates as a consortium of five countries (for details, see Annex IV), nine CGIAR Centres, six universities, seven NGOs, four regional commodity networks, three regional and global research institutions and five district-level groups. While ICRAF provides technical support, ASARECA sets the regional and policy guidance for this ecoregional programme. The Regional Co-ordination Office, initially based at ICRAF, has recently been relocated to Kampala, Uganda.

Whereas Phase I was narrowly based on two research themes – integrated pest management, and tree and soil fertility – Phase II introduces new elements featuring livestock, water, biodiversity, greater sensitivity to clients' needs, the importance of linking NRM with improving productivity, the role of dissemination in development, as well as sociocultural and policy issues. It now accords much more closely with the

well as sociocultural and policy issues. It now accords much more closely with the criteria for ecoregional research, but still has a long way to go in exploiting the holistic potential of the ecoregional approach and in defining a major unifying problem or opportunity for NRM research.

Consortium for the Sustainable Development of the Andean Region (CONDESAN)
The origins of CONDESAN go back to 1992 when CIP, with support from IDRC, organized and promoted this initiative with partners from Bolivia, Colombia, Ecuador and Peru. The research agenda is at present composed of five themes: tools and methods for soil and water management; agrobiodiversity in Andean root, tuber and pasture species; improved farming systems for the Andes; policy research, including trade-off between productivity, profitability and environmental impact; and human-resources development and communications (InfoAndina). CONDESAN has its own Board of Directors and its coordinating unit is based at CIP.

CONDESAN's achievements have not only been in characterization of mountain ecosystems, but also in its research on Andean biodiversity and the utilisation of *mesas de concertación* (where political, research and other partners define R&D activities to be conducted at the watershed level). Its research generally meets the ecoregional criteria, but in common with most of the ecoregional programmes it has not fully used the considerable powers of the ecoregional approach. There is a deficit of policy research which tends to become more important when scaling-up from farm to watershed levels and beyond, and only limited strategic research on NRM technologies (Annex V). CONDESAN probably has a more diverse group of partners than any other consortium. This brings benefits in terms of complementarity of resources and expertise, but can create management and administrative difficulties.

2.1.2 Commentary

2.1.2.1 Organization

Of the eight ecoregional programmes, four are organized as research consortia with the strong involvement of NARS and other non-CGIAR agencies (ASB, EPHTA including IVC, RWC and the two CGIAR components of the GMP). In two other programmes which are at an earlier stage of development (Ecor (I) Asia and DMI), the chief activities to date are also conducted in a research network or consortium. The major distinguishing feature of collaborative research networks or consortia is that research is jointly planned and executed (Plucknett *et al.* 1990). CIAT's ecoregional programme is different as it has incorporated the ecoregional approach into the mainstream of its research agenda. The OFWH Programme of ICARDA also operates within the Centre's programme and project structure.

The distinguishing feature of all the consortia listed above is the presence of a central facilitating or coordinating unit; the four main functions of these units are:

- co-ordinating research and research-related activities by exchanging technical information and setting priorities for future research;

- providing training in elements of the ecoregional approach and standardization of methods;
- conducting research projects on the ecoregional approach, including characterization of ecoregions, working in consortia and participatory methods;
- providing supplementary funding (core funding in the case of ASB) to encourage collaborative research and related activities by the participating institutions.

The most successful ecoregional programmes are those which have a clear focus on a major problem, strong leadership capable of articulating a vision of how a problem should be addressed and able to effectively facilitate collaboration at the research level.

2.1.2.2. Choice of regions

The ecoregions listed as being of highest priority in 1992/93 (Chapter 1) were chosen by TAC using an analytical framework containing the following criteria: number of poor; increasing pressure of population; continuing dependence on agriculture; economic importance; rate of resource degradation; strength of national programmes; importance of particular commodities; and comparative advantage of the CGIAR. Cool tropical highlands had a lower priority index, but were included on other grounds.

However, in practice most ecoregional programmes have defined their problem/research domains by production systems (rice/wheat); vegetation zones (savannas of South America); topography (hillsides of Colombia and Central America); geographical position (inland valleys, desert margins); or even by the process of preparing forested land for cropping (slash and burn). While they have moved in the well-established direction of defining a problem that can act as a unifying theme for researchers and be attractive to funding organizations, they have also been very strongly influenced in most cases by the nature of the pre-existing Centre research from which they evolved. For this reason, it could be argued that TAC's original concept of ecoregions has never been given a fair trial. Moreover, some of the problems and regions of the existing ecoregional programmes appear to be quite narrow in terms of the CGIAR's goals of poverty alleviation and food security. Why they need to operate as Systemwide entities at all could be questioned.

2.1.2.3 Relation to other Systemwide Programmes

Chapter 7 of the document "CGIAR Priorities and Strategies for Resource Allocation During 1998-2000" (TAC/CGIAR 1997b) lists eight Systemwide Programmes in addition to those with an ecoregional approach. These are for:

- water management;
- agricultural research indicators;
- soil, water and nutrient management;
- integrated pest management;
- genetic resources;
- livestock research;

- property rights and collective action; and
- participatory research and gender analysis.

In general, these Systemwide Programmes were devised for a different purpose to that of the ecoregional programmes; they were undertaken to improve the efficiency and effectiveness of more specific aspects of research and research-related activities at the System level. Nevertheless, members of this group share many objectives with the ecoregional programmes.

Soil, water and nutrient management is a good example of a programme that has a high level of coincidence, as its subject is intrinsic to the NRM strengthening focus of the ecoregional approach. The same is true of the programmes on property rights and collective action, integrated pest management and particularly the *in situ* conservation of genetic resources, which cannot be separated from the ecoregional approach. ILRI, as a matter of policy, implements the Systemwide on Livestock Research Programme through existing ecoregional programmes. At the other end of the spectrum, the programme on agricultural research indicators is probably only marginally related to ecoregional activities through the evidence it provides of partner capacities.

An efficient use of scarce resources requires that maximum synergy be extracted from the common interests of the two kinds of Systemwide Programmes. Links appear to be excellent in a number of cases, for instance between the soil, water and nutrient management programme and CIAT's savanna research. ILRI's livestock programme cooperates very effectively with those of AHI, CIAT, CONDESAN and EPHTA, but not yet with RWC. Non-ecoregional programmes are being reviewed individually and that of the Systemwide Genetic Resources Programme has already been completed. It is highly desirable that future reviews should examine the effectiveness of the interaction of these two kinds of programmes. One indicator would be the extent to which field research sites are shared.

Recommendation 1: That future reviews of the non-ecoregional Systemwide Programmes examine the extent of their interaction with pertinent Ecoregional Systemwide Programmes.

2.2 Other Ecoregional Activities

One of the ways in which the CGIAR responded to the challenges of the 1980s (Section 1.2.1) was to expand to include three Centres with natural-resource mandates (CIFOR, ICRAF and ICLARM) and a fourth (IWMI) dealing with the very important natural resource of water. This part of the Report examines in a very preliminary way the role of the three 'natural-resource' Centres in implementing the ecoregional approach.

These Centres seem to embody ecoregional principles more completely than most other CGIAR Centres. CIFOR deals holistically with one of the world's most extensive natural resources, tropical forests, which are also a major source of environmental services,

particularly water resources. Several features of CIFOR's research are central to the ecoregional approach, notably the linking of its strong NRM research to that on forest production systems and the combination of the technical and human dimensions of problems. Emphasis is placed on policy and public management issues in relation to the future of tropical forests and social sciences, not just economics, play an important role in the Centre's work. The Centre is strong in innovative strategic research, for instance, in the conservation of biodiversity, for which tropical forests are of global importance. Since its foundation, CIFOR has worked in close partnership with national forestry agencies rather than setting up traditional regional laboratories.

All ICRAF's research is ecoregional in nature and much of it is conducted within ecoregional programmes. Research into productivity of trees on farms is always linked to NRM because of the role that trees play in stabilizing hillsides, in nutrient recycling and in catchment hydrology. In addition, ICRAF's policy is to link agroforestry research closely to that on crop and livestock production through such mechanisms as the use of foliage for soil improvement and stock feed. In collaboration with IFPRI, ICRAF has incorporated economic and social-science research to augment the human dimension of its work. Approximately 60% of the Centre's international professional research staff are outposted in regional programmes involving NARS.

While ICLARM's work on the enhancement of fish stocks and aquaculture is analogous to the commodity-improvement programmes of Centres that have been part of the CGIAR for much longer – ICLARM joined the CGIAR in 1992 – this Centre takes an NRM-based approach to all its research, particularly that which addresses coastal-zone management and coral-reef degradation. The idea of an ecoregional programme on coastal-zone management was mooted because of the link to work on terrestrial sources of water pollution. However, this research is being managed within the Centre's agenda.

In addition to the work of the above-named Centres and the ecoregional programmes, the influence of ecoregional thinking can be detected in NRM research elsewhere in the CGIAR, even if the other dimensions of the approach are missing or weakly developed. Several Centres, including ICARDA, ICRISAT and IITA, have a mandate to address issues of sustainable production in a particular ecoregion. It was not possible for the Review Panel to assess and report on other research being carried out within the CGIAR which reflects ecoregional thinking.

CHAPTER 3 - RESPONSE TO TERMS OF REFERENCE AND OTHER CONCLUSIONS

3.1 Response to Terms of Reference

In the process of developing its formal response, the Panel went beyond the strict guidelines of the Terms of Reference, to explore broader issues which are mostly reflected in Section 3.2 and Chapter 4. The Panel also highlights the particular difficulties it encountered in addressing the second term of reference (Systemwide vs. Centre-based) given the nature of the value added so far by the ecoregional programmes and the lack of hard data.

3.1.1 Response to Terms of Reference 1

> *How the Programme performed in addressing the objective of sustainable improvement of productivity, especially how well the ecoregional approach had performed in linking strategic and applied research on natural resource conservation and management with that on production systems, including location-specific aspects of global commodity/subject matter research activities.*

3.1.1.1 Sustainable improvement of productivity

As might be expected, the activities that were already using the ecoregional approach to at least some degree, when the CGIAR decided at ICW'93 to initiate ecoregional programmes – ASB, CONDESAN, RWC and CIAT – have more research to show than those initiated from 1994 onwards. It seems to have taken two or three years to establish new research in every case. Very significant ecoregional research has been carried out since 1994 by CIAT and ASB (notably in Indonesia). RWC has continued its valuable work on declining factor productivity in high-yielding rice-wheat systems, with additional research on tillage and weed control. The humid forest consortium of EPHTA has also studied weed control. CONDESAN's development of *mesas de concertación* for collaborative R&D at the watershed level should also be mentioned.

Much of the new research has been on the characterization of regions and sites. Significant examples include all three consortia of EPHTA, with IVC leading the way, and the SysNet project of Ecor (I) Asia. The Ecoregional Fund to Support Methodological Initiatives has played a praiseworthy part in fostering such research. Without this fund there is no doubt that much less ecoregional research would have been carried out. The ASB has gone further than the others in relating its research sites to its whole problem domain and in scaling up to the global level its findings on the trade-offs between carbon sequestration and biodiversity on the one hand, and agricultural productivity on the other. Less tangible achievements of the ecoregional programmes include their influence on research priorities and practices outside the CGIAR. In some

cases, practical benefits have been gained from enhanced technology transfer and adaptation.

Another of the achievements of ecoregional programmes has been their publications (Table 3.1), particularly: conference/workshop proceedings, annual reports, reports to donors and public information material. In several cases (e.g. CIAT, Ecor (I) Asia), it proved difficult to separate programme publications from the rest of the Centre's output. Also, with the exception of ASB and CIAT, it was difficult to judge the adequacy of contributions to peer-reviewed journals.

A key question is the extent to which the potential of the holistic ecoregional approach has been explored by the ecoregional programmes. Particular interest attached to work that has been initiated or planned during the five years since they were first established. In fact, it is hard to find any case yet where the whole approach has been followed systematically, that is, an NRM problem of high importance for the sustainability of developing-country agriculture in a priority ecoregion, has been defined, analysed for all its researchable problems/opportunities in both the human and technical (biophysical) dimensions, and which has led to the design of significant new research. The ASB and CIAT's programmes, in their formative stages, probably came closer to the ideal than some of the more recent ones and the RWC has always focused on the sustainable improvement of productivity.

More commonly, what has happened is that a Centre's existing NRM activities have been broadened to include some features of the ecoregional approach, with much of the new research to date being on site and regional characterization, and only to a limited extent in the human (particularly policy) dimension. Clearly, the need identified during the 1980s to strengthen research on NRM and agricultural sustainability, to complement the System's strengths in commodity improvement research, has been met incompletely. Lack of clarity in the meaning of the ecoregional approach (Section 3.2.1), and shortage of funds, provide only partial explanations in the Panel's opinion. The case for new NRM research, in the context of the sustainable improvement of productivity, has yet to be presented as effectively as it could be.

There appear to be few precedents in industrialized countries of agricultural/NRM research programmes that have attempted as broad holistic coverage as the CGIAR's ecoregional approach (Chapter 1). The Panel sees it as highly commendable that the CGIAR seeks global leadership in this field. Certainly the need for efficient use of agricultural research resources is more urgent in developing countries than in more affluent industrialized ones. But it is a very ambitious undertaking and this needs to be kept in mind.

Table 3.1: Publications and Documentation produced by the Ecoregional Programmes*

Programme	Consortia Publications, Annual Reports	Popular Brochures, Awareness Material, Newsletters	Workshops, Regional Consultations	International Scientific Conferences, Books	Journal Papers, Peer Reviewed**	Technical Publications, Conf. Papers, Book Chapt., Software	Internet WebSite	Reports to Donors, P&E Documents, Other Papers	Total No. of Publications
Desert Margins Initiative (DMI)	1	1	5	-	-	2	1	6	16
Ecoregional Progr. for the humid and sub-humid trop. of SSA (EPHTA)									
• Inland Valley Consortium (IVC)	3	5	8	1	6	31	-	7	61
• Moist Savanna & Humid Forest Consortia	2	3	3	-	-	2	1	7	18
Ecoregional Progr. for the Humid and Sub-Humid Trop.in Asia(Ecor(I)Asi a)	3	5	19	2	4	19	1	12	65
On-Farm Water Husbandry Progr. in WANA (OFWH/ ICARDA)	**25**	**2**	**7**	**4**	**2**	-	**1**	-	**41**
Programme for Rice-Wheat based cropping systems in the Indo-Gangetic Plains (RWC)	5	3	2	-	-	21	2	6	39
Ecoregional Programme for Tropical Latin America (CIAT)***	2	1	12	5	12	29	4	4	69
Alternatives to Slash and Burn Agriculture Programme (ASB)	12	4	8	3	53	45	2	17	144
Global Mountain Programme (GMP)	-	-	-	-	-	-	1	1	2
• CONDESAN	2	5	2	1	2	46	2	40	100
• African Highlands Initiative (AHI)	2	2	2	-	-	8	1	5	20
Totals	57	31	8	16	79	203	16	105	575

* Based on publications and/or list of publications provided by programmes, complemented by information obtained from the Websites of Centers

** List of peer reviewed papers was established from records provided and may be incomplete; in several cases it was difficult to identify and separate peer reviewed papers from the list of technical reports listed (e.g. RWC, IVC)

3.1.1.2 Linking research on natural resource conservation and management with that on production systems

The Panel found good evidence of effective NRM and productivity linkages in several of the reviewed programmes, particularly at the applied level. Some examples are the integrated work of ASB in Sumatra, CIAT's savanna programme, CONDESAN's research on fragile watersheds, the tillage and weed control activities of RWC in Asia, and the rice production and water management research of IVC. The Panel's findings also indicate that commodity research has provided useful inputs to the ecoregional programmes. However, it is much harder to find evidence that the ecoregional programmes have exerted any significant influence on the global commodity improvement programmes. There is strong potential to change this, one means being the wider application of GIS tools to commodity research in order to sharpen the focus of germplasm-enhancement activities. There are also exceptions to the general criticism, e.g. CIMMYT's wheat-improvement programme has responded to some of the lessons learned in the RWC.

While ecoregional programmes have been hardly more than add-ons for several Centres, and so have had little influence on the rest of their research, this may not be an accurate indication of what has occurred more generally with the CGIAR's NRM-productivity linkages. Experienced observers believe that the integration of NRM concerns with productivity has advanced significantly at the Centre level in recent years. But only a third of survey respondents said that they included ecoregional criteria in planning their own programmes.

3.1.2 Response to Terms of Reference 2

> *Evaluate, using the following seven criteria, how the value added by making the activities Systemwide, rather than leaving them as a series of Centre-based components, outweighed the additional transaction and management costs.*

The seven criteria are used as headings under which the Panel's findings are presented.

3.1.2.1 The degree of effectiveness of collaboration among Centres, and between them and their partners (linking, openness, involvement with NARS and other research partners)

One very positive outcome has been the excellent progress made by the consortia in developing synergies mainly with NARS but also with NGOs, Advanced Research Organizations and regional organizations. The Panel considers this to have been a major achievement, fully in line with the vision articulated at Lucerne and in the Declaration of Global Partnership in Agricultural Research in 1996, and with considerable future potential for the CGIAR generally. However, interaction has been much more limited with the private sector and national agencies dealing with environment, water, forest and land issues.

The Panel was especially sensitive to the harmonization of the roles of the CGIAR Centres and NARS. In general, NARS have been closely involved from the beginning and in some cases, their sense of ownership of the activity is already high. Experience to date strongly highlights that a high level of commitment and leadership from both Centres and NARS is a necessary ingredient for success. Generally, the disjointed, even competitive approach of Centres in their dealings with NARS, which was identified as a weakness of the CGIAR a decade ago, seems to have been fixed.

Despite the good progress that has been made in collaborating with NARS, in some cases there have been difficulties in resolving technical roles and responsibilities and in allocating funds. These difficulties have also frustrated inter-Centre cooperation at times. The issue warrants further attention (Section 4.3.2).

The ecoregional programmes have helped to strengthen NARS through such important activities as the standardization of methodologies (e.g. ASB's soil analyses) and the provision of new scientific and technological information (EPHTA's short course on integrated weed management; RWC's technology transfer with tillage machinery). At various places in this report, attention is drawn to instances where more should be done in: understanding the importance of natural-resource degradation (below); devising robust techniques for scaling and extrapolation using minimum data sets (Recommendation 10); and developing the special skills needed to conduct research on NRM (Recommendation 11).

Ecoregional programmes have a less satisfactory record of achievement in promoting collaboration among Centres. Even in the more successful programmes such as those of ASB, RWC and CIAT, there have been frustrations in reaching agreement on the allocation of research responsibilities among Centres. There are still too many examples of Centres doing pertinent research in the same region as an ecoregional programme without formally collaborating. The allocation of international funds to participants in collaborative research consortia is always a sensitive issue.

As mentioned in the previous chapter, the facilitation units of consortia have played a vital role in developing partnerships in several of the programmes. They represent the culmination of the CGIAR's long experience in developing networks for collaborative research. The key functions performed by the facilitators, and the exceptional personal qualities needed to do this very demanding job well, deserve to be better understood and supported by the System.

3.1.2.2 Cost-effectiveness/value-added of the implementation option

The Review Panel was unable to address this part of the Terms of Reference satisfactorily due to the lack of hard data on both costs and benefits. In most ecoregional programmes, the chosen implementation option has been the collaborative research consortium. Consortia should be judged mainly on the value that their facilitation units have added to the research and related activities being carried out on a continuing basis by the

participating organizations. However, it is hard to find objective indicators for value added by developing new relationships with and among national systems, harmonizing Centre activities or the use of farmer and community oriented participatory methods to help identify problems, opportunities, priorities and so on.

The Panel's collective judgement is that the cost effectiveness of implementation has been increased significantly by the participation of other CGIAR Centres and outside partners as it has brought with it complementary resources, capabilities and expertise. This is particularly true when the R&D continuum moves up to more complex scales, e.g., from the plot and farm levels to the watershed or the region. Often a small CGIAR investment in given consortia can be multiplied several fold (four to ten times according to some of the people interviewed) by the contribution and participation of outside partners with complementary skills. One mechanism that has proved effective in achieving this is the use of small competitive grants to fund R&D activities on agreed priorities. The Panel supports the wider use of this model.

Centres have expressed concern about the high transaction costs of collaborative research consortia, particularly in the establishment phase, and the Panel is sure that the costs to national agencies have also been substantial. Several donors have questioned the levels of funding being sought for the ongoing operation of the facilitation units in research consortia. It should be possible to establish financial benchmarks for the efficient operation of facilitation units, and to quantify the total amount of research being conducted under the aegis of a collaborative consortium. Guidelines are needed to distinguish consistently between the costs of coordination and those of various R&D activities. Lack of such information precludes the estimation of transaction costs and full costing of programmes.

Recommendation 2: That the CGIAR Secretariat, in consultation with TAC and Centre Directors, provides clear rules to Centres for accounting for all financial and other resources committed by Centres and their partners in collaborative programmes, and for the allocation of costs between coordination and R&D activities.

The issue of 'ownership' also requires careful consideration. By definition a consortium belongs to all partners, independently of the level of their contribution and participation There is a strong feeling among the Panel members that clarification of the evolving role of Centres in established ecoregional consortia is now in order. This need was identified in earlier external reviews of AHI and CONDESAN and it still exists. It does not mean that Centres should no longer host facilitation units.

3.1.2.3 The participation of potential beneficiaries and other stakeholders in the definition of the research problems and priorities

Participatory approaches and gender sensitivity fit well with the requirements of the ecoregional approach. The Review Panel found good evidence that the tools and mechanisms to enable potential beneficiaries to take part in the definition of research

opportunities and priorities have been used in most cases. Relevant examples include Local Agricultural Research Committees (CIALS) at CIAT, and the active participation of district stakeholders in the AHI in eastern Africa. However, strong cultural barriers sometimes impede the involvement of particular classes of society in decision making.

3.1.2.4 Clarity in communicating the importance of the research to the CGIAR members and other actors

There have been major problems in communicating to the CGIAR and other stakeholders the nature of the research being done by ecoregional programmes. It is doubtful that much of the literature listed in Table 3.1 has been seen by key decision-makers in the CGIAR. The role of central facilitation units, as distinct from the research that the Centres do under the aegis of the consortia in which they participate, is rarely publicized by host Centres in their Annual Reports or other material seen by most members of the CGIAR. Apart from a conference organized by the Centre Directors at ISNAR in 1996, there has been no venue at which the central facilitation units could exchange and record their experiences.[3] Neither has there been a direct channel of communication between the ecoregional programmes, TAC and the CGIAR Secretariat, other than through funding requests.

3.1.2.5 Continuity of funding support

Funding has been a problem for all the established ecoregional programmes, even the most successful ones. Expectations of access to 'new' money were high in Centres and even higher outside the CGIAR, but increased long-term support has not materialized. The current piecemeal and opportunistic approach to programme funding leads to fragmentation of the research effort and the lack of a long-term strategic focus. It has been particularly difficult to obtain continuing support for the facilitation units, for which short-term project funding is not very suitable. These should be funded from core resources to provide long-term stability.

The Panel argues in Chapter 4 that the greater part of the NRM research in the System can be managed at the Centre level. It recommends that the System be very selective in future in its choice of NRM activities to be funded at System level, and more proactive in requesting funding from donors for those activities. Their funding requirements should be identified separately during the CGIAR financing process.

Recommendation 3: That financial estimates for selected Systemwide natural resource management activities be included as additional columns in the budget matrices of the CGIAR, as part of a co-ordinated approach to donors.

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3 However, both ASB and CIAT have documented aspects of their experiences with the ecoregional approach, and the USAID Africa link project has improved communicatin among ecoregional programmes in Africa.

3.1.2.6 Ease of accountability

Accountability, meaning transparency in the cost of coordination by the lead Centre and resources committed by all partners, has already been dealt with in 3.1.2.2. With regard to accountability in the narrower sense of correct use of money, financial control and auditing do not seem to have been a problem for the ecoregional consortia hosted by Centres. Experienced managers in the Centres have stressed the importance of allocating any supplementary research grants through a transparent competitive process in order to avoid conflicts of interest. Accountability, in the broader sense of monitoring and evaluation of performance, is addressed in the next section.

3.1.2.7 The standards of planning, monitoring and evaluation

Generally, planning has been very competent. Research consortia that have a two-level structure with a regional policy committee dominated by national leaders and supported by a technical committee, on which scientists from Centres and advanced research institutes are strongly represented, appear to have worked well in policy making and planning. However, there have been tensions because, in general, NARS do not see the longer-term, less-obvious forms of natural-resource degradation as being of as high a priority as the CGIAR does. The Panel suggests that the evidence for the CGIAR view needs to be presented better.

In contrast to the planning situation, the standards of monitoring and evaluation in the ecoregional programmes often leave a good deal to be desired. Briefly, most programmes spend considerable resources and time in characterization and planning, less in monitoring and practically none in evaluation. So they neglect the possibilities of saving money on investigations that are clearly going nowhere and of improving efficiency by learning from case studies of success and failure. Nor have there been *ex ante* assessments of the likely costs and benefits of expected R&D investments, although this work is planned in one or two Centres. Amongst the things that should be evaluated better in future is the contribution by programmes to peer-reviewed scientific literature.

The desk study found that few EPMRs carried out over the past 4-5 years have examined ecoregional programmes in any detail. Reviewing has been left largely to the agencies that have helped to fund the research, such as the Asian Development Bank, the Global Environment Facility and IDRC. The Panel returns to the issue of monitoring and reviewing in Section 4.2.

3.2 Other Conclusions

3.2.1 Misunderstanding of the Ecoregional Approach

A number of useful lessons can be learned from the experience of the first five years of implementing ecoregional programmes. Many of the deficiencies seem to have stemmed from the lack of a clear general understanding of the meaning of the ecoregional

approach. Approximately three-quarters of those who responded to the survey recorded a lack of clarity in the approach, even for those involved in programmes. Some people had not understood, or had forgotten, or had mixed up with other things, the fact that research on NRM was a central component of the approach (Section 1.2). The simultaneous pursuit of the two objectives of sustainability and improved partnership and collaboration with NARS probably confused the concepts. Inclusion of *sustainability* in the wording did not help, as that term has accumulated its own philosophy, and the CGIAR is really interested only in forestalling agricultural unsustainability. Other reasons that can be suggested for the misunderstanding are given below.

3.2.1.1 Means confused with ends

Firstly, there has been some confusion between means and ends. Research on an NRM problem requires a definition of its spatial occurrence. So, for some people the characterisation of regions became an end itself rather than a necessary step in addressing the NRM problem. Similarly, the fact that there are very complex interactions in NRM, which require a system perspective for their effective study, led some to think that the system approach (often with a heavy emphasis on computer-based modelling) was the primary purpose of the ecoregional approach. Again, the human dimension of NRM, with landholders, and various community and government institutions exerting a strong influence over any changes in NRM practices, requires the participation of a much wider range of stakeholders than say the introduction of a new cultivar/breed or macro food policy. Hence, participatory methods became the essence of the ecoregional approach for a group of people.

3.2.1.2 Other agendas attached

From 1994 onwards, as the CGIAR developed new agendas on such things as participatory approaches in research and sensitivity to the role of women in agriculture, their implementation tended to be attached to the ecoregional approach. Use of 'eco' in front of regional may also have been a source of confusion, especially among donor constituencies. 'Eco' is used by special interest groups in a variety of value-laden arguments (often anti-industrial) that have little to do with strengthening NRM in pursuit of the CGIAR's goals.

The designation of Programmes as Systemwide was itself confusing. Some people expected all Centres to participate in Systemwide Programmes and the role of research partners outside the CGIAR was unclear. The Panel prefers the term *System level,* specifying exactly what functions are being performed at that level (e.g. presentation at Mid-Term Meetings and International Centres' Weeks, identification in the System's budget matrices and in deliberations of the Finance Committee).

3.2.1.3 NRM priorities not specified in detail

The Panel ascribes particular importance to the fact that priorities for carrying out NRM research using the ecoregional approach were never specified in detail. The Panel was

told that the possibility of assigning NRM mandates to avoid problems of fragmentation and duplication was discussed at a CGIAR meeting in 1991, but never followed through. The subsequent creation of many of the other set of Systemwide Programmes (Section 2.1.2.3) can be interpreted as an attempt by Centres and donors to fill the gap left by the absence of precisely-defined, researchable NRM priorities. Recommendation 8 in the next chapter addresses this issue.

There were other problems in communicating the nature of the ecoregional approach. The fact that NRM research, particularly its application, required links to a much wider range of activities than the CGIAR had been involved in before, led some observers to assume wrongly that the CGIAR was entering into new areas such as extension and development. Even one or two Centres misinterpreted the ecoregional approach as a rebalancing towards applied research. It is true that the ecoregional approach involves an R&D continuum from strategic research to applied and adaptive research, and developmental activities. But the Panel found no evidence of an intended change in the role of Centres versus that of others, or as it is often expressed in the CGIAR, of the 4% versus the 96%. The Centres' niche (competitive position) within the R&D continuum remains mostly in strategic, public-goods research with very selective incursions into applied and adaptive work (Annex V). This is especially important in view of the rapid growth of alternative sources of R&D supply, particularly from the private sector, and particularly in Latin America.

3.2.2 Consequences

Perhaps the most important consequence of this lack of clarity was that the opportunity was not fully taken to mobilize support for new research on major agricultural sustainability issues likely to impact on the achievement of CGIAR goals. A number of donors commented that proposals for ecoregional initiatives were often unconvincing as to the importance and researchability of the problem, and if the research were successful, the potential impact on sustainability and poverty alleviation.

NRM research is open to a wide range of interpretations, ranging from agronomic studies of the kind that have always been part of commodity improvement programmes, to research on those forms of natural resource degradation that pose the greatest threats to the sustainability of agriculture. Again, the full disciplinary diversity of the ecoregional approach, from biophysical research on natural resources through to social science research on human factors important in implementing improved management practices, is applicable in NRM research. The lack of precisely-defined, researchable NRM priorities led to a diffusion of effort in the ecoregional programmes.

3.2.3 Strong Support for the Principles

Despite this, the almost unanimous view of those consulted during this Review is that the broad principles embodied in the ecoregional approach should continue to be applied. These principles have taken a firm hold in the CGIAR community. This is extremely positive and the Panel strongly supports the continued implementation of the ecoregional

principles, even though it is a very ambitious undertaking. Recommendations for updating the conceptual framework, without spending too much time on definitions, and for giving a more pragmatic problem/opportunity focus to the System's NRM research, are presented in the next chapter.

CHAPTER 4 - FUTURE OF THE ECOREGIONAL APPROACH AND ECOREGIONAL PROGRAMMES

4.1 Sustainable Improvement of Productivity as a System Priority

In the Panel's view the principles underlying the ecoregional approach, as initially formulated by TAC, are still valid and sustainable improvement of productivity should be reaffirmed as a System priority. Those words 'sustainable improvement of productivity' encapsulate three related objectives (i) better management of natural resources, (ii) safeguarding the sustainability of agriculture, and (iii) linking the twin pillars of the CGIAR – research on NRM and research on productivity – in order to exploit their complementarities. They also recognize that because of continued population and economic growth, agricultural productivity will need to be increased not just sustained.

The TAC documents examined by the Panel do not contain much of the rationale for links between NRM research and productivity research. One reason, significant in 1990, was that a change was being sought in the way commodity and regional Centres operated in order to broaden the objectives of their production research in line with current thinking on sustainability. Also, there is a reference in an unpublished TAC paper to integration of all aspects of sustainability at the national level being the pre-requisite for attaining sustainability. The Panel believes strongly in the importance of the potential complementarity of NRM and productivity research, for instance through changes in production practices to prevent natural resources from being degraded in the first place, and through the conservation and use of biodiversity.

NRM and productivity research have already been linked successfully in the natural-resource Centres, CIAT and more recently in IITA. Effective linkages also exist in some other cases, especially at the applied research level (Section 3.1.1.2). The System is in the process of adopting a logframe approach that explicitly joins production and NRM in its statements of purposes and outputs. In addition, Centre Directors are currently looking at the role of integrated NRM in the CGIAR. These measures should be sufficient to ensure that the "twin pillars" are well linked in future, especially if the System's external review processes regularly monitor the effectiveness of use of the logframe.

Therefore, the Panel's advice in the rest of this Chapter is directed largely to NRM issues. As already stated in Chapter 3, the need identified during the 1980s to strengthen research on NRM and agricultural sustainability, to complement the System's strengths in commodity improvement research, has been only partly met so far. Even those Centres with a traditionally strong commodity approach would benefit from an increased NRM effort based on the principles of the ecoregional approach.

The Panel believes that better management of natural resources – soil, water, forests, aquatic resources, biodiversity – is critical if the CGIAR's objectives of poverty alleviation, food security and environmental conservation are to be achieved. Major food

production systems in the developing world face multiple threats from the degradation of the natural-resource base by the continuing expansion of agriculture into marginal lands, the breakdown of traditional management systems due to population growth, and from high levels of intensification that degrade land and water and pollute the environment. Many of these problems affect large areas and transcend political boundaries. Failure to address these pressing NRM issues is undermining the CGIAR's efforts to alleviate poverty and sharply reducing the payoff from the CGIAR's investment in traditional areas of plant and animal improvement. While resources from a variety of research organizations must be mobilized to confront these problems, the Panel believes that NRM research should be a high priority for the System.

Recommendation 4: That the CGIAR reaffirms research on the sustainable improvement of productivity as being a high-priority activity, which should include providing leadership on selected aspects of research on major NRM problems.

The Systemwide ecoregional initiatives were launched largely as an effort to focus CGIAR attention on NRM issues. As noted in previous sections, this research has made important contributions but has failed to fully exploit the power of the new approach. Major Centre activities remain focused on productivity enhancement through commodity research and some Centres are still not structured effectively for integrated NRM research. The Panel believes that a considerable part of the problem is a flawed conceptual framework for organizing and prioritizing the ecoregional approach and lack of clarity in communicating a vision for NRM research to donors, NARS and other major stakeholders. This section provides broad elements of a conceptual framework using revised terminology, which the Panel believes would help guide System support to NRM. It is followed by specific recommendations on implementing the framework.

4.2 Towards a Revised Conceptual Framework for NRM Research

As stressed a number of times in this report, there is much confusion within the CGIAR and among partners on the definition of NRM research with an ecoregional approach. It is, therefore, imperative that the System provides and communicates a clear strategy for organizing its research on NRM. The Panel proposes a definition that departs from problem identification and which considers the characteristics of the research approach used to solve the problem as well as indicators of its success.

CGIAR research on NRM should be organized around major problems (or opportunities) of NRM that are of both national and international relevance (important across a broad region within a continent and/or across continents). These problems or opportunities may be defined primarily from the perspective of preservation of natural resources, such as saving natural forests, or primarily from the perspective of food security, such as lack of sustainability of current food-production systems. However, most problems will include elements of both perspectives with important inter-relationships (e.g., sustainable agricultural intensification on land other than natural forests to allow these to be preserved).

Prioritization of NRM problems within the CGIAR should follow the general criteria outlined for CGIAR activities: (i) the importance of the problem in terms of food security, poverty alleviation and the environment, (ii) the likelihood, taking into account NARS capacities, that investment in strategic research over the long term will produce solutions to the problem, (iii) the potential to produce international public goods with wide spillovers across national boundaries, and (iv) the potential for applied R&D activities to have tangible impacts in the short to medium term.

To set priorities requires defining boundaries for the identified problems (i.e., the 'problem domain'). For the CGIAR, the major challenge is to map the geographical boundaries of the occurrence and severity of the problem, perhaps including a time dimension as well. Each problem domain may consist of one or more research domains, depending on whether the same research programme is relevant to the whole or part of the problem domain. Characterization of the research domain, in terms of biophysical, socioeconomic, market and political variables, is essential to understand the problem, design and execute the research and extrapolate results valid for similar situations. The Panel recognizes that the research domain may be defined in a number of ways, both bottom up and top down, and include references to the underlying agroecological zones, but the essential point is that the research domain must be problem-driven.

This contrasts with the TAC definition of six major ecoregions based on agroecological and economic criteria, without defining their major NRM problems *a priori* (TAC/CGIAR 1992). The Panel believes that concentrating on major problems or opportunities provides a better focus for collaborative research and accords more closely with scientific practice. Ecoregional programmes that have been most successful to date (Section 3.1.1.1) are identified with problems which are relatively amenable to geographical mapping.[4]

While pursuing NRM problems/opportunities is the primary purpose, and the means of achieving that purpose (end) should not be confused with it, the CGIAR should always aspire to best practice. Therefore, the Panel further suggests that the CGIAR's work in NRM combine five characteristics essential to solving the identified problems.

1. The human element in several dimensions (social, economic, political and institutional) together with technical elements are integrated in solving the problem. Solutions may include both technical and policy interventions broadly related to the rural economy (food crops, cash crops, livestock, fish, forests and non-farm economic activities).

2. Holistic systems thinking and methods are used to understand and solve the problem.

3. The problem is addressed at multiple scales, from plot to field to watershed to higher levels of aggregation, as needed, to consider both on-farm and off-site impacts.

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4 However, TAC's ecoregions may still have advantages for priority setting. Indeed, they were first delineated during the review of priorities and strategies completed in 1992/93.

4. The definition and solution of the problem uses participatory approaches that involve users and other stakeholders (especially NARS) at all stages from problem identification to research evaluation.

5. The research will be formulated, managed and executed by a multidisciplinary team approach, which is often only achievable through a multi-institutional partnership, to ensure that the full range of skills needed to solve complex problems in NRM are mobilized.

Any distinction between the proposed approach and the original intentions of the ecoregional approach is mostly a question of degree. The proposed approach explicitly includes attention to off-site impacts at higher scale levels, takes a long-term perspective, and gives greater weight to the human dimension in both diagnosing and solving problems. It has much in common with the TAC study on Priorities and Strategies for Soil and Water Aspects of Natural Resources Management Research in the CGIAR (TAC/CGIAR 1997a).

The integration and management of the many and diverse disciplines and skills needed to address complex NRM problems at the watershed level and beyond, is a formidable task that requires Centres to seek partnerships. In many cases, a single Centre will have a natural advantage in initiating and promoting NRM on a particular problem that merits CGIAR attention. Other Centres may be natural partners for these efforts, but this should be based on merit rather than obligation. The Panel believes that the greater part of the NRM research in the System can be managed at the Centre level. Only in exceptional circumstances should NRM programmes be featured at the System level (Section 4.5).

The initiation of a major new programme of NRM research requires a convening institution or institutions to take the lead in conceptualising the approach to the problem and in facilitating relevant partnership arrangements. Most of the convening of ecoregional programmes was done by CGIAR Centres, but there is no reason why this should be the case with new programmes in future. Moreover, the majority of the existing programmes have now reached the stage where they no longer need a convenor. In those cases, Centres should continue to support collaboration and to provide needed technical backstopping and scientific advice, but more in partnership than convening mode. Established consortia have their own governance mechanisms (Section 4.3.2). However, the CGIAR still needs to designate its lead Centre to provide leadership within the System. To complete the list of definitions, a host Centre/institution is the one with which the facilitation unit is affiliated.

Within the proposed framework, progress toward solving the problem would be measured by indicators that reflect the technological, institutional, and human and policy dimensions of system sustainability over the medium to long term. Indicators would be problem-specific and would apply to the combined effort of all research partners. The output level of the logframe, which has the four levels of goals, intermediate goals, purposes and outputs (TAC 1998), is particularly relevant. Indicators of outputs would normally include key biological and physical parameters relating to soil and water

resources, pest populations and conservation of agrobiodiversity, and indicators of human welfare, such as broad-based increases in household income. Increased agricultural productivity and reduced year-to-year production variability are other examples. By definition, logframe indicators are quantitative and time-related, with the scale specified.

Other output indicators relate to the CGIAR's role in providing knowledge and expertise to enhance the performance of research. Such indicators would reflect the development of tools and methods to extrapolate research results at the international, national and sub-national levels, and of strategic knowledge and understanding of physical, biological and socioeconomic processes in NRM, and of institutional capacity in NARS.

Recommendation 5: That the CGIAR and its Members adopt a revised framework for NRM research comprising three elements: (a) research should be organized around major problems (or opportunities) of sustainable NRM that are of international relevance, (b) it should use holistic systems approaches that combine human and technical elements to address problems on multiple scales, and (c) it should provide for its progress to be measured against specific performance indicators.

Recommendation 6: That the principles underlying the revised framework be applied by all CGIAR Centres involved in NRM research for the sustainable improvement of productivity.

One reason why the standard of monitoring and evaluation of ecoregional programmes has been unsatisfactory is probably because these programmes have been largely excluded from the independent external review processes of the CGIAR. Evaluation of regional NRM research should be given a higher priority in future. For Centres, the external review processes (External Programme and Management Reviews and Centre Commissioned External Reviews) should explicitly focus on how well the revised framework has been mainstreamed into their work. System-level NRM programmes should be subject to external reviews, commissioned by the lead Centre and its partners on a regular basis of every three to four years. In-depth 'sunset' reviews should be scheduled every 10 years to decide whether a programme should be continued or not.

Recommendation 7: The CGIAR's external review processes should explicitly focus in future on how well the revised approach has been mainstreamed into the work of Centres. System-level activities should be subject to special external reviews and in-depth 'sunset' reviews.

4.3 Implementing the Proposed Framework

4.3.1 Priorities and strategies

The Panel recognizes that further work is needed to develop the above framework and to provide specific guidelines for its implementation. It recommends that TAC commission

a multidisciplinary task force of experts to assist it in this purpose and to identify a priority short list of major NRM research problems and opportunities. Although the strengthening of NRM research was a major part of the ecoregional approach, it appears that the precise problems that were a threat to sustainability were never specified.

Summary of Revised Framework for NRM Research in the CGIAR	
Definition:	Identified by major NRM problem transcending national boundaries
Selection Criteria:	Importance of problem in terms of CGIAR goals; NARS commitment and participation; production of international public goods.
Elements of the Approach:	Holistic systems thinking; multiple scales; human element; characterization; participatory approaches.
Intermediate Indicators:	Increased agricultural production over the long term; changes in quality of resource base; system resilience to external shocks
Multiplier Effects of CGIAR:	Tools and methods; development of knowledge; institutional capacity.
Evaluation of Impact:	Poverty alleviated; food security achieved; environment protected

This is in striking contrast to the situation in crop improvement where the System has always maintained a tight discipline over priorities through mandates.

Once the task force has done its job, TAC should immediately prioritize the existing ecoregional programmes and identify those few that merit continuation at System level. At the same time, TAC should include the definition of researchable NRM problems and opportunities as an integral part of the upcoming priority- and strategy exercise. In making its recommendations for resource allocations for the period 1998-2000, TAC was unable to do more than apply a weighting to protecting the environment at the very broad System level (TAC/CGIAR 1997b).

Recommendation 8: That TAC commission an expert task force to assist it in developing and implementing the revised conceptual framework for NRM research in the CGIAR.

On present indications, the existing ecoregional programmes deal with only two major problems or opportunities of sustainable NRM that are of international significance: rice and wheat sustainability in the high-yielding production systems of Asia (RWC); and the worldwide problem of tropical deforestation (ASB, Humid Forest Consortium of EPHTA, Forest Margins in CIAT's work). However, TAC and the expert task force would need to consider whether there are other factors that need to be taken into account, such as the role that some Programmes may play in developing methods and experiences that could be of wider applicability than in the regions covered by their current activities. AHI, if it can be focused on a major natural-resource problem, may be a case in point because it deals with a great diversity of production systems, many based on commodities not covered by the CGIAR mandate. The experiences and methods developed there may be more applicable in areas with complex production systems than for the relatively simple rice-wheat rotation.

Care should be taken to distinguish between priorities in food security and poverty alleviation on the one hand and those in NRM on the other, as these will not necessarily be identical. The study commissioned by TAC on CGIAR Research Priorities for Marginal Lands (TAC/CGIAR 1996) commented that rural poverty, especially that associated with marginal areas, is a product of many factors, some of which fall outside the scope of research. For instance, marginal areas have typically been neglected by central governments, resulting in limited public investment in education, health and infrastructure. This multifaceted nature of the problem of marginal lands may explain why the DMI has had difficulty in identifying a major NRM theme for its ecoregional programme, despite the human importance of the problems of desert margins.

4.3.2 Organization and governance

Collaborative research consortia are the organizational method chosen by most of the existing ecoregional programmes and are judged to be very satisfactory for future use at either Centre or System level. However, if the Panel's recommendation on the revised framework is accepted, consortia will only be set up to address major problems (or opportunities) of sustainable NRM that are of international relevance. Not all research on the sustainable improvement of productivity warrants the setting up of research consortia

at either Centre or System level and there is still a place for reductionism in the CGIAR research agenda.

NRM research conducted through partnerships requires a governance structure that reflects the joint nature of the work. No one model can fit all situations but one that has worked well has been the formation of a regional or global policy body composed of major NARS and CGIAR partners, chaired by the NARS. This policy body may be assisted by one or more technical committees in order to formulate and coordinate research plans and monitor results. This structure is already in place to a large extent in some consortia, such as CONDESAN and the Rice-Wheat Steering Committee. In these examples, the effort is led by the NARS while the lead Centre coordinates the CGIAR's input. For some regionally based efforts, the emerging regional research associations should be explored as a mechanism to oversee governance (as in the AHI).

However, as noted elsewhere in this report, there have sometimes been difficulties in the operational and technical management of collaborative research programmes. It is not easy for a body composed entirely of representatives of competing research organizations to resolve amicably sensitive issues in allocating responsibilities, money (especially money), and in due course, credit for achievements. The Panel suggests that partners consider the addition of a few independent members to the technical committees responsible for the management of collaborative research consortia. Those independent members (an independent chair has proved particularly helpful in other places) should be chosen for their skills and experience in technical corporate governance. Eventually, it may be worthwhile for consortia to consider simple contracts to add order and predictability to their relationships. The present 'loose' arrangements do not seem adequate to deal with some of the emerging issues.

4.3.3 Strengthening strategic research in NRM

In some of the existing ecoregional programmes, very little new strategic research on resource management issues is being conducted beyond the initial characterization of research sites and domains. This criticism is less applicable to the research being conducted outside the ecoregional programmes in the natural-resource Centres, particularly in CIFOR. The Panel strongly advocates raising the standards of strategic research. As the strategic research on NRM being carried out by Centres is constrained by current budget pressures, the Panel suggests that the only feasible way to bring in additional skills in strategic research is through wider partnerships with mature NARS and Advanced Research Organizations. This will require concerted donor support over a period of a decade or longer.

Rigorous priority-setting is advisable, because in some areas that have been intensively studied already, especially in biophysical aspects of NRM, the knowledge base may be adequate for present purposes. In other areas, there are excellent opportunities for the CGIAR to create international public goods through innovative strategic research. Newer research approaches such as integrated catchment management and modelling of multiple-objective decision making have not been taken up to any extent yet. Research

paradigms combining human and technical elements of NRM in a holistic systems framework are needed. Another challenging opportunity is that of using advanced technologies to overcome the problem of the location specificity of many NRM phenomena (see Section 4.3.5). There is also a significant general point about strategic research. Unless the CGIAR Centres and their developing country partners have the necessary scientific capacity and credibility, it is difficult for them to draw effectively on the basic knowledge and understanding of NRM that resides in Advanced Research Organizations.

4.3.4 Strengthening social-science research, especially policy research

Current initiatives have performed variably in improving the disciplinary balance between social science and technical research. Overall, however, the Panel recommends considerable strengthening of social-science research in order to achieve the balance between the human and technical dimensions originally envisaged by TAC. This is reinforced by the fact that social-science capacity in NRM is one of the weakest disciplines in NARS, especially in government research and extension organizations. Many programmes require additional expertise in economics, sociology and anthropology, especially in relation to strategic research on farmer and community decision making on natural-resource issues. Social science research may also throw new light on the reasons for the apparently large backlog of un- and under-used research results in NRM – a long-standing cause of concern.

All programmes require strong efforts in policy research to analyse the broader questions of macro-economic and sectoral policies as they affect resource-management decisions. Policy research and interaction with policy makers is also needed to enhance resource management through the design of appropriate financial incentives, public investment allocations and targeted developmental programmes. Even in the ecoregional programmes where social-science research seemed to be reasonably strong, policy research was usually weak. The Panel recommends that Centres adjust staff mix, even within existing budgets, to give more balance to social sciences, and that they strengthen capacity in social-science research in NRM, giving special attention to policy research, by forming relevant partnerships.

Recommendation 9: That a special effort is required to strengthen collaboration with strong partners in strategic research on biophysical, social science and policy aspects of NRM. The frequently observed imbalance between biophysical and social-science research must be redressed.

4.3.5 Developing and harmonizing methodologies

In many Centres, developing sustainable NRM research is at a relatively early stage. Therefore, it is not surprising that the Panel found considerable methodological diversity with respect to work on characterization, research at benchmark sites, and emphasis on tools and methods versus technology. Given the widely varying nature of the problems being addressed, considerable diversity of methods is expected. However, the Panel also

feels that there are many opportunities for standardization or convergence of methods. In addition, many areas of methodology remain poorly developed in all programmes. These problems need to be addressed primarily by the programmes and experiences shared (next section).

Nevertheless, the Panel cautions against the danger of methodology becoming too much of an end in itself (and also against too strong a reliance upon any particular school of thought on methodology). There needs to be a balance between defining the problem and working to solve the problem (including monitoring and evaluation); in other words, a balance between characterization, intervention and upscaling activities. It is the Panel's belief that this shift in emphasis is essential if impact opportunities are to be enhanced in the target population and environment. In addition, the design of robust and simple methodologies (the minimum data sets being developed at CIP are one example) should go a long way towards protecting time and resources that could then be invested in the intervention and upscaling parts of the programmes.

The Panel recommends that special attention be given to the inter-related issues of scaling within benchmark sites from field to watershed and beyond, and extrapolation outside the benchmark sites. While the Panel recognizes the complexity of these issues, they must be addressed early in the research process, even prior to selection of the benchmark sites. The Panel believes that although there will be limited opportunities to extrapolate finished technologies and policies, there is considerable scope to extrapolate strategic understanding of the physical, biological and socioeconomic processes in resource management, as well as tools and methods to enhance the efficiency of applied research over wide areas. As a result of recent advances in the enabling technologies, unprecedented opportunities exist to combine the powers of integrated computer-based modelling with those of remote sensing and GIS data-handling methods. In this respect, and given the heavy investment at some sites, the Panel recommends that more attention be given to developing robust methods, such as minimum data sets, that can be applied within the financial and human resource constraints of NARS.

Recommendation 10: That, in relation to methodology, special attention should be given to harmonizing the inter-related issues of scaling within benchmark sites and of extrapolation from them. Robust techniques are needed that can be applied within the financial and human resource constraints of national systems, using minimum data sets.

4.3.6 Exchanges among NRM Programmes

At this stage of developing NRM within the new framework, there are a multitude of methodological and other issues, many of which are common to most programmes. A specific example is the need to develop financial benchmarks for the efficient operation of the facilitation units of research consortia. Therefore, the Panel strongly recommends regular focused workshops to exchange information on selected topics related to methods, organization and management of NRM research. They should also foster

communication on innovative approaches and emerging lessons. National partners and specialist institutes such as IBSRAM should be fully involved.

Recommendation 11: That regular workshops should be arranged under the aegis of the Centre Directors' Committee for the exchange of information, experiences and lessons learned in NRM research, especially that conducted within collaborative research consortia. In addition, attention should be given to filling gaps amongst NARS partners in the special skills needed for conducting research on NRM.

4.4 Terminology

In the interests of clarity, the Panel strongly advises that the words *ecoregional approach* be dropped from common usage in the CGIAR. This term, as used in many fora, has been asked to carry far too heavy a burden of diverse messages. The original broad reasons for adopting the ecoregional approach should be reaffirmed (Recommendation 4) but the objectives should be defined much more precisely and in plain words (Recommendation 8). The term ecoregional should be reserved in future for its original use, namely in connection with the regional definition of agroecological zones. The word 'regional' would suffice to describe the research/problem domains adopted in most of the existing ecoregional programmes.

4.5 Future Policy on Programmes at the System Level

The CGIAR should support a combined System effort in the few exceptional cases where: the natural-resource problem is of major importance on a global or regional scale; no single Centre has the natural advantage in taking the leadership role; and there is considerable potential to capture synergies and gain in efficiency by coordinating the efforts of two or more Centres. Such combined System initiatives should be carefully prioritized and given System status as part of a coordinated approach to donors. Adequate, secure funding is needed to provide an incentive for collaboration. A pragmatic approach should be employed in selecting partners, recognizing that there is a range of partners, apart from other CGIAR Centres, who might provide the needed skills. However, the lead Centre should have a strong stake in the Systemwide effort.

The application of these criteria depends very strongly on progress in developing the guidelines mentioned in Section 4.3.1. Even if those guidelines are not fully developed in time, the Panel recommends that a preliminary selection of Programmes that merit continuation at the System level should be made by TAC in March 2000 when it reviews the research agenda for 2001.

Recommendation 12: That three criteria be adopted for the selection of programmes to be supported at the System level: (a) the problem (or opportunity) is of major importance in relation to CGIAR goals, (b) no single Centre has a natural

advantage in terms of its mandate, and (c) there is a high potential for efficiency gains from the combined efforts of two or more Centres.

Recommendation 13: If guidelines have not been fully developed in time, a preliminary selection of Programmes that merit continuation at the System level should be made by TAC in March 2000, when it reviews the Research Agenda for 2001.

These recommendations should not be construed as a diminution of the importance of the NRM problems that should, in future, be supported at the level of Centres. Nor do they imply that Centre-level programmes have little chance of future growth or success. The traditional strengths of the CGIAR lie in leadership and management at the Centre level (including the arrangement of a good deal of inter-Centre cooperation), and the Panel is doing no more than recognizing that reality. In fact, the designation of Systemwide Programmes has generally not proved popular with donors, as evidenced by their funding decisions since 1994, and a special effort will be needed to provide adequate CGIAR support for those major programmes selected for continuation at the System level. In addition, the Panel believes that there are still untapped sources of funding that could support these efforts. These include the philanthropic area, the private sector, international environmental funds and bilateral technical assistance.

4.6 Unfinished Business

Even if the above recommendations are accepted, and a similar process is adopted for deciding the future of the other Systemwide Programmes, further action will still be required on behalf of the few remaining System-level Programmes in order to overcome the identity and funding problems identified in Chapter 3. Visibility is essential in today's process of competitive bidding for CGIAR funds. It seems curious that many non-CGIAR organizations use the Mid-Term Meetings and International Centres' Weeks to canvass for support, whereas the System's own programmes have largely been overlooked. That situation was remedied for the ASB, but so far as the Panel is aware, other ecoregional programmes have not enjoyed similar exposure (at least in plenary sessions).

While this issue falls outside the Terms of Reference of the present Review, the Panel offers the suggestion that action is needed at two levels. First, a way has to be found for System-level Programmes to be given appropriate opportunities to present their case to the Group in the future. Obviously, the Panel thinks that this privilege should be accorded only to those very high-priority Programmes which address major problems (or opportunities) that are of international relevance. Secondly, the funding of such System-level Programmes needs to be considered formally by TAC during its annual review of Centres' medium-term and financing plans. Estimates of required funding should be included in the CGIAR financial matrices (Recommendation 3). TAC should highlight the programmatic implications for CGIAR priorities and strategies to the Finance Committee and the Group, especially to the co-sponsors in their role as donors.

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ANNEX I

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More than 100 articles published nationally and internationally focused on the social aspects of agriculture and rural development. She has served in more than 120 national and international Boards (such as CIP, ICRAF, IPGRI, ISNAR and IDRC), on Advisory Committees (such as ILO Rural Development, WHO Tropical Disease Research, the Ecoregional Fund UPWARD-CIP Resesarch Programmes,etc.). Served on Review Teams (such as the Review of the CGIAR) (Panel on Science). the Review of the ACIAR, the Review of the ACAIR, the Review of the Rainfed Lowland rice Ecosystem Research Programme, Review of the International Foundation for science. Member UNESCO-UNFPA Team to evaluate the Family Planning Communication Project of the U.P. Institute of Mass Communication, 27 August to 5 September 1973. Member, World Bank, Research Advisory Panel on Agriculture and Rural Development, Washington D.C., September 6-21 1978.

Name: **JOHL, S.S. (India)**
Position: Director of Central Governing Board and Member of Board of Financial Supervision of Reserve Bank of India (since 1993); Chair Mannaging Committee, Amrdeep Memorial College, Mukandpur, Punjab
Expertise: Management
Education: M.A. in Economics and M.Sc. in Agric. Econonics (1956); Ph.D. in Economics (1965; D.Litt. Hon. (1998)
Experience: Held positions as visiting professor Ohio State University 1970-72; served United nations (FAO) Project Manager and as World Bank Consultant 1974-79, 1982, 1987, 1991-93; Vice Chancellor Punjabi University Patiala 1983-86; Vice Chancellor Punjab Agric. University Ludhiana 1986; National Professor of Eminence in Economics 1986-93; served as Member of State Planning Board Punjab 1980-86 amd 1993-97; Chair Agric. Prices Commission Govt. of India 1987-92, Member of Economics Advisory Council to Prime Minister 1987-93; served as President of Indian Society of Agric. Economics 1983, of Indian Society of Agric. Marketing 1989, of Indian Agric. Econ. Research Association 1987-93 and

of the Punjabi Sahitya Academy Ludhiana 1990-96; published seven books and over 300 research papers.

Name: **Kürschner, Ekkehard (Germany)**
Position: Consultant
Expertise: Agroecology and Natural Resources Management
Education: Dipl. Ing. Agricultural Sciences (1982/83); Dr. sc. agr. Farming Systems and Land Scape Ecology (1986); University of Stuttgart-Hohenheim
Experience: 1983-85 Weed Management Specialist Department of Agriculture and University of South Pacific (GTZ Project Western Samoa); 1985-86 Instructor at Department of Plant Production and Agrocecology in the Tropics and Subtropics University of Stuttgart-Hohenheim; 1997-1990 Associate scientist in multidisciplinary team and coordinator of collaborative research on epidemiology and integrated disease management, Justus-Liebig University of Giessen seconded to the International Rice Research Institute (IRRI); 1991 Project Planning and Management Assistant, Vocational Education Centre, Leipzig; 1992-1997 Coordinator for International Agricultural Research to the Federal Government of Germany, Council for Tropical and Subtropical Agricultural Research (ATSAF), Bonn; 1998 CGIAR Strategy Advisor , German Agency for Technical Cooperation (GTZ), Eschborn; conducted TAC Desk Study on Systemwide Programmes with an Ecoregional Approach (1998-99)

Name: **MATEO, Nicolas (Costa Rica)**
Position: Costa Rican National Biodiversity Institute (INBIO): responsible for the design, development and implementation of the Institute's biodiversity prospecting activities and strategies.
Expertise: Agronomist
Education: Agronomy, University of Costa Rica, the Tropical Agronomic Research and Higher Education Center (CATIE) and the University of Florida (PhD).
Experience: He has held research positions at the Costa Rican Ministry of Agriculture and CATIE and research and management positions as Associate Director for Latin America and Asia (crops) of the International Development and Research Center (IDRC-Canada), and as Director of the International Network for the Improvement of Bananas and Plantain (INIBAP) in France. Dr. Mateo worked from December 1995 to March 1999 at the National Biodiversity Institute (INBIO) and had the responsbility for the design, development and implementation of the Institute's biodiversity prospecting activities and strategies.

ANNEX II

TERMS OF REFERENCE FOR THE REVIEW OF SYSTEMWIDE PROGRAMMES WITH AN ECOREGIONAL APPROACH

1. Background

The Ecoregional Programmes Review will assess the progress made towards the implementation of those Systemwide programmes employing an ecoregional approach launched by the CGIAR centres in collaboration with their partners since 1995. These programmes are new efforts in the CGIAR and this review is timed to evaluate at System level the experiences which have been gained to this point. The review will also be a part of TAC's consideration of the value added by Systemwide Programmes more generally.

The ecoregional programmes to be reviewed are:

(i) The desert margins programme for sub-Saharan Africa.
(ii) The programme for the warm humid and sub-humid tropics of sub-Saharan Africa.
(iii) The programme for the humid and sub-humid tropics of Asia.
(iv) The on-farm water husbandry programme for West Asia and North Africa.
(v) The programme for rice/wheat based cropping systems in the Indo-Gangetic plain.
(vi) The programme for enhancing agricultural research effectiveness in Tropical America.
(vii) The alternatives to slash and burn agriculture programme.
(viii) The sustainable mountain agricultural development programme.

The Systemwide initiative on coastal environments is excluded as it has not yet progressed to a point where review would be useful.

2. Terms of Reference of the Review

The terms of reference of the Review are as follows:

1. Analyze how the programmes performed in addressing the objective of sustainable improvement of productivity, especially how well the ecoregional approach had performed in linking strategic and applied research on natural resource conservation and management with that on production systems, including location-specific aspects of global commodity/subject matter research activities.

2. Evaluate, using the following seven criteria, how the value added by making the activities Systemwide, rather than leaving them as a series of centre-based components, outweighed the additional transaction and management costs.

- The degree of effectiveness of collaboration among Centres and between them and other partners (linking, openness, involvement with NARS and other research partners).

- Cost-effectiveness/value added of the implementation options.
- The participation of potential beneficiaries and other stakeholders in the definition of the research problems and priorities.
- Clarity in communicating the importance of the research to the CGIAR Members and other actors.
- Continuity of funding/support.
- Ease of accountability.
- The standards of planning, monitoring and evaluation.

The Panel will also conduct selective visits to field sites of some programmes, if necessary, to verify the findings of a desk study outlined below. Preferably, the visits will be focused on the oldest programmes.

3. The Desk Study

The Review will be supported by a desk study which will gather and analyze the following information on each of the eight ecoregional programmes:

- Programme proposals and plans, progress reports, any journal or conference papers reporting research results, and any documented adoption or impact studies.

- The responses of stakeholders to a formal set of questions about how well they thought the programmes had performed in conducting research on the technical and human dimensions of problems in the sustainable improvement of productivity for their ecoregions, and any suggestions they wished to offer to improve the efficiency and effectiveness of the ecoregional approach. These questions should address specifically also the adequacy of existing accountability (review) processes.

  The stakeholders to be interviewed would include: (a) the CGIAR Centres, especially the Lead/Convening Centre; (b) the participating national organizations, in developing countries (and going beyond the NARS to the national agencies responsible for rural land and environmental administration); (c) the CGIAR Members and other agencies that have provided funds for the programmes; and (d) NGOs and ARIs.

- Any information about such programmes that has emerged in the course of recent EPMRs, and other CGIAR Reviews such as the one on the Systemwide Genetic Resources Programme.

4. Timing of the Ecoregional Review

The preparatory desk study phase will be carried out by the TAC Secretariat, and the report will be considered by the Committee at TAC 76 meeting in March 1999.

The main phase of the Review will commence in April 1999, and the Panel report will be considered by TAC 77 in September 1999.

25 September, 1998 Approved by TAC (75)

ANNEX III

REPORT OF PANEL VISIT TO RICE/WHEAT CONSORTIUM

The Rice/Wheat Consortium (RWC) was visited in India by a Panel comprising:

- Dr. Gelia T. Castillo - Professor, University of the Philippines, Los Banos; member of the International Scientific Advisory Committee of the Ecoregional Fund to Support Methodological Initiatives

- Dr. S.S. Johl - Director, Reserve Bank of India; former Vice Chancellor, Punjabi University, Patiala

- Dr. E.F. Henzell (Panel Leader) - Former member of the Technical Advisory Committee of the CGIAR

The visit took place from 18-22 April 1999. Discussions covering the main activities of the RWC were held with representatives of the participating countries and institutions, including the Chairman of the International Steering Committee of the Consortium (Dr. R.S. Paroda), and scientists from the NARS of Bangladesh, India and Nepal and from five Centres. A visit to farmers' fields and a meeting with a group of farmers was arranged by the Department of Agriculture, Government of Haryana. Details of the schedule are given at the end of the Report.

Special thanks are due to Peter Hobbs and Ram Iyer for the excellent arrangements made for the Panel's visit.

Background

Evolution of Concepts

In India, the largest NARS participating in the Consortium, concepts on the organization of agricultural research have evolved very significantly over the past 40 to 50 years. Similar evolutionary changes have occurred in the NARS of Bangladesh, Nepal, Pakistan and Sri Lanka, and it is reasonable to expect that this learning process will continue. The ecoregional approach is the latest and most comprehensive of the evolving concepts of how agricultural research should be structured for more effective performance.

The following stages, with some overlap in time, can be identified in the conceptual evolution of Indian agricultural research.

1. In the early 1950s, research was organized on the basis of commodities and academic disciplines within separate sections of the national and state agricultural research organizations, and within independent faculties/departments of universities. Cooperation between the commodity and disciplinary entities was left to the individual researchers and was often weak, especially between institutions.

2. The next step was the establishment of coordinated projects which brought together commodity specialists from different research organizations, and at a later date subject matter specialists, into teams to carry out multi-site projects of a standard design. The first All-India Coordinated Project (for maize) was launched by the Indian Council for Agricultural Research (ICAR) in 1957, with the assistance of the Rockefeller Foundation. There are now 84 All-India projects, comprising 26 in crop sciences, 17 in horticulture, 16 in animal sciences, 15 in NRM and 10 in agricultural engineering.

3. The All-India projects for commodities such as wheat started with a full complement of biophysical disciplines, including pathology, entomology, plant physiology, agronomy and grain quality, but no economists. Each All-India project was the responsibility of a different Deputy Director General of the Indian Council for Agricultural Research, and this sometimes made cooperation difficult. In the 1970s and 1980s, commodity projects, such as that for wheat, started to look at their crops in different agroecological zones and cropping sequences, however, the primary emphasis was still on the commodity mandate and varietal improvement.

4. The All-India Coordinated Agronomic Research Project was set up in 1968. In the 1970s, the farming-systems approach was formulated in various parts of the world. This broadened the concept of agricultural research to include the whole spectrum of commodities and commodity sequences, and the critically important role of farmers. The All-India Coordinated Agronomic Research Project was upgraded to a Directorate for Cropping Systems Research in 1986-88. It has retained an agronomic focus, and has worked mainly on cropping patterns and crop rotations both on-station and on-farm. It reports to a different Deputy Director General than the commodity directorates.

5. An important innovation during the late 1980s was the creation of national centres of excellence to provide scientific leadership; these go under the name of institutes, centres or directorates. CIMMYT has interacted strongly with the Wheat Directorate and IRRI with the Rice Directorate. However, the Panel was told that the national agencies specializing in NRM research were largely left out of these interactions.

6. An Indian Institute of Soil Science was formed during the 1980s at Bhopal. This took over the coordination of many of the soil-related, All-India projects and their coordinators were located at the Institute. Natural-resource disciplines continued to be dispersed across the various All-India institutions and the Institute of Soil Science.

7. During the 1990s, the ecoregional approach also influenced the priorities and strategies of research in the Indian system, mainly through its emphasis on achieving sustainable improvements in agricultural production by balancing commodity research with increased research on NRM, and by strengthening cooperation between international centres and national research agencies. However, this was certainly not the only influence in that direction because the limitations of too strong a reliance upon a fragmented commodity/discipline approach had already been recognized by national scientists.

As a result of these evolutionary changes in the Indian research system, by the early 1990s strong multidisciplinary teamwork had been established within its institutions. However, links between institutions were much weaker, especially when they reported to different lines of management. Thus, while the commodity-mandated institutions looked at cropping-system

interactions for their particular commodity, this tended to be isolated from related research in, for example, the Cropping Systems Directorate and other commodity-based programmes. Social science was, and often still is, relatively weak.

Policy and public-management sciences in particular, were not strongly represented in the Indian system (the National Centre for Agricultural Economics and Policy Research was founded only in 1991), and many of the extension workers were not well trained in farmer-oriented, participatory approaches. The prevailing philosophy of how to connect farm and laboratory was "land to laboratory and laboratory to land". Experiments carried out by scientists in farmers' fields were, and often still are, the norm.

The Panel's much less comprehensive discussions with scientists knowledgeable about other NARS participating in the RWC indicate that despite the many differences between them, they share the same general problem of implementing the full scope of the ecoregional approach. Similarities are that natural-resource disciplines are dispersed; work is carried out on mandated commodities only, with very little focus on farming systems; and programmes are organized mainly around individual commodities with a focus on multidisciplinary teamwork. Disciplinary sections or divisions still exist although their functions have been redefined.

In Bangladesh, cropping systems or on-farm research divisions or programmes were created in the major research institutes, with a technical head reporting direct to the Director. This approach was not very helpful because it created an artificial wall between the commodity researchers and the farming-systems researchers.

One of the major objectives of the Indian National Agricultural Technology Project (NATP) is to improve the synergy between the different components of the Indian NARS as they focus on NRM issues. It promises to effect major changes in the agricultural research and extension systems of the country. The NATP document, dated October 1998, is the outcome of more than three years of concentrated effort by Indian research leaders and ministry officials, World Bank staff, and FAO and other international experts. The RWC participated in the planning meetings of the NATP.

Since the 1980s, a fact of life for many national and international agricultural research organizations has been the widespread fall in public funding of research. Cuts in non-restricted core funding have certainly affected the ability of Centres such as CIMMYT and IRRI to sustain their major programmes of commodity improvement while expanding their research on various aspects of the ecoregional approach. This has affected their ability to catalyze work in the NARS, and to develop the new paradigms needed to conduct research on the conservation and management of natural resources.

The same financial pressures have been felt to varying degrees by the NARS of South Asia. Funding for the ICAR has been maintained, whereas government funding has dropped in Pakistan, Bangladesh and Nepal. This has weakened them significantly, and Bangladesh and Nepal have become more reliant on outside aid. Small amounts of flexible funding can help considerably in such circumstances.

The RWC had its origins in many years of collaborative research between CIMMYT, IRRI, and the national research centres for rice and wheat in South Asia. These arrangements were formalized in 1989 by an agreement between IRRI, CIMMYT and the NARS of India,

Pakistan, Bangladesh and Nepal. Funding was provided by the World Bank and later the ADB. Cornell University is also a member of the Consortium.

Concern about the sustainability of the rice-wheat system arose from diagnostic work initiated at the different sites. Analysis of data from field experiments conducted by scientists associated with the Directorate of Cropping Systems and the All-India long-term soil fertility project provided early evidence of a sustainability problem. In 1996, the RWC organized a workshop in India for the various scientists involved in long-term soil fertility experiments in the region. The full papers from this workshop, which document the evidence for productivity decline in this intensive system, have been compiled and edited, and are in the process of being published. A summary has already been published. Papers presented by Bangladesh and Nepal at this meeting also provided evidence of a decline in factor productivity in rice-wheat cropping systems. Although most of these experiments were initiated in the 1970's, many of the results were not widely known. The RWC workshop catalyzed the publication of these experiments.

In 1993 an important workshop, organized by FAO in Bangkok, consolidated the evidence available up to that time. Most of the papers were from scientists in the ADB project and the IRRI scientist in charge of the project helped to organize the workshop. The proceedings were published by FAO in 1994 and have since become a standard reference on the subject of sustainability of rice-wheat production systems in Asia.

When TAC called for proposals for Systemwide and ecoregional initiatives in its review of CGIAR resource allocations for the period 1994-98, a submission for a Systemwide Ecoregional Programme, incorporating elements of the CIMMYT-IRRI rice-wheat programme, was presented by ICRISAT on behalf of its partners. Since 1995, the RWC has been listed as one of the CGIAR Programmes with an ecoregional approach.

Assessment of the RWC

The Nature of the RWC

It needs to be made very clear that the RWC is truly a consortium (a special kind of research network). It is not a research programme in its own right in the sense that the word 'programme' is generally used in the CGIAR. Apart from any studies the facilitation unit might carry out on ecoregional methodologies, the RWC is not structured to conduct research in its own name. The research programmes and projects directed at the problems of rice-wheat production systems, and carried out under the aegis of the RWC, all reside with one or more of the participating research organizations. To add to the confusion, the RWC has sometimes been described by the CGIAR as an ecoregional programme, for example in TAC's 1994 Review of Proposals for Systemwide and Ecoregional Initiatives.

The RWC has a Regional Steering Committee which is currently chaired by Dr. Paroda of India; this position rotates annually. Membership comprises the Directors of the four NARS, a representative from the International Agricultural Research Centres (IARCs), and a donor representative. The Consortium Facilitator acts as Secretary (Dr. Peter Hobbs is the interim Facilitator). A Regional Technical Coordinating Committee, made up of the national rice-wheat coordinators, four scientists from the participating IARCs and the facilitator, supports the work of the RWC. In addition there are national technical coordinating committees and there have always been informal site committees. These have now been formalized under the

NATP in India and are the favoured mechanism for the cooperative research sites in all four countries.

RWC works on the four themes of tillage and crop establishment, integrated nutrient management, integrated water management and system ecology/integrated pest management. Since its designation as ecoregional in 1995, its activities have included:

- development of priorities and strategies for research on rice-wheat production systems;
- provision of a forum where scientists in the region can meet to discuss common problems, and to exchange ideas and technologies (also effected through a newsletter and a web site);
- coordination of activities through national coordinating committees and site teams, including the submission of joint funding proposals on behalf of stakeholders;
- organization of technical conferences and training seminars;
- publication of conference proceedings and training materials;
- organization of travelling seminars to see farmers' problems and field experiments at first hand; and
- promotion of the use of new methodologies.

A good example of the last point is the promotion of farmer participation in the research process. Traditionally, research and extension is a top-down process. The results of research are provided to extension workers and the recommendations are then demonstrated to farmers; farmer participation is minimal. Improved farmer participation in diagnostic work to set the research agenda, and to experiment with new technology is being encouraged by the consortium with the backing of the IARC and the Agricultural Research Institutes. The success of the new tillage options is one example of how this new methodology has allowed faster adoption of a new technology.

If funds permit, the RWC intends to develop a regional project information system and a regional GIS for cross-site synthesis of data.

How should the achievements of the RWC be evaluated?

The achievements of the RWC can be expected to manifest themselves as improvements in:

- research carried out by the participating organizations: priorities, organization and management (institutional development, mindset), procedures and results;
- determining government policies affecting the rice-wheat production system;
- adoption of new technologies by farmers using the rice-wheat rotation; and

- capacity of scientists working on the rice- wheat production system.

The Panel was particularly interested in the changes that had occurred since the RWC formally adopted the ecoregional approach. Therefore, the degree of understanding of the major elements of that approach, especially its emphasis on sustainable improvement of production, was also pertinent.

> *- - -how the programme performed in addressing the objective of sustainable improvement of productivity, especially how well the ecoregional approach had performed in linking strategic and applied research on natural resource conservation and management with that on production systems, including location-specific aspects of global commodity/subject matter research activities.*

Dr. Paroda credits the ecoregional approach with having heightened awareness in South Asia of the benefits of a whole system perspective in agricultural research and the importance of integrating NRM research with production research. The Panel's view is that the recent ecoregional phase of the RWC has had its greatest success in linking research on natural resource conservation and management with that on production. The new tillage options increase production while conserving soil resources and saving on fuel, tractor costs, water, fertilizer and chemicals. Earlier planting of wheat means an earlier harvest and more time for another crop. Higher wheat yields free some land for possible crop diversification. A research area which has emerged through the RWC is the relationship between water needs and new cultural management practices such as zero tillage. These recent achievements are additional to those of the longer standing research (predating the formalities of adopting the ecoregional approach) on whether or not factor productivity is declining – very strategic research on the link between NRM and productivity.

What is not so clear is whether the designation of the RWC as an ecoregional activity has strengthened NRM research in the participating IARCs. There appears to have been some redirection of priorities in line with ecoregional principles, e.g. in the work of IRRI on integrated nutrient management and of ICRISAT on the fertilizer needs of grain legumes, but very little in the way of distinctly new projects. There was already a strong awareness of threats to the sustainability of the rice-wheat system, and increased attention was being given to soil fertility management and crop protection before the RWC was designated as an ecoregional activity in 1994. The work on fertilizers and nutrient management has yet to be incorporated into a systematic multidisciplinary team effort under the RWC, but it is hoped to do this in future.

However, the above conclusion concerning new research needs to be qualified. The capacity of CIMMYT, ICRISAT and IRRI to develop new lines of research has been severely restricted by funding difficulties during the 1990s, as already mentioned. The RWC has not invested as much in regional and site characterization as a number of other ecoregional programmes, but it may be enough. One of the pilot sites of SysNet is in the rice-wheat region of India.

Perhaps the greatest gap in the NRM coverage of the RWC is in water-resources research. There are significant problems in different areas of the Indo-Gangetic Plain such as competing demands for water, water pollution, and waterlogging and salinity of irrigated land. Water-resources policy is of vital importance. A good deal of research is being done on

these issues by national agencies and by IIMI, but this is not overtly linked to the RWC. This is likely to change in future, according to IIMI's presentation to the Panel. As with the other Centres, the capacity of IIMI to develop new water-resources research has been constrained by lack of finance.

One of the problems with water management is that work on this subject is often carried out in a different department or ministry, and so is more difficult to coordinate with traditional agricultural research. There is also a difference of scale between catchments (basins) and agricultural-production systems, which complicates the reconciliation of site requirements for the two kinds of work. However, the RWC has had recent discussions with other groups looking at river-basin approaches and this matter was discussed at the last meeting of the Regional Steering Committee.

Evaluate, using the following seven criteria, how the value added by making the activities systemwide, rather than leaving them as a series of centre-based components, outweighed the additional transaction and management costs.

The degree of effectiveness of collaboration among Centres and between them and their partners (linking, openness, involvement with NARS and other research partners)

The Panel judges this to have been a most important achievement of the RWC, built on the sound foundations created in earlier phases. Certainly there are more effective partnerships between Centres and their NARS partners, and within and between the four national systems of the region. The RWC is clearly a NARS-driven initiative with the Centres having roles largely defined by the Consortium.

However, the RWC has not been as effective in increasing cooperation amongst Centres operating in the rice-wheat region. IRRI's interest seems to have waned since the days when it hosted the facilitation unit. However, the Panel was informed in discussion that some very relevant IRRI research that has taken place in recent years has not been reported as a contribution to the RWC. The decision of CIP to participate in the next phase of the consortium is a significant gain.

The effectiveness of collaboration, and of using the ecoregional approach, are shown in a number of ways:

- Scientists from the four countries in the region continue to cooperate constructively under the umbrella of the RWC, notwithstanding other tensions.

- In both Bangladesh and India, the purposes of recent World Bank loans for R&D have been strongly influenced by the experience of the RWC. The Panel was told that the only direct experience of working on a whole production system as a 'systemwide programme' that senior Indian scientists could draw on, came from the rice-wheat production system.

- The RWC has improved the planning of research and extension through a better understanding of issues, approaches and experiences. Success of a technology in one country, e.g. with zero tillage, has caused others to review its potential utility. The planning process has been able to tap knowledge, experience and expertise at all levels from local farmers to international scientists.

- As a result of the improved communication amongst research organizations participating in the activities of the RWC, national and international researchers have been sensitized to the issue of duplication and gaps in experimentation. This has led to problems being corrected in a non-threatening manner.

- Discussions with the National Centre for Agricultural Economics and Policy Research (NCAP) in Delhi, created in 1991, revealed an advanced understanding of the value of including social sciences in a whole-system approach to the problem of sustainably improving agricultural productivity. The Director indicated that his knowledge of the ecoregional approach was obtained through contacts with ICRISAT and the RWC. NCAP's aims include improving the use of the agricultural-research system as a source of advice to Government policy makers. In addition, socioeconomic constraints to technology transfer are being researched.

- Other interesting evidence of the effectiveness of the RWC in encouraging a multidisciplinary systems approach to rice-wheat research came from a soil physicist in one of the agricultural universities. He stated that his involvement was triggered by information gathered at one of the RWC's travelling seminars.

- RWC's effectiveness in improving technology transfer shows up particularly clearly in tillage practices. Equipment and techniques from New Zealand, China and the headquarters of two Centres have been adapted and used to solve practical problems in rice-wheat production. Through the consortium, CIMMYT and IRRI have played a vital role in facilitating this technology transfer.

Cost-effectiveness/value-added of the implementation option

None of the achievements listed above can be attributed entirely or even mostly to the recent phase of the RWC or to the contribution of the CGIAR. Many different agencies and individuals have been involved and the origins of the changes often go back many years. The closer the cooperation becomes in a consortium like the RWC the more seamless its operations will be and the more difficult (and perhaps counterproductive) it will be to try to separate the individual contributions. What is clear to the Panel, however, is that the activities since 1994 have significantly increased the extent of cooperation in rice-wheat research and set a basis for even greater achievements in future.

It is virtually impossible to put a dollar value on the benefits of the consortium to date and only its direct costs can be calculated. Much of the time and effort contributed by participants is not accounted for. The facilitation unit (facilitator plus local staff and operating money) has cost approximately t US$200,000 a year to run. Until this year, about another US$200,000 has flowed to NARS to support meetings, workshops, training, publications and small competitive grants.

It is largely an act of faith that a more cooperative and participatory approach will improve the efficiency of the research process, and increase the rate of adoption and impact of new technologies sufficiently to give a good rate of return on the additional investment. The Panel believes it to be so, provided that the transaction costs are kept under strict control.

There is a strong tradition in basic science of rewarding individuals for their discoveries and innovations, and of tolerating inter-institutional rivalry. This culture spills over into strategic and applied science and may have been strengthened by the recent trend for protection of intellectual property. Therefore, it is necessary to balance the competitive and cooperative proclivities of scientists, both of which can be very valuable. This is probably one of the most important public-good responsibilities of agricultural research leaders.

There is clearly a strong commitment to the RWC at the highest level of leadership in the three NARS with which the Panel had discussions. The enthusiasm of the participating researchers and extension specialists was also very evident. What was not so obvious was the extent of support at intermediate levels of management in government research institutions and universities. The Panel was told that commitment to the new approach is often stronger amongst the practising scientists than with middle management. When funds are scarce in the RWC, it is difficult to give enough people the chance to become acquainted at first hand with what is happening. Also, institutional rivalries are often stronger at managerial levels.

The participation of potential beneficiaries and other stakeholders in defining research problems and priorities

This has been one of the strengths of the RWC. The travelling seminars seem to have provided a very effective mechanism for ensuring that researchers at all levels in the consortium are kept well informed on the nature of farmers' practices and concerns. In the meeting at Karnal, the rapport between State extension specialists and farmers, and between both groups and the scientists who were present, was most impressive. In contrast, gender sensitivity is not a strong point in South Asian cultures.

Clarity in communicating the importance of the research to CGIAR members and other actors

While technical communication has been excellent within the consortium, its special funding requirements do not seem to have been communicated to TAC and members of the CGIAR as effectively. The fact that it was sometimes documented by the CGIAR as an ecoregional programme rather than a consortium has added to this problem.

The technical achievements of the RWC, especially those involving Centre scientists, have featured strongly in the Annual Reports of CIMMYT and IRRI, and some information has been given there about the consortium's mode of operation. However, it is very difficult to ascertain from these reports that special funding is necessary to facilitate the cross-institutional activities of the RWC. Nor was that need featured in ICRISAT's reports during the period in which it acted as convening centre.

Continuity of funding support

Funding was adequate during the first phase of the consortium (1989-1994) but less money was available to support the NARS during the second phase (1994-1998). So far it has proved difficult to obtain even US$200,000 a year for the third phase – certainly not enough has been pledged yet to employ a full-time facilitator. This difficulty may be explained by a lack of understanding in the CGIAR of the real purpose of the RWC, and it may also be part of a broader problem of financing and managing Systemwide activities.

The Panel learned that some potential donors for consortium operations presented the convening centre with the choice between support for the Centre or for the RWC. To the Panel, this indicates a basic misunderstanding of what the RWC is about. It is not a matter of one or the other but of putting some resources into a consortium to increase the efficiency with which Centre funds are used. Funding can improve a range of operations from the better initial definition of research priorities through to improved chances of adoption and the eventual achievement of the CGIAR goals. So it is not simply a question of sufficiency of funding, but of achieving a balanced investment through a process which is increasingly constrained by the restriction of purpose and location imposed by many donors.

Only a small proportion of funds need to be allocated directly to the RWC. Used creatively, that money can influence the allocation of a larger quantity of R&D resources by the participants (through leverage). There is no reason why all the funding for the RWC's facilitation functions should have to come from international sources. There are potential benefits to be had also from more flexible funding within the NARS. The Panel concludes that there is scope for developing innovative funding mechanisms to provide the relatively modest longer-term support needed for the activities of consortia such as the RWC.

Within the new CGIAR logframe, the expected outputs from the facilitation function of the RWC are to increase the accessibility of "knowledge and expertise for enhancing the performance of research and related institutions". The RWC can be a very effective means of bringing partners together in focused activities where the NARS can define what they expect from Centres.

Ease of accountability

There are no problems in using project-accounting methods for the budget of the facilitation unit. Accounting for the value of in-kind contributions by participating organizations is much more difficult.

Standards of planning, monitoring and evaluation

Policy making, carried out by the Steering Committee for the consortium, seems to have been of a high standard as has monitoring the activities of the facilitation unit. The planning of rice-wheat research in the participating organizations has been considered above. It has not been possible to fund any recent independent evaluation of the operations of the consortium but the ADB conducted a review of the RWC towards the end of its first phase.

The RWC as an ecoregional activity

Since 1995, the RWC has maintained its strong focus on the sustainable improvement of productivity, with additional research on tillage and weed control. However, it has still to exploit the full scope of the holistic ecoregional approach. As already explained, there may be some good reasons for this, chiefly that research by the consortium's participants was already quite strong on particular aspects of sustainability (notably in detecting declines in yields and factor productivity, and in searching for practical solutions) before the RWC was ever designated as an ecoregional activity. Also, it takes time to catalyze change. But participants in the consortium still have some way to go, especially if they are to adopt a river-basin (watershed) framework as the conceptual basis for dealing with problems of water management in areas practising rice-wheat rotation. Use of this framework does not mean the

actual study of catchments, but an awareness of upstream/downstream linkages in research at different kinds of sites. For irrigated agriculture, the canal area may be the appropriate research domain.

Arguments for adopting the watershed framework were presented to the CGIAR in a paper entitled "Priorities and strategies for soil and water aspects of natural resources management research in the CGIAR" and adopted at MTM 1996 in Jakarta. IIMI uses this framework, describing the units as river basins rather than watersheds or catchments. During its discussions with ICAR and scientists from other IARCs, the Panel was assured that it will be possible to reconcile the differing site requirements of the production system and river basin approaches. However, that has still to be done under the umbrella of the RWC.

Working in partnership with national organizations, and involving all the stakeholders with a role in agriculture and the management of natural resources, was seen by the CGIAR as an essential part of the ecoregional approach. Particularly if it was ever to have any substantial impact in resolving problems of sustainability and conservation. While this was initially a means to an end for the CGIAR, it took on much greater prominence with the subsequent emphasis on global partnerships in agricultural research.

Some of the greatest achievements of the RWC have been in fostering partnerships and strengthening stakeholder participation. Part of the paradigm shift that is being sought under current thinking is the early involvement of a wider range of stakeholders such as farmers, extension workers, local government officials, Non governmental Organizations and the private sector (seed producers, machinery manufacturers, traders, processors), as well as traditional research providers. The aim is not only to draw on their experience and knowledge in order to set more relevant priorities, but more importantly, to develop a sense of ownership of the R&D process and to improve the 'goodness of fit' of its expected products. It is hard to see how the CGIAR can play any useful role in testing and developing these partnership approaches unless it is through a mechanism such as the RWC.

Another aspect of the RWC that warrants comment is its decision to focus on a production system rather than the ecoregion defined by TAC: the warm arid and semi-arid Tropics and sub-Tropics of Asia. The Panel was assured that careful consideration had been given to TAC's regional classification as well as to earlier ones developed in South Asia. According to the main document of NATP (p 26), the ICAR first divided the country into 20 agroecoregions (and 60 sub-regions) on the basis of soils, physiography, climate, crops and vegetation, and duration of growing period. But this classification failed to reflect the significance of differences in social and economic conditions, market support and the service sector. Also, the introduction of irrigation has alleviated a major constraint and provided opportunities for diversification. Therefore, the ICAR focused on production systems which integrate all the "components for determining the productivity and profitability of the system".

ICRISAT also found the TAC ecoregion difficult to use and developed other typologies of land use based on socioeconomic and agroecological information. It seems that the original definition of the ecoregion left a good deal to be desired and that pragmatism has led to the choice of alternative regions, broader in definition than those proposed by TAC. If this proves true for other CGIAR ecoregional initiatives, then some re-examination of the whole issue is warranted.

Certainly the rice-wheat production system is important in relation to the CGIAR's goals. It is vital to food security in South Asia (it is the main source of surplus grain in India) and north China. But above that, it is a primary testing ground for the sustainability of high-yielding technologies of rice and wheat production.

The future of the RWC

The Panel was very impressed by the achievements of the RWC, which have been assisted recently by the ecoregional approach, and even more impressed by the potential for future benefits. A number of actions can be suggested to increase the chances of that potential being realized.

1. The way the consortium works (especially what it is that the facilitation unit actually does), the value of its activities in promoting participatory practices and R&D partnerships, and its successes need to be understood better within the CGIAR. This consortium plays a vital role in the process of learning how to conduct agricultural research more effectively in a food-production system of great significance to the CGIAR.

2. Some flexible funding is needed on a long-term basis, from both national and international sources, to promote international and intranational cooperation under the RWC. The provision of incentives for participating in partnerships is likely to remain important. Short-term project funding at the margins of this work will not achieve the synergistic objectives of the RWC.

3. Provision should be made for periodic evaluation of the internal operations of the consortium – its impact on the performance of institutional leaders and others engaged in R&D at various levels in the rice-wheat production system – and the efficiency of its processes. The actual research done by the participants should be reviewed separately in the normal way, e.g. through the External Programme and Management Reviews of Centres.

4. There appears to be scope for the RWC to play an even greater role in gathering, evaluating, synthesizing and disseminating useful information from international sources, as has been done so successfully for tillage technology.

5. More emphasis should be given by the participants to natural resource conservation and management issues. In particular, the CGIAR should strengthen its involvement in water-resources research under the umbrella of the RWC. The role of livestock in the longer term viability, especially financial viability, of the rice-wheat system also warrants attention.

Schedule of visits

19 April 1999
Meeting of Panel at the Facilitation Unit, IARI Campus
Discussion with Dr. P R Hobbs, Interim Facilitator, Rice-Wheat Consortium
Visit to National Centre for Agricultural Policy - Dr. D N Jha (Director) and senior staff
Meeting with Dr. I P Abrol, ex- Facilitator, Rice-Wheat Consortium

20 April 1999
Field visit of the TAC Ecoregional Review Team to Karnal, Haryana

The team first visited a farmer's field in this rice-wheat area where farmers use zero-tillage to establish wheat after rice. The farmer was present in the field to answer questions. This was the only field in the area planted to wheat because all the other fields were too wet to plant. This field had been planted using the new zero-tillage option being promoted by the State Extension Service and recommended by the Haryana Agricultural University. The farmer, who said he would buy his own drill next year and plant a larger area, was pleased with the 3.5 t/ha crop.

The team then moved to the HAU Uchani Research Station where they saw a field of bed-planted wheat. This was higher yielding than the flat-planted crop mainly a result of less lodging. A group of 20 farmers who experimented this year with zero-tillage and bed planting under the supervision on the State Extension Service were available at the station to talk about their experiences and answer questions. The majority of the farmers were happy with the experiment although a few problems were identified and a feedback was relayed to the researchers. The zero-tilled plots usually yielded the same or more than traditionally planted wheat but at less cost. Farmers indicated they would expand the area planted to the new technique next year.

After lunch the Review Team assembled in the conference room of the Directorate of Wheat Research for discussions with a group of scientists and extension agents invited from other parts of India and from Nepal and Bangladesh. There were active discussions on various aspects of the rice-wheat research in the region and it was agreed that the ecoregional approach had brought added advantages to their programmes. This meeting enabled the Review Team to better understand the intricate research system in India that involves State Agricultural Universities and ICAR programmes working with State Extension Services. The following is a list of the various participants:

1. Dr. Y. Singh, General Manager (Farms), GB Pant University of Agriculture and Technology, Pantnagar
2. Dr. S.B. Sharma, Head, Division of Nematology, IARI, New Delhi
3. Dr. Samar Singh, Agronomist, CCS HAU, Regional Research Station, Uchani, Karnal
4. Dr. V. Beri, Professor, Dept. of Soil, PAU, Ludhiana
5. Mr. Aroor Singh, ASS Foundry, Amritsar (Local Manufacturer of drills)
6. Dr. P.R. Gajri, Professor, Dept. of Soils, PAU, Ludhiana
7. Dr. R.S. Mehla, Joint Director Extension (Agri), Haryana
8. Dr. J.K. Verma, Joint Director Extension (Agricultural Farm Machinery), Haryana
9. Dr. S.K. Rautaray, Principal Scientist, CIAE, Bhopal
10. Dr. S.S. Dhillon, Sr. Agronomist Wheat, Dept. of Plant Breeding, PAU, Ludhiana
11. Dr. R.K. Malik, Professor (Weed Science), CCS HAU, Hisar
12. Dr. D.S. Chauhan, Principal Scientist, DWR Karnal
13. Dr. C.R.S. Panwar, Assistant Agriculture Engineer, Karnal
14. Dr. S. Nagarajan, Project Director, Directorate of Wheat Research, Karnal, Haryana
15. Dr. S.D. Dhiman, Agronomist, CCS HAU Rice Research Station, Kaul, Haryana
16. Dr. T.P. Pokharel, Director of Crops, NARC, Nepal
17. Dr. M.A. Razzaque, Director of Research, BARI, Bangladesh
18. Dr. C. Johansen, ICRISAT
19. Dr. R. Barker, IIMI

20. Dr. P.R. Hobbs, CIMMYT

21 April 1999

Discussions/Presentations by ICAR Rice-Wheat Team
- Dr. R.K. Gupta, RWC Coordinator for India
- Dr. P.K. Aggarwal, Systems Analyst
- Dr. S.B. Sharma, Head, Division of Nematology, IARI

Lunch hosted by Dr. R.S. Paroda at Indian International Centre

Discussions/Presentations by IARC scientists
- Dr. M. Hossain and Dr. V. Pal Singh, IRRI
- Dr. S. Illangantilake, CIP
- Dr. C. Johansen, ICRISAT
- Dr. R. Barker, IMMI (IWMI)
- Dr. P.R. Hobbs, CIMMYT

Concluding commentary by Dr. R.P. Singh, Director, IARI

Dr. M.A. Razzauqe, RWC Coordinator, Bangladesh and Dr. T.P. Pokharel, RWC Coordinator, Nepal, also participated in the discussions on 21 April. An apology was received from Dr. M. Saleem, RWC Coordinator, Pakistan.

22 April 1999

Internal Panel discussion and wrap-up meeting with Dr. Hobbs.

REPORT OF VISITS TO ECOREGIONAL ACTIVITIES IN SUB-SAHARAN AFRICA

1. Background

The Panel for the sub-Saharan African visits was comprised of Dr. Shellemiah Keya, Executive Secretary of TAC and Dr. Ted Henzell, Chairman of the Review of Systemwide Programmes with an Ecoregional Approach. In Nairobi, the Panel was assisted by Dr. John Lynam, Senior Scientist, Agricultural Sciences, Rockefeller Foundation, Nairobi.

The visit took place from 5-12 May 1999. In Nairobi, discussions covered mainly the ASB Programme, focusing on its global structure and management, and the AHI, which is the major ecoregional activity conducted in eastern Africa. The opportunity was taken also for the Panel to be briefed on the valuable experience of the Systemwide Livestock Programme, which aims to implement its activities in collaboration with CGIAR Centre-led ecoregional consortia. The schedule of meetings in Nairobi is given under Point 4.

In Cameroon, comprehensive presentations and selected field inspections covered the earlier developments, current activities and future plans of the IVC, the rest of EPHTA and the ASB Programme in West Africa. Details of the schedule for the Panel's visit to Yaounde are listed under Point 5.

Thanks are due to a large number of people for the excellent arrangements made for this visit, but particularly to Ralph von Kaufmann of ILRI and Jimmy Kiio of ICRAF for the East Africa visit, and to Stephan Weise and Aboubakar Yacoubou of IITA, and Polly Ericksen of ASB/ICRAF, for the West Africa visit.

2. Response to Terms of Reference

2.1 Alternatives to Slash and Burn

The ASB Programme is a global consortium. Collaborative research involving over 30 international and national research organizations is implemented through three regional benchmark sites/areas which use the ecoregional approach to address the environmental impacts of slash and burn agricultural practices, to develop alternative technologies, and to provide policy options for removing constraints to adoption of alternatives. The ecoregional activities at the main continental sites in Brazil, Indonesia (Sumatra) and Cameroon each have a hierarchy of steering committees, but (in contrast to other ecoregional activities) there is also a global steering group. The part-time global coordinator of the ASB (Dr. Erick Fernandes who resigned during the Review) is located at Cornell University and the assistant, now interim coordinator (Dr. Polly Ericksen) is located at the ASB global coordination office at ICRAF's headquarters in Nairobi. At the global level, four specific functions have been performed: planning of research activities, standardization of methods across sites, fund raising and distribution, and trans-regional analysis of experiences and results.

In relation to the Terms of Reference of the Review, the following assessment is based on information gathered during visits to the global coordination office at Nairobi and the site at Yaounde, and on other information available to the Panel concerning the achievements of the

consortium working in Indonesia. The Panel notes that a comparable level of detailed information was not available from the work at the Brazilian site. Also, the phase II final report from the Brazil visit was still in the process of being translated from Portuguese.

In Cameroon, five subjects have been researched since 1994: (i) nine land-use systems have been characterized in the slash and burn forest zone; (ii) carbon stocks, greenhouse gas emissions and biodiversity have been measured; (iii) the agronomic and soil sustainability of different systems has been estimated; (iv) cash and calorie returns have been calculated, and also their potential tradeoffs with environmental factors; and (v) future land-use trends have been predicted (cocoa and oil palm systems will probably increase). Current collaborative research includes both of these agroforestry systems. Since 1998, ICRAF has been giving more emphasis to tree-domestication research.

Against Terms of Reference 1, the ASB has made a major contribution to research in natural resources conservation and management, and in linking such research to that on production systems. The ASB's global findings on trade-offs between environmental parameters such as carbon sequestration and biodiversity on the one hand, and agricultural productivity indices such as profitability on the other, are of great value for the global debate on sustainability issues. The Indonesian consortium has made considerable progress also in linking research on agroforestry production to policy on forest management. The work in West Africa has the same objective but has not progressed so far. However, CIFOR has carried out important research in its study of the causes of forest-cover change in the humid forest zone of Cameroon, which has strong policy implications.

The ASB has carried out new natural resources conservation and management research, notably on biodiversity, carbon sequestration and greenhouse gas emissions, and new research on cropping and agroforestry systems. It has also produced publications on process (project management within consortia) and the problem of extrapolation from benchmark sites (modelling the global representativeness of the 108 locations at which research has been conducted in the western Amazon, Indonesia and Cameroon).

For Terms of Reference 2 (Value Added), the Indonesian consortium rates highly on the effectiveness of collaboration and partnerships amongst Centres (notably between CIFOR, ICRAF and IFPRI), between them and various Indonesian research and policy-making agencies, and with an impressive number of other bilaterally funded research partners. The policy research in Indonesia has been first rate, and its practical impact is reflected in recent ministerial decrees authorizing community management of significant areas of forest in Sumatra and Kalimantan. In addition, the ASB has helped to strengthen regional research capacity.

The success of the Asian ASB consortium seems to be attributable to several favourable factors – effective scientific leadership, a strong capacity for R&D in the region to which value could be added through coordinated effort, a recognized problem of real significance (deforestation) and dependable political support from the Government of Indonesia. The Scientific and Technical Advisory Panel (STAP) report (see below under Evaluation) commented on "the excellent participation of local (Indonesian) institutions and scientists in the first phase of the ASB project". The relationship between ICRAF, IITA and IRAD at the southern Cameroon benchmark area has also been close.

However, the Panel was aware of some operational difficulties in allocating roles, responsibilities and funding among partners at both the Asian and African regional benchmark sites of ASB. It appears that such difficulties have sometimes been encountered both between Centres and between Centres and NARS. Governance of partnerships is

obviously not a simple matter, and there are good opportunities to learn by sharing experiences.

Cost Effectiveness The start up and global coordinating functions of the ASB appear to have been relatively costly when they are considered in isolation, but these costs need to be set against the total resources devoted to pertinent R&D by the consortium's participants. Efficiency in the use of these financial resources should be improved by operating under the umbrella of the consortium. However, apparently the value of this total R&D effort has not yet been estimated with any accuracy (see below).

Participation of Potential Beneficiaries Farmers and Indonesian Non-governmental Organizations participated strongly in the research carried out at the site in Sumatra. The recording and documentation of the farmers agroforestry system played an important role in convincing policy-makers to grant them rights to manage the land, and in removing the threat of it being logged. In general, the convening Centre ICRAF has a good record of involving stakeholders in its activities. Recently, it has sponsored training in participatory methodology in southern Africa.

The strong participatory emphasis of the ASB work in Cameroon is described later under the heading of EPHTA. Several documents, particularly that from the launching function held in Yaounde in May 1997, attest to the high priority given to the involvement of farmers, Non-governmental Organizations and community-based organizations.

Clarity of Communication The ASB has been exceptionally effective recently in communicating the importance of its research to policy makers engaged in the global environmental debate. The presentation to International Centres' Week 98 attracted wide interest, and there have been subsequent presentations to other influential stakeholders. However, the way in which the ASB consortium and the global coordination office add value to the whole R&D process has not been communicated as effectively. It takes much time and effort, and some financial leverage, to convince researchers and those in charge of agricultural R&D institutions (including bilateral donors), who have long been used to working in fragmented isolation, to change their mode of operation in pursuit of the broader goals of the ecoregional approach.

Continuity of Funding This lack of clarity on process is probably one reason why the continuity of funding for coordination has been a problem for the ASB at times. In contrast, the Panel was told that funding for research by participants under the umbrella of the consortia has been much more robust, especially in Asia. In contrast to the provision of only supplementary research funds by other ecoregional programmes, ASB has provided some core funding for research activities.

Accountability There is an issue of accountability in distinguishing between expenses incurred by ICRAF for the central operations of the three consortia and the global coordinating office, and those incurred by its involvement as a major participant in the Programme. It is also hard to discover from published accounts how much is being invested in ASB, in cash and in kind, by participants other than ICRAF. Estimates provided to the External Programme and Management Review of ICRAF in 1998 indicated that 14 - 18% of ASB funds were spent on the ASB coordination office over the three years 1996 to 1998. However, some bilaterally funded research was not included. These estimates suggest that the investment in R&D has been at least four to six times the transaction costs of global and regional coordination.

Planning, Monitoring and Evaluation The multi-level steering committees of the ASB seem to have achieved high standards of planning and monitoring, and a positive external

evaluation of phase I of ASB was conducted in 1997 by STAP, the advisory body to the Global Environment Facility (GEF). A comprehensive report has been compiled on phase II of the ASB. In all, ASB has been reviewed three times by the GEF, but two of the reviews were of limited scope.

2.2 African Highlands Initiative

The AHI, which was first proposed in 1992, is a consortium with collaborative research in five of the nine countries covered by ASARECA: Ethiopia, Uganda, Kenya, Tanzania and Madagascar. The first phase (1995-97) consisted of a small number of technical research themes or NRM problem areas, but the second three-year phase has adopted a much broader approach. This is more in line with ecoregional thinking and follows an increased system approach organized around benchmark sites, although it is less strong in regional linkages. AHI research now addresses the problem of the decline in soil fertility in the intensively cultivated highlands of eastern Africa. The tropical highlands in East Africa are identified by elevations above 1500 m and more than 1000 mm rainfall, and characterized by inherently fertile soils which host a wide range of cash and food crops, such as coffee, tea, bananas, maize, potatoes, beans, vegetables, multipurpose trees and livestock. The highlands occupy only 23% of the total land area in the nine eastern African countries in which they occur, but they are economically important and provide food and a home to half the population of these countries. Recently, water for domestic and agricultural use has become a limiting resource. Although there are few off-farm income opportunities, and access to input and output markets is poor, land tenure is relatively secure in the highlands.

At the regional policy level, the AHI consortium operates under the aegis of ASARECA. Below that, there is an established structure of a Regional Steering Commodity (currently chaired by Dr. R.M. Kiome of Kenya) and a Technical Steering Committee, with a coordinator for each of the eight benchmark locations. Research is currently conducted in a decentralized mode, in particular in Uganda and Tanzania, using what is termed as the Participatory Agro-ecosystems Management approach, but with cross-site linkages. This approach serves to connect adaptive research and extension, rather than to instil a more systems approach. The AHI is by far the most comprehensive of the networks, programmes and projects proposed to be carried out under ASARECA's long-term strategic plan.

Consortium funding is provided for a full time coordinator and the operation of her office in Uganda. Other centrally funded ecoregional activities include a research project on participatory methods. Following initial grant support along research themes through a regional fellowship scheme, support in phase II to national scientists focuses on method development, backstopping and facilitation of linkages. Financial assistance is also being provided to help set up electronic communications between the benchmark locations.

Against Terms of Reference 1, the Panel found that compared with the previous phase, phase II embodies the development of a stronger linkage of research on natural resources conservation and management with research on production systems. However, more time will be required to fully implement this integration at specific benchmark sites. The integration that already existed in phase I, which concentrated more on diagnosis, planning, regional synthesis and building strong partnerships, seems to have come mainly through agroforestry inputs from ICRAF, including the Agroforestry Research Networks for Africa (AFRENA). However, there was also an emphasis on integrated pest management during phase I of AHI. Integrated nutrient management and catchment management practices are both listed in the current agenda of the AHI. The Panel pointed out that care should be taken to ensure that the

commonality between AFRENA and AHI projects in Kenya and Uganda does not interfere with AHI's development of broader aspects of the ecoregional approach.

The Director of the Kenya Agricultural Research Institute credits the dissemination of ecoregional thinking for the improvement in the characterization of regions for predicting crop varietal performance in eastern Africa. He is in a good position to know as he chaired the CGIAR Task Force on Ecoregional Approaches to Research which reported to the Group at Mid-Term Meeting 95. Agroclimatic classifications of land in East Africa had been available for many years, but had proved to be of limited utility for purposes such as targeting new varieties from plant-breeding programmes. The 1998 publication of the book "Maize technology development and transfer: A GIS application for research planning in Kenya" by CAB International (UK), in association with CIMMYT and the Kenya Agricultural Research Institute, was quoted as a good example of how the new approach exploits the power of GIS.

However, it would not be correct to attribute all such changes to the CGIAR's advocacy of the ecoregional approach. In eastern Africa, as in other regions of interest to the CGIAR, thoughtful people in national R&D agencies had also become dissatisfied with the limitations of working in disciplinary isolation, with too heavy an emphasis on commodities.

Turning to the several points of Terms of Reference 2, the AHI is still at an early stage of development, but some useful conclusions can be drawn already. The effectiveness of collaboration and partnerships amongst international Centres seems to be quite high. Collaborative projects are being engaged in by three Centres and the Tropical Soil Biology and Fertility Programme (TSBF); four other Centres are also involved through networks that operate in the highlands. Within the national programmes, partnerships between disciplinary and commodity specialists are at varying stages of development. In Kenya, and now in Tanzania, the trend towards an integrated approach at the district level has been helpful to the AHI. Only one of the five countries (Ethiopia) was reported to have a strong emphasis on a whole-system approach.

The perception that consortia such as the AHI were too strongly driven from the outset by Centres persists in some places. In the past, there have been some difficulties in reconciling the interests of Centres and NARS at the operational and technical levels of AHI. The Centres are in a difficult position as they are often under an obligation to those who fund them to meet demanding milestones. This makes it hard for national scientists to adjust to the pace of change and to achieve a sense of ownership of the new ways of doing things. Younger researchers commonly have less difficulty to adjust than middle-level managers. With the increasing responsibility of National Agricultural Research Organizations in the decision making of consortia, efforts are sometimes needed even to maintain a significant level of Centre commitment clearly, sensitivity is needed on both sides of the partnership.

Operational research funds come primarily from international sources. Despite reductions in support for agricultural research in ASARECA countries, both from international donors and national governments, it appears that there is still sufficient R&D capacity to add significant value through coordination by the AHI consortium. Nevertheless, the limited financial resources become a problem when there is a need to recruit expertise to fill gaps or to build new fields of research, for instance in the hitherto neglected areas of natural resource conservation and management, and in the social sciences, including policy research. Only the strongest national systems, such as the Kenya Agricultural Research Institute, have been able to recruit to fill such gaps. A consortium such as AHI should provide operational support to the NARS to allow NARS partners an equal footing with Centres in developing a true partnership.

Cost Effectiveness A considerable investment in time and resources has been required to get the AHI to its present promising position. It is very clear that the process of institutional change required to achieve the objectives of the ecoregional approach does not occur quickly or easily. The managers of the AHI generally accept that the job is far too big for a part-time regional coordinator, which is what the consortium had during its first phase. While great progress has been made in developing participation and partnerships, much coordination remains to be done in the future to realize the vision of sustainable land-use practices for the highlands.

Concern has been expressed about the cost of coordination in phase II of the AHI. The ecoregional approach being adopted by the consortium (its guiding principles are exactly in line with ecoregional principles) is bound to require more costly coordination than any of the other more traditional commodity and technical networks planned to operate under ASARECA. However, it would be helpful to separate transaction costs more transparently from research expenditures (see under accountability), to document the quantity of R&D resources that could function more effectively as a consequence of the coordination, and to communicate more effectively the processes involved in fostering the changes required to implement the ecoregional approach.

The coordination mechanisms in Africa, i.e. ASARECA, the Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles (CORAF) and the Southern African Centre for Co-operation in Agricultural and Natural Resources Research and Training (SACCAR), have emerged in recent years as the recognized regional policy bodies for organizing agricultural research. In East Africa, ASARECA seems now well established. Nevertheless, the Panel was surprised at the large number of steering committees and similar mechanisms that have been set up to oversee networks in eastern Africa. There could be scope for rationalization of structures, even if it is desirable to retain separate technical committees. The CGIAR's objective, as reported in 1994, was to use the ecoregional mechanism to provide a single point of contact between Centres, donor agencies and heavily pressured national systems. However, the CGIAR should recognize the change in the external policy environment which now provides the key entry points for regional collaboration of Centres with NARS. If anything, the pressures may even have increased since 1994 as donors have become more project-oriented and interventionist.

Participation of Potential Beneficiaries The Participatory Agro-ecosystems Management approach is a recent innovation, but participatory rural appraisal featured strongly in the diagnostic fieldwork recently completed by the consortium. Training in the methodology of participatory research is currently underway and it is clear that the participation of potential beneficiaries is one of the chief priorities of the second phase.

Clarity of Communication While ICRAF has been highly supportive of the AHI, there is some concern that in its published reports it is too difficult to distinguish between what the regional coordinating unit has achieved, what national participants have achieved through collaborative research, and what ICRAF has contributed to the Programme. Virtually the same observation was made in the report prepared for ASARECA by Drs. K.T. MacKay and F.N. Gichuki in May 1996.

As already proposed under ASB, much greater clarity is required as to what the coordination function actually involves in practice and why it is so important. This information is needed to help convince ASARECA and the donor community that the central operations of the consortium are a good investment.

Continuity of Funding Current negotiations will determine whether or not the central functions of the AHI consortium have continuity of funding. There is concern also as to whether government funding of national research systems has stabilized and whether bilateral donors will continue to divert their funds away from agriculture. Despite all these uncertainties, the Panel members were assured that sufficient resources would be available in the foreseeable future to achieve the main objectives of the AHI. Efficient cooperation is even more important in the face of scarce resources for research.

Accountability Transparency in accounting would increase significantly if mechanisms were developed to distinguish between expenditure on regional coordination (the direct transaction costs of a regional consortium), expenditure on ecoregional studies (research on the ecoregional approach itself) and expenditure on conventional agricultural research by participating organizations. In Africa, there are usually strong pressures for international donors to cover operating costs for national scientists engaged in collaborative projects. Transparency in accounting also requires more systematic reporting mechanisms. For instance, AHI does not appear in ICRAF's Annual Report.

Planning, Monitoring and Evaluation The presentation to the Panel indicated a highly professional standard of planning in the AHI. Future provision has been made for regular monitoring and reporting, internal evaluations and an external evaluation to take place in 2001, and for setting a baseline in 1999 to measure future impact. The external evaluation of the first phase of the AHI has already been mentioned.

Finally, it is worth noting that the AHI has had some success in facilitating technology transfer among the participants. The technology for growing climbing beans (from CIAT) on stakes (from ICRAF) has been communicated to farmers using innovative methods, including drama, with the major involvement of national scientists in Uganda and Tanzania.

2.3 African Highlands Initiative as Part of the Global Mountain Programme

The Panel was told that linking the AHI to ICIMOD had been of little value because the natural environments and types of land use differ so completely between the predominantly agricultural highlands of eastern Africa and the high mountains in Asia, where forestry is the only form of 'agriculture'. Even the African highlands and the Andes do not have much in common. It appears that the substantial experience of ICIMOD in highlands R&D, which covers land-use planning in a broad sense, including income generation, organization and management, as well as policy issues, would justify a more positive attitude in this arena. The Panel sees a particular value in the exchange of information and experiences in the application of methodologies.

2.4 Implementation of the Systemwide Livestock Programme within Ecoregional Activities

Most of the effort of the ecoregional initiatives during their first three or four years has been devoted to establishing new modes of operation with national systems and to developing participatory approaches. It has taken some time to develop a whole systems approach linking natural resource conservation and management and production research. This has made it difficult for livestock researchers to use ecoregional initiatives (at least those begun by the CGIAR) as a framework for their activities. In particular, the slow development of ecoregional initiatives in semi-arid and dry areas has been a major source of frustration for the Systemwide Livestock Programme as livestock play a major role in dry environments.

Livestock are also part of important interactions in crop production systems. Changes in production practices, for instance the intensification of cropping, have major implications on animal-feed supply. Conversely, livestock (especially ruminants) can play a vital role in plant nutrient cycles and maintenance of soil fertility. Without such recycling, animal wastes may cause environmental pollution.

The senior management of ILRI advised that they had been most successful in establishing collaboration with CONDESAN, and with the ecoregional activities of ICRAF and IITA in Africa. In the past, there have been strong links with ICRISAT in West Africa.

2.5 Inland Valley Consortium (IVC)

The Panel was presented with extremely informative material on the whole range of ecoregional activities in West Africa. This report focuses mainly on two consortia under EPHTA, the IVC and that for Humid Forests (see 2.6). The term inland valleys in the title of IVC refers to the upper reaches of river systems. IVC's research is concerned with the bottom land of inland valleys which may be submerged for part of the year, the hydromorphic fringe and the dry uplands that lie higher up the slope.

IVC was launched in April 1994 for an initial period of five years with support from WARDA's core resources, the Netherlands Directorate General for International Coorperation and the French Cooperation. WARDA is its host and convening Centre. The founding members of the consortium were seven NARS members of CORAF (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Nigeria, Sierra Leone), two international organizations (WARDA and IITA) and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), France, and the Wageningen University and Research Centre, the Netherlands. IVC was subsequently joined by the NARS of Guinea, Cameroon and Togo, and ILRI and FAO. WARDA's membership of IVC brought excellent links with countries in the region as well as its scientific strength in inland-valley research and experience in GIS.

In April 1999 the second phase was launched, which goes up to 2004, with CORAF and IWMI as additional consortium members. The research agenda for the second phase aims to strengthen NRM and social science research. It is organized under four themes: characterization of inland-valley land-use dyanmics; development and evaluation of technologies for improved production systems and NRM; socioeconomics and policy aspects of improvements in inland-valley land-use systems; and technology dissemination processes and impact pathways for inland-valley development. Work is being carried out at 15 sites and five benchmark sites will be used for more strategic studies from 1999 onwards. The long-term donor support for IVC is very encouraging.

The IVC is truly a consortium under whose umbrella research and research-related activities are being carried out by national partners (including NARS, extension agencies, universities, NGOs, farmers) in ten member countries, in collaboration with international institutions. A Consortium Management Committee has replaced the steering committee and is elected every two years at a consortium workshop. It is chaired by a National Coordinator and co-chaired by CORAF. The IVC Regional Coordinating Unit, based at WARDA, includes a senior agronomist as coordinator and a natural resource management scientist (formerly an agroecologist). National Coordination Units have also been formed which play a vital role in the success of the consortium.

The Panel's impression is that those involved in the IVC appear to be very well aware of the essential elements of the ecoregional approach. The IVC has made very good progress in evolving from an emphasis on regional characterization and production to one that is truly ecoregional in its concern for issues of natural resource conservation and management, and policy. The seasonal reliability of the water supply in the inland valleys is of immediate concern. Water quality (pollution) is not yet a major problem but could become one. Health hazards related to water are now of far more importance and are issues to which WARDA can contribute in view of its collaboration, since 1995, in a Human Health Consortium together with the World Health Organization. Good hydrological data are available for the main river basins in West Africa, but there have been fewer studies of small catchments.

Policy makers in the region are perhaps not as sensitive to issues of natural resource conservation and management as are the scientists involved in the IVC, and policy and public management research has not been developed in many of the countries. In its second phase, the IVC will address these issues through the development of decision-support systems aimed specifically at assisting policy makers. Already, there are examples of IVC National Coordinators providing influential policy advice to national policy makers in West Africa.

The IVC has accumulated much valuable experience in relation to the Review's Terms of Reference 2, some examples of which are given below.

Collaborations and Partnerships The IVC has benefited from WARDA's excellent links with countries in the region, and from its research and expertise. Altogether 10 countries are now members of the IVC as well as an impressive list of international institutions.

The role of National Agricultural Research and Extension Systems (NARES) is a very important issue for this consortium. National institutions vary widely in capacity and as they are independent agents and often strong rivals, there are challenges in facilitating collaboration and partnerships within and between them. Complex problems arise if the priorities of the NARES do not coincide with the additional work considered to be a priority by the consortium. If NARES are unable to adjust quickly enough, this can be misinterpreted as lack of support for the consortium.

Another major issue in the early days of the IVC was the standardization of methods for multi-scale characterization. The international research institutions took strong positions and the NARES felt that the value of their local experience was being undervalued. Eventually a better sense of ownership was achieved by sharing experiences. The Panel was informed that it had been a continuous effort during the first five years of the IVC to develop and maintain a high level of partnership and collaboration. An issue which may require attention is that of IVC's future relationship with WARDA's programmes. This is being addressed in phase two by a closer integration of the IVC research agenda with that of WARDA.

Cost Effectiveness The IVC seems to have had less of a problem in justifying its coordination costs than other ecoregional initiatives. For IVC's partners it was apparently clear from the beginning that coordinating the numerous efforts that already existed was a priority. One of the first tasks carried out by the Regional Coordination Unit at WARDA was to encourage capitalization of existing results through state of the art papers, and national and regional workshops, etc. WARDA's regional task forces comprised of national collaborators, and the setting up of IVC National Coordination Units may have played an important role in increasing awareness of the importance of coordination in such an approach.

Participation of Potential Beneficiaries The main involvement with farmers, village organizations and Non-governmental organizations has been at the level of the National Coordinating Units. These have helped to identify constraints and to promote adaptation and

adoption of new technologies. The establishment of a close link between IVC and WARDA's System's Development and Technology Transfer Programme will further strengthen participatory approaches to technology development, evaluation and adoption.

Clarity of Communication The IVC seems to have been able to communicate the nature of its activities and their importance for development rather more effectively than some of the other ecoregional consortia. Reasons for this may include the active role that French and Dutch institutions have played throughout the time of the IVC and the publication of its work in a separate Annual Report.

Continuity of Funding So far, funding of the consortium's central operations has not been a special problem. However, while funding for coordination and field work has been available from the beginning, funding for training, the early development of benchmark sites and strategic research has been a problem. During the first year of the IVC a part-time scientific and administrative liaison officer was appointed in Wageningen to maintain contact with research institutes outside the region and with donor organizations. This may have been a critical factor in raising support for the IVC. Research institutions at Wageningen and CIRAD have made special efforts to encourage the Dutch and French governments to continue funding. The fact that the two scientists at the Regional Coordination Unit at WARDA were from these donor countries facilitated contacts and continuity of funding.

Accountability The consortium has produced detailed financial accounts annually for presentation and discussion with all partners. These are internal records, attached to the minutes of meetings with partners, which are available to donors on request. As with other ecoregional activities, the value of in-kind resources contributed by participants has not been well recorded.

Planning, Monitoring and Evaluation Initially, and in contrast to the situation with most other ecoregional consortia, provision was made for the IVC to be reviewed every three years. The review in 1996 proposed the establishment of a scientific advisory group to advise the consortium more regularly than an external review. Other recommendations concerned scientific discussions, standards of publications and rationalization of study sites. Meanwhile, the evaluation of IVC has become part of the regular WARDA review and planning process. The Panel appreciates that IVC will now benefit from the forthcoming Centre Commissioned External Review and the External Programme and Management Review. WARDA has decided to provide scientific oversight through its Programme Management Committee and the biannual Meeting of National Experts which brings together all NARS Directors.

2.6 Ecoregional Programme for the Humid and Sub-Humid Tropics of Sub-Saharan Africa (EPHTA)

Although the IVC began separately, it is now part of EPHTA. The rest of EPHTA is formally structured into two regional consortia, one for humid forests and one for the moist savannas, though in practice the work seems to be organized primarily within a set of six benchmark areas. These are representative areas which are well characterized and large enough to capture important variability and gradients, both biophysical and socioeconomic. The concept of benchmark areas presumes that an understanding of driving influences on resource-use patterns (such as population, urban proximity and market access, presence of institutions, resource access) is essential for developing resource-management technologies that fit the strategies of farmers. They are a spatial representation of resource-use dynamics. Pilot sites are an important element in the concept to complement the broad benchmark areas. They are chosen to cover specific farmer circumstances and responses, and provide focal points for adaptive research and technology transfer.

EPHTA has adopted a zonation defined according to the length of the growing period, but depicts the location of the six existing benchmark areas on a map using names of vegetation zones: humid forest, derived savanna and Guinea savanna (southern and northern). However, the Panel noted that the vegetation actually seen on the ground now may differ significantly from the original. It also noted that the humid forest and savanna zones overlap with the zone used by IVC to define its research domain.

IITA convened the task force that developed the humid forest and moist savanna consortia. Several planning meetings, workshops and conferences were held during 1995 and 1996, culminating in the launching of the two consortia in 1996/97. EPHTA operates under the regional umbrella of CORAF. EPHTA's Programme Management Committee is co-chaired by IITA's Director General and CORAF's Executive Secretary. It has representatives from member countries and research institutions. Scientific oversight is provided by an annual planning workshop. There are coordinating committees for benchmark areas and pilot sites.

Since 1995, a number of scientific conferences and launching ceremonies, with associated technical workshops, have been conducted under the aegis of EPHTA. Both the methodologies of the ecoregional approach and advanced research topics (integrated weed management) have been covered.

One of the perhaps unforeseen spillovers from the intensive effort devoted to characterizing the benchmark areas and to the preparation of technical papers for launch ceremonies is that a great deal of existing scientific information was re-assessed, and opportunities for new applications through pilot demonstrations were discovered. This process could have significant benefits in terms of local rural development. In any event, the consolidated information placed on record is likely to be of lasting value.

The following comments concerning the Terms of Reference apply particularly to the southern Cameroon benchmark site at Yaounde, which the Panel visited. This benchmark area of 15,000 square kilometres also serves as the forest margins benchmark for ASB.

The briefings that the Panel received at Yaounde indicated that current research activities at the Degraded Forest benchmark area include the gathering of baseline information with strong farmer participation. Altogether five universities are involved. At the Northern Guinea Savanna benchmark area the emphasis is on crop/livestock integration and crop rotations. The human element, notably surveys of population density and marketing infrastructure at the village level, has received special attention.

In the humid forest zone and moist savanna, addressing the dyanmics of land use change as a result of increasing human settlement constitute a cross-cutting research. In Northern Guinea Savanna, EPHTA has tested the pressure response hypothesis. Considerable progress has been made in building ownership of the consortium by involving the partners in identifying the constraints, decision-making and participatory research. Participants met during the visit confirmed that the ecoregional approach was beneficial and gave an example where the benchmark area in Guinea has been used as a model to launch the FAO Special Programme on Food Security.

Review Terms of Reference 1

The NRM research that the Panel saw and learned about at village sites focuses on the development of sustainable production systems for small landholders. There are no marked soil and water degradation problems related to the intensity of resource use found in the forest margins or forest pockets, but there are indications of problems associated with

agricultural intensification in degraded forests where land use is more intensive. Only about 4% of the land around Yaounde is still covered by primary forest.

In this area, NRM problems are expected to result from over-reliance on fertilizers to maintain soil fertility in the face of accelerated nutrient removal in high-production areas and the decline of soil organic matter under more regular cultivation. Soil degradation is an important issue, particularly on bare sloping land. IITA scientists appreciate the concepts of watershed and landscape management, but lack capacity in strategic research. There is little use of herbicides and the emergence of more intractable weed communities is a real concern for farmers. In more intensively managed urban and peri-urban lowland systems, there are also expected to be serious human health problems associated with water-borne diseases and contamination of food crops. The success, in ecoregional terms, of future work in this humid forest benchmark area will be measured by how well these foreseeable threats to sustainability can be mitigated.

NRM and productivity research appear to have been linked effectively at a practical level by the humid forest consortium, especially in the areas of plant protection and testing of improved varieties. There was evidence also that research in IITA's Crop Improvement Division had gained from the ecoregional approach.

Review Terms of Reference 2

Collaborations and Partnerships It was apparent throughout the three days of presentations and inspections at Yaounde that commendable progress has been made in developing partnerships with the national systems of the region. A total of seven countries are members of the Humid Forest Consortium and nine are members of the Moist Savannah Consortium. IITA and IRAD have achieved a strong partnership in Cameroon. Discussions with the leaders of IRAD revealed very constructive support for the continuation of the consortium partnerships, qualified only by the desire to continue to intensify its involvement in consortium management (including dealing with problems of continuity of donor support).

While at Yaounde the Panel also heard presentations that indicated very effective collaboration between ILRI and IITA in the northern Guinea savanna benchmark area. (ILRI is also an active participant in the IVC). Another important factor that has been achieved at the southern Cameroon benchmark area, and which was very definitely part of TAC's initial thinking on the ecoregional approach, has been the inclusion of non-mandate crops which are important in the regional production systems, i.e. oil palm and cocoa. Expertise in these tree crops is provided by CIRAD and national scientists. Networks for maize, and roots and tubers, also represent successful partnerships under the umbrella of CORAF and IITA.

In relation to capacity building by EPHTA, the NARS are beginning to acquire the expertise needed for tackling NRM problems important in poverty alleviation.

Cost Effectiveness As with other ecoregional consortia, it is very difficult to judge the cost effectiveness of EPHTA's mode of implementation for two main reasons. Firstly, it is difficult to assess how much value has been added by the work of the coordinators at the level of EPHTA as a whole, or at benchmark areas or pilot sites. This is because its effects have been realized through the evolution of existing research programmes in collaborating organizations, rather than through new programmes or projects. On top of that, there are difficulties in accounting for in-kind costs and of separating transaction from conventional

research costs. IRAD scientists told the Panel that up to 70% of the costs of their involvement in joint projects in Cameroon were borne by in-kind contributions of the national institution.

Participation of Potential Beneficiaries The research in progress at the southern Cameroon benchmark gives high priority to the involvement of farmers. It was very instructive to see at first hand what is actually required to involve farmers in research at the village level. Because of its complexity, this process places great demands on the skills of field researchers, and even more on the professionalism of the coordinators who have to bridge the differences of scale back up to the creation of international public goods at the level of the CGIAR. It is a pity that more decision makers in the CGIAR do not have an opportunity to see what the participatory approach means in the real world.

The Panel was able to meet representatives of farmers' organizations, Non-governmental Organizations and the national extension service. The decentralization reforms of the Government of Cameroon in the early 1990s are said to have created a favourable environment for community-based action in the country. The practical problems in achieving this are illustrated by the fact that farmer representatives from different parts of the benchmark area hardly know each other. In these circumstances, Centres are likely to have to play an early catalytic role in areas in which they have no competitive advantage at all in the longer term.

Clarity of Communication The progress of EPHTA and its components has been documented very thoroughly indeed. What is lacking is any record of the experiences of the coordinators, especially in regard to the leadership and human relations aspects of their roles. It is probably very hard for any donor representative to understand how critically important these aspects are for the achievement of partnerships and participation of beneficiaries. This maybe why the current negotiations with the European Union have proved so cumbersome, and why the proposal has had to be broken up into modules that could be funded independently. The work of a consortium needs a balanced investment to realize its full benefit.

Continuity of Funding IITA has contributed considerably to meeting the costs of the consortia. In fact, the research plans of EPHTA have largely been implemented through IITA's core activities, at a cost to the Centre of about US$5 million per year. For instance, about half of the work of IITA's Resource and Crop Management Division is located within the southern Cameroon benchmark area. In fact, much of EPHTA's research seems to have evolved from the Centre's earlier NRM activities. It appears to have been very difficult to obtain any 'new' funds for EPHTA, beyond the extremely valuable support received from Denmark, the Netherlands and France.

Accountability Judging by the budgets shown to the Panel, the EPHTA consortia share with others the difficulty of estimating total costs and separating transactions costs from those of research, i.e. research on the ecoregional process itself (e.g. characterization of benchmark areas) and more conventional agricultural research. This makes it even more difficult than it would otherwise be to assess whether the value added by EPHTA has outweighed its additional transaction and management costs.

The Panel can only offer the opinion that the progress which has been made in developing partnerships and participatory approaches in West Africa, which are a significant departure from traditional methods, would not have been possible without an investment of this order of magnitude.

Planning, Monitoring and Evaluation EPHTA has been planned within a logical framework that specifies processes for monitoring and reporting against verifiable indicators.

3. The ASB Programme in Asia and African ecoregional activities: examples of the ecoregional approach in practice

The above activities seem to have one thing in common: they appear to consist predominantly of consortia facilitating collaborative research. They are not research programmes in the sense in which that word is used in formulating the CGIAR research agenda (even if they are called programmes). When the ecoregional approach was adopted, TAC and CGIAR Members apparently expected to see the creation of major new research programmes, or at least substantial new projects. However, with a couple of notable exceptions, this has not happened. Most of the research carried out under the umbrella of these ecoregional initiatives is really part of the continuing research programmes of the international and national participants in the consortia. To varying degrees, the objectives have been modified to accord with the ecoregional approach.

One of the notable exceptions is research on the characterization of benchmark sites and ecoregions, and on methodologies of various kinds. Some, but not all, of this research has been supported by the Ecoregional Fund to Support Methodological Initiatives.

Another important exception is the additional research conducted on natural resource conservation and management, and agroforestry under the ASB. Valuable new work has been carried out on carbon sequestration, on fluxes of greenhouse gases and on above and below ground biodiversity with funding from the Global Environment Facility. There are some other good examples, for instance the water research done with the involvement of CIRAD in the IVC, but in general, the idea that the ecoregional approach would facilitate a major strengthening of natural resource conservation and management research in the CGIAR has yet to be realized in the ecoregional entities covered by this visit. There may be very good reasons, e g, a lack of money to appoint new staff, but this does not seem to be the whole explanation.

A common feature of EPHTA/IVC, AHI and ASB is the focus on benchmark sites, the only major difference being in the number. The humid forest benchmark area in Cameroon, which the Panel visited, is the main focus for the work of the ecoregional consortium for the humid forests of sub-Saharan Africa and for ASB in West Africa. The arrangement is not dissimilar to that at the ASB site in Sumatra, which provides a major focus for research with links to related activities elsewhere in southeast Asia.

The effective functioning of the facilitation units of ecoregional consortia has proved essential in achieving positive outcomes. These units, normally comprising one, or a few, staff members, play a multiplicity of linking roles such as NRM research with that of other programmes in the Centres, and the Centres' work with that of partners in the consortia. They often provide training in the elements of the ecoregional approach and on standardization of methods. In addition, they perform a number of managerial functions as well as organizing information flows in various directions (including Email and Web sites), preparing proposals for donor consideration and distributing funds to encourage collaborative research. Some of the basic staff requirements are an understanding of, and sensitivity to, R&D issues, capacity to work with many people and managerial experience.

A very pertinent question is the extent to which the full scope of the ecoregional approach (holistic, integrating resource management with productivity concerns, combining technical

and human dimensions) has been explored in the African ecoregional programmes. The AHI and IVC seem to have begun from a relative narrow base of biophysical research and to have broadened their agendas to become more ecoregional with time. ASB has influenced the humid forest consortium, which from the beginning has satisfied all the criteria of the ecoregional approach, except for its choice of agroecological zone. The moist savanna consortium seems to be the one where there is the most scope for broadening the research agenda in line with ecoregional concepts.

The better-watered tropical savannas of Africa have the potential to "feed Africa" (comment to Panel members from a senior representative of a conservation agency). The problem of declining soil fertility under savanna cropping systems in West Africa was well documented before the advent of the ecoregional approach. Excellent research has been done on fertilizer responses and technologies for restoring soil organic matter. The reasons why there has been so little impact so far may reside more in the human element of the holistic ecoregional approach, and particularly in its political, economic and institutional dimensions, than in its technical element.

The Panel unfortunately did not include a social scientist, but it is very likely that the criticisms of the weakness of policy and institutional research in the ecoregional programmes of LAC (Annex V) would apply equally to those in sub-Saharan Africa.

4. Schedule of Discussions in Nairobi

6 May 1999

Discussions at ICRAF on ecoregional research, in particular on AHI and ASB
Meeting of the Panel at ICRAF with ICRAF Senior Management
- Dr. Pedro Sanchez, Director General, ICRAF
- Dr. Ann-Marie Izac, Director of Research
- Dr. Glenn Denning, Director of Development
- Erick Fernandez, ASB

Presentation and discussion on AHI
- Ann Stroud, Coordinator
- John Lynam, Rockefeller Foundation and member of AHI Steering Committee
- Dr. Kwesi Atta-Krah.

Lunch meeting hosted by Pedro Sanchez, Director General ICRAF
Discussions/presentations on the ASB programme and its global coordination:
- Polly Ericksen, Programme Coordinator at ICRAF

Concluding discussion with staff concerned and wrap-up meeting with ICRAF management

7 May 1999

Interactions and consultations with Kenyan NARS
- Director of KARI, Dr. Cyrus Ndiritu who participated in the CGIAR Task Force on Ecoregional Approach and outgoing Chair of ASARECA
- Kenyan scientists (Dr. Romano M. Kiome)
- Hank Fitzhugh, the ILRI Director General, on the Centre's involvement in various ecoregional initiatives, more specifically on the Systemwide Livestock Programme convened by ILRI, by Jimmy Smith, the SLP Coordinator and Ralph von Kaufmann.

8 May 1999

Internal discussions of the Panel and drafting of trip report

9 May 1999
Transfer from Nairobi to Yaounde

5. Schedule of Presentations and Field Inspections at Yaounde

10 May 1990
General briefing for the Panel at the site and discussions on EPHTA:
- Emmanuel Atayi - Development of EPHTA: goal, outputs and structure
- Dr. J.-Y. Jamin, coordinator - IVC, Development of IVC
- IVC - Key site approach and experience of IVC
- IITA - Resource use paradigm and benchmark area concept
- IRAD - Development of the Forest Margins benchmark area
- NRCRI - Development of the Degraded Forest benchmark area
- IAR - Development of the Northern Guinea Savannah benchmark area

Discussions with farmers during field visit to a research village

11 May 1999
Discussions on the Role of Convening Institutes in EPHTA:
- J.-Y. Jamin - WARDA and the IVC
- Emmanuel Atayi - EPHTA programme coordination and benchmark area development
- Humid Forest Consortium Team IITA - The HF Ecoregional Centre in southern Cameroon
- Resource Management Programme IITA Ibadan - Northern Guinea Savannah benchmark area

Inter-Institutional Collaboration and Farmer Participation in EPHTA:
- IVC - Collaborative efforts within IVC
- NARES, NGOs, and farmers groups in the Forest Margin benchmark area (IRAD / HFC-IITA)
- NARES in the Northern Guinea Savannah benchmark area (IAR / RCMD-IITA Ibadan)
- Inter-Centre collaboration in Northern Nigeria (IITA-ILRI)
- Group discussion with local EPHTA partners:
  IRAD, FORCE, CFPC, SAILD, PNVA, Dschang, CIRAD, ICRAF, CIFOR

12 May 1999
Discussions with the DG, Dr. Jacob Ayuk-Takem and the DDG , Dr. J.D. Ngongoupayou of IRAD, Cameroon
Presentation and discussion with ASB Programme (IRAD and HFC-IITA)
Wrap-up meeting with scientists present on EPHTA, IVC and ASB

TAC REVIEW OF ECOREGIONAL PROGRAMMES
LIST OF INDIVIDUALS/PARTICIPANTS MET BY THE PANEL DURING DISCUSSIONS

(IITA Humid Forest Centre, Yaoundé
10-12 May 1999)

Name	Position	Institution
Centres		
1. Osseynou Ndoye	CIFOR Representative	CIFOR Cameroon, c/o IITA Yaoundé

Name	Position	Institution
2. Zac Tchoundjeu	ICRAF Project Leader, Cameroon	ICRAF, BP 2067 Yaoundé
3. Emmanuel Atayi	EPHTA	IITA, Ibadan, Nigeria
4. Ousmane Coulibaly	Agricultural Economist	Humid Forest Centre, IITA Yaoundé
5. James Gockowski	Agricultural Economist	Humid Forest Centre, IITA Yaoundé
6. Stefan Hauser	Soil Physicist	Humid Forest Centre, IITA Yaoundé
7. Lydie-Stella Koutika	Soil Scientist-Post Doc	Humid Forest Centre, IITA Yaoundé
8. Guy Blaise Nkamleu	Agricultural Economist	Humid Forest Centre, IITA Yaoundé
9. Christian Nolte	Soil Scientist	Humid Forest Centre, IITA Yaoundé
10. Shirley Tarawali	Agronomist	IITA/ILRI Ibadan, Nigeria
11. M. Tindo	Entomologist – Post Doc	Humid Forest Centre, IITA Yaoundé, IRAD, Yaoundé, Cameroon
12. S. Weise	Team Leader, HFC-IITA	Humid Forest Centre, IITA Yaoundé
13. J.Y. Jamin	IVC Regional Coordinator	IVC-RCU, WARDA, Bouaké, Cote d'Ivoire
NARS		
14. Jean-Georges Etele	Directeur Adjoint des Programmes	FORCE, Yaoundé
15. Jean Mbarga	Responsible des Programmes, FORCE	FORCE, Yaoundé
16. A.M. Emechebe	Plant Pathologist, Northern Guinea Savanna Benchmark	IAR, Amadu Bello University, Zaria, Nigeria
17. L. Thiombiano	NCU/IVC Coordinator, Burkina Faso	INERA, Ouagadougou, Burkina Faso
18. Regina Aroga	Cereals Entomologist	IRAD Nkolbisson, Yaoundé
19. Luc-André Bayomok	Agroforester, ASB/IRAD Researcher	IRAD Nkoemvone, Ebolowa
20. Luc Dibog	ASB/IRAD Researcher	IRAD Nkolbisson, Yaoundé
21. Jacob Ngeve	Humid Forest Margins BenchmarkArea Coordinator	IRAD Yaoundé, Cameroon
22. Jean-Claude Ngongang Nono	IVC/UNC Rapporteur	IRAD Barombi-Kang, Kumba
23. Laurent Nounamo	ASB/IRAD Researcher	IRAD Nkolbisson, Yaoundé
24. Tarcisius Nyobe	ASB/IRAD Researcher	IRAD Nkolbisson, Yaoundé
25. Pierre-Roger Tondje	Cocoa Pathologist	IRAD Nkolbisson, Yaoundé
26. Jean Tonye	Head, Farming Systems Division, IRAD	IRAD, Yaoundé, Cameroon

Name	Position	Institution
27. Nyemb Tschomb	Cocoa Pathology	IRAD Nkolbisson, Yaoundé
28. Christopher Ngong	Research-Extension Liaison Officer	National Agricultural Extension Service, Ministry of Agriculture, Yaoundé
29. J.E.G. Ikeorgu	Degraded Forest Benchmark Area Coordinator	NRCRI, Umudike, Nigeria
30. Jean Nyemba	Lecturer in Ag. Extension	University of Dschang, Dschang
Others		
31. Jean-Louis Reboul	Représentant Régional	CIRAD, Cameroun
32. Eliane Sentenac	Adviser, CFPC	Coopération Suisse, Yaoundé

ANNEX V

REPORT OF PANEL VISIT TO THE PROGRAMME FOR ENHANCING AGRICULTURAL RESEARCH EFFECTIVENESS IN TROPICAL LATIN AMERICA AND TO CONDESAN

1. Executive Summary

A review of CIAT and CIP Ecoregional Programmes was conducted between the 3rd and the 7th of May, 1999. It was found that the ecoregional approach has been an adequate framework to address NRM problems related to the CGIAR's goals, at the scales from farm to region. There is, however, a need for further strengthening of concepts and practice of the ecoregional approach by:

- Identification of the specific research 'niches' on which the Centres should focus their work, based on their competitive advantages.
- Delineation of problem-solving strategies, with less emphasis on the development of tools and methods as ends in themselves.
- Clarification of the role of the ecoregional approach within the various approaches to NRM research in the CGIAR.
- Improvement in the funding mechanisms and greater commitment to the ecoregional approach.

Evidence was found of strong links between NRM research and that related to the improvement of productivity. Similarly, there is evidence of inter-Centre collaboration, although it is still less than desirable. Participation of NARS in the ecoregional approach was very strong in both Centres. Opportunities for expansion of policy research were noted.

The enthusiasm and competence of CIAT and CIP researchers working in the ecoregional-approach programmes are remarkable and deserve strong support from the System.

2. Objectives and Description of the Latin American Review

A Review Team comprised of Derek Byerlee, World Bank, Nicolas Mateo, consultant and Elias Fereres, TAC member, visited CIAT from 3-4 May, and CIP from 5-7 May with the objective of evaluating the ecoregional approach to research, instituted within the CGIAR in 1994. The team was guided by a desk study "Background Information on Systemwide Programmes with an Ecoregional Approach" by Ekkehard Kürschner, selected documents provided by CIAT and CIP, and the Terms of Reference (see Annex 1). Discussions took place on the ecoregional approach with Centre Directors, project leaders, scientists and many partners, including Non-governmental Organizations, government research and development agencies, and local officials. Field visits were programmed by both Centres, but due to security problems, only that to the Cajamarca site of CIP was realized.

The team recognized at the outset that in the short time available, and given the complexity of the ecoregional approach and the number and diversity of current work with an ecoregional approach being carried out in CIAT and CIP, it was not possible to conduct an in-depth review of the activities of the Centres visited. In some cases these activities may not have been accurately captured. The following gives the team's overall impressions and discusses specific constraints and issues, most of which are common to both Centres.

3. TAC definition and rationale for the ecoregional approach

TAC defined the ecoregional approach as one that focuses on the sustainable improvement of productivity by conducting research combining the objectives of productivity enhancement with conservation of natural resources in an integrative way. Key characteristics of the ecoregional approach are an emphasis on partnerships among relevant actors to provide complementary skills, a focus on the 'right research' for the ecoregion, and the development and testing of new research paradigms (TAC 1993).

The rationale behind the formulation of the ecoregional approach concept was based primarily on the perceptions that:

- research on increasing productivity had to be combined with research on conservation of natural resources;
- there are potential complementarities in Centres' work that could result in large payoffs from inter-Centre collaboration and from coordinating Centres-NARS interactions;
- advancements in the development of new technologies for natural-resource characterization could help in extrapolating research results beyond national boundaries, thus leading to the development of a new set of international public goods related to the management of natural resources.

4. Translating the ecoregional approach into practice

4.1 CIAT

When TAC endorsed the ecoregional approach there were already activities in CIAT that fitted the TAC requirements for an ecoregional approach. These included the ASB initiative and work on hillsides. In fact, about 40% of the research currently conducted at CIAT fits the ecoregional approach. Thus, CIAT saw the ecoregional programme as a means of: providing a mechanism for articulating all of their NRM projects, and providing support and initiatives to those projects; and enhancing the interface between R&D.

CIAT now implements the ecoregional approach through a combination of strategic research and R&D at benchmark sites for three ecoregions: hillsides (Colombia, Honduras and Nicaragua), savanna (Colombia) and forest margins (Peru). This work is supported by CIAT through a strong capacity in GIS and modelling, and through emphasizing participatory approaches to R&D design and implementation. Work on the hillsides is concentrated in a

project, while work at the other sites is spread across projects. In addition, CIAT has a small ecoregional programme – funded by the System – that focuses on developing linkages and partnerships with users, and monitoring, evaluating and assessing the impact of the ecoregional approach.

4.2 CIP

CIP's early involvement with CONDESAN, of which it is a founding member, facilitated the strengthening of the ecoregional approach into its research portfolio. CONDESAN has established benchmark sites in all of the Andean countries and CIP provides strategic research support to this work. The GMP, which links work on high mountains in the Andes, Himalayas and East Africa especially through the exchange of information, is another initiative convened by CIP that shares the ecoregional approach. While not all of CIP's ecoregional work is done by CONDESAN and not all CONDESAN's work is CIP's, it appears that the ecoregional approach has served as a useful exploratory approach that takes CIP beyond its research capabilities into development activities, which in turn feedback into CIP's research. It is, therefore, of interest to CIP to maintain its links with CONDESAN as an example of the research developmental work continuum at the ecosystem level, as there are few examples of such work within the System.

5. Overall Impressions

It was recognized at the outset that it is too early to evaluate the ecoregional approach to research as this needs more time to achieve important objectives beyond ecosystem characterization and problem identification. However, it was felt appropriate to provide comments relative to the conceptual approach, independently of the specific CIAT and CIP programmes.

The ecoregional approach is conceptually an appropriate framework to tackle problems associated with the sustainable intensification of productivity at the various scales: plot, farm, watershed and ecoregion. It is also the team's belief that it is appropriate for Centres to conduct research in an ecoregion with an ecoregional approach. This should provide some comparative advantages in the development of international public goods related to NRM. However, it is important to emphasize that the Centres must find a niche within the R&D continuum of the ecoregional approach, probably upstream in the strategic research areas, with very selective incursions into adaptive research and development work.

One of the perceived advantages is that the work is conducted in the fragile environments of poor areas where sustainable increases in productivity are uncertain but urgently needed. Some of these environments, notably in Central America, are becoming more vulnerable to natural disasters presumably due to lack of adequate policies and poor NRM. There is significant potential for decreasing the vulnerability of many areas if the responses to changes in management and land use could be anticipated via integrative modelling.

Centres also have the capacity to integrate a wide range of disciplines to organize the research needed for solving problems of an interdisciplinary nature. In both CIAT and CIP the ecoregional approach has served to focus the NRM work and has contributed to a shift in priorities and to the design of strategic research. It has also led to new lines of research such as product transformation for providing added value for rural growth and poverty alleviation.

The Centres are also in a good position to extrapolate research results at the ecoregional level to similar ecoregions around the world.

The team was also very positive about the diversity and the number of partners in the ecoregional programmes examined. However, it is important that the Centres select and prioritize their activities so that while acting as a catalyst, they can foster cooperative work without becoming too involved in it. Otherwise, they run the risk of spreading themselves too thin given the present level of activities, limited budgets and the large number of cooperators.

Despite these potential advantages, significant problems can be seen in translating the concept into practice, particularly at scales above farm level. Integrating the many diverse disciplines that affect the linkages between natural resources and productivity, into a problem-solving approach at the watershed/regional levels and beyond, is a formidable task that has yet to be accomplished in the programmes reviewed (and possibly anywhere). A major limitation to conducting long-term strategic research with an ecoregional approach of such a nature – the role that we would recommend primarily to the CIP and CIAT – is the nature of programme funding. Both Centres had expectations of attracting donor support for the ecoregional approach that have not materialized. Despite the initial good response, since 1996 donors seem to have lost interest in the ecoregional approach.

It was observed that research is often of an opportunistic nature, primarily donor-driven and often with an emphasis on short-term payoffs. Both characteristics cause ecoregional-approach research to deviate from planned objectives and to loose focus in the long run. If the ecoregional approach deserves a place in the System, there should be renewed efforts by TAC and the CGIAR to make a formal funding commitment to it.

We also still see the need for strengthening the conceptual framework of the ecoregional approach, including delineating appropriate activities to facilitate the identification of technology requirements. In our opinion, both the CIAT and CIP ecoregional programmes require more conceptualization and a focus on a small number of key priority problems within the target ecoregions, and less emphasis on the development of tools and methods as ends in themselves. As with any research, that to improve productivity and resource conservation at the ecoregional level has to focus on solving problems. Progress in linking problems to actual strategies and policies directed at the sustainable improvement of productivity also appears to have been limited.

While we could not judge critically the balance between biophysical and socioeconomic research, as we saw evidence of contributions from both sides, there appears to be a deficit in activities on policy research which we consider critical, as policy and institutional factors tend to dominate when moving from farm to watershed and beyond.

Finally, as noted above, there are opportunities for improving and streamlining ecoregional programmes in the CGIAR, and for clarifying the role of facilitation units with donors, partners and at System level in order to provide a consistent and clear message on the ecoregional approach. There are a number of different initiatives at the System level which need clarification and consolidation, such as the differences between global, ecoregional and Systemwide programmes in the ecoregional approach of NRM, and the existence of a soil-water-nutrient Systemwide Programme, as well as an ecoregional programme on soil and water conservation.

To sum up, we generally endorse the concept of an ecoregional approach in the Centres provided that it is adequately integrated in the overall NRM research programmes of the CGIAR and can be effectively translated into practice. The CGIAR might consider enhancing such work if the problems and limitations observed could be overcome.

6. Issues and constraints

6.1 Science issues

6.1.1 NRM and productivity research links

There was considerable evidence in both CIAT and CIP of strong links between NRM research and research on productivity enhancement, especially that on germplasm improvement. In CIAT, several products of the rice, cassava, bean and the pasture research programmes have been used in the ecoregional sites. Likewise, germplasm and integrated pest management research in CIP, as well as ILRI research on livestock production, have been important inputs at CIP benchmark sites. Evidence of feedback from NRM research to germplasm research is weaker, in part because the ecoregional sites represent only a small part of the mandate of Centre's germplasm improvement programmes. However, there has been considerable spillover of GIS work to the germplasm and integrated pest management programmes in both Centres. Ecoregional perspectives are also being gradually accepted in the commodity-research programmes.

The team noted that although the ecoregional programmes are realizing important synergies between NRM and productivity-enhancing research, this should not be the primary rationale for the ecoregional approach to research as conceived by TAC. The ultimate research goal on an ecoregional approach is to reduce poverty and increase opportunities for sustainable development in communities. Therefore, the role of the CGIAR should be to use strategic research outputs and its convening power as a catalyst to help achieve the goals set by all the partners in the ecoregion.

6.1.2 The balance of science and technology versus tools and methods

The primary product of Centres should be international public goods. In the case of ecoregional research, these public goods include new knowledge and technologies for NRM, improved germplasm, and methods and decision tools for more effective and efficient solution of ecoregional problems with wide applicability across national boundaries within a given or comparable ecoregion.

Both Centres visited by the Review Team seem to focus in their ecoregional programmes on methods and tools with wide potential for application. This is reflected in the considerable effort in modelling and GIS in both Centres. There appears to be less emphasis on strategic research on NRM technologies and this work is often fragmented. Even at the benchmark sites, little has been done to develop comprehensive sets of technologies at the watershed level, within a problem focus, in order to test the applicability of the tools and methods. A notable exception appears to be the savanna ecoregional programme at CIAT.

The team feels that more emphasis is needed on problem-solving research within the benchmark sites to develop appropriate technologies and demonstrate impacts, and based on

this experience to develop tools and methods that can be applied to other sites in a cost-effective manner. The initiation of work on defining minimum data sets by CIP represents a commendable step in this direction.

6.1.3 Benchmark sites and extrapolation

Each Centre has selected benchmark sites for implementing the ecoregional approach. These sites typically comprise watersheds of 10-20 000 ha. Clearly for purpose of replicability and extrapolation it is critical that these sites be representative of a larger ecoregion in terms of agroecology, socioeconomic circumstances, infrastructure and institutions. While considerable work has been done in characterizing ecoregions, the team was not provided with good evidence that sites were representative of important ecoregions in terms of population, poverty and natural-resource degradation.

Likewise, neither did the team perceive strong evidence that the Centres had developed concepts and methods for extrapolation from the benchmark sites. While GIS clearly provides powerful tools for extrapolation, much more work is needed on the conceptual definition of appropriate scales for NRM work of different types: strategic, applied and adaptive, including socioeconomic research. A related issue in extrapolation is the development of tools and methods that can be applied within the resources and skills of national systems. There is presently a danger that the heavy investment of resources in a relatively small benchmark site will lead to results that cannot be replicated due to the high resource intensity of the investment. Work on minimum data sets and proposed work by both CIP and CIAT on *ex ante* cost-benefit analysis at the watershed level should help clarify this issue.

6.1.4 Policy research

The team concluded that policy research in the ecoregional programmes reviewed is weak and needs strengthening. Ecoregional research must be designed within the context of macro-economic and trade policies that will have profound effects on the production opportunities in the ecoregions. Likewise, the design of interventions in the ecoregions must be set in the wider context of public investment decisions for the selected ecoregions. For example, work is needed to clarify the role of public investments in technology, institutions, infrastructure, education in promoting rural economic growth, and poverty alleviation in the selected ecoregions. Other priority areas for policy research include efficient functioning of rural financial markets, market development and price policy. The International Food Policy Research Institute (IFPRI), which has considerable expertise in this type of policy research, is notably absent from the ecoregional work in Latin America.

6.1.5 Socioeconomics and gender

The team did not see enough evidence that socioeconomic and gender issues receive sufficient attention in the ecoregional work. This is reflected in the following observations.

- Lack of presentations on economic analysis of alternative NRM interventions (CIAT has economists as integral members of their ecoregional teams but none were available during the team visits).

- Absence from the ecoregional teams of sociologists and/or anthropologists with expertise to address issues in land tenure, social stratification etc. (during the team's visit).

- Little apparent emphasis in the choice of some sites and interventions on poverty alleviation, and within sites on identifying clearly who are the poor.

- Little emphasis was given to gender issues in the materials provided to the Review Team on designing and implementing interventions.

On the positive side CIP, and especially CIAT, have developed strong participatory approaches to ecoregional research, including an emphasis on community organization. The strong emphasis in the CIAT ecoregional sites on local farmer research committees to carry out adaptive research and diffuse results is a model for participatory ecoregional research.

6.1.6 The balance of strategic research, applied research and development

A holistic approach to ecoregional research requires a judicious balance of strategic and applied research and technology transfer, and developmental activities, with strong linkages along this continuum. The Centres clearly have a comparative advantage at the strategic end of this continuum and have sought to develop partnerships to provide expertise in the applied and developmental aspects. However, in part due to funding priorities, it has often been easier to fund applied R&D activities with near-term payoffs than strategic research.

Both CIP and CIAT are involved in development activities although it is sometimes unclear if the focus is on development *per se* or on research on processes to formulate tools and methods for developmental activities. CIP undertakes a significant part of its ecoregional work through CONDESAN, a regional consortium of public and private organizations, organized on CIP's initiative, which retains its secretariat at CIP headquarters. This has led to important issues of ownership between the role of CIP as a participant or partner in CONDESAN, and CIP as a coordinator and financier of CONDESAN activities. The team feels that the role of CIP in strategic research could be better served by devolving progressively the management of CONDESAN to the member organizations and separating its coordination, physically and administratively, from CIP.

6.1.7 Synthesis, dissemination and lessons learned

In the team's view, given the experience of both CIP, CIAT and some ecoregional sites in applying an ecoregional approach, there is now much to be gained from a synthesis of experiences to date and a distillation of lessons learned.

6.2 Partnerships

6.2.1 NARS partnerships

The team was generally impressed with the wide range of national partners participating in the ecoregional benchmark sites, and to a lesser extent, in the strategic research. These national partners, including the INIAs, universities, government developmental agencies, NGOs and on occasion, private firms, have provided complementary skills, especially in applied R&D activities. In at least one case, the high number of local partners may have

resulted in 'overkill', as the numerous institutions involved exceeded the capacity of local community organizations and farmers to effectively absorb them.

Although it is clear that NARS actively participate and benefit from the collaboration, the team was not able to evaluate the extent of NARS ownership of the ecoregional programmes – an issue which will affect their long-term sustainability.

6.2.2 Inter-Centre collaboration

Although the Review Team found evidence of constructive inter-Centre collaboration, this is still less than could be desired. Centres noted the considerable transaction costs of collaboration and difficulties in funding. In addition, funding mechanisms and incentives currently encourage competition rather than collaboration. Given the current funding climate, there may also be problems in providing due recognition of the inputs of individual Centres and national partners. However, the team concluded that inter-Centre collaboration cannot be forced but must result from clear complementarity of interests. Some observations follow.

Good theoretical examples of collaboration include that of ICRAF, CIFOR and CIAT in the forest-margin ecoregional site where each of the Centres has a complementary role in the continuum from forest to permanent agriculture. In practice, however, coordination and competition was reported to be clearly below individual Centre expectations. Other Centres that could provide potentially valuable inputs to this ecoregional research are IFPRI, IPGRI and CIMMYT. Although it is our understanding that these Centres do have activities in Latin America, their role in the ecoregional programmes is either missing or was not highlighted to the Review Team.

There are many other international organizations, apart from Centres, with capacities in strategic research (e.g., CIRAD). Some of these are already partners in some sites, therefore, inter-Centre collaboration should not be seen as an end in itself. In reality, the final responsibility for collaboration rests with donors who must encourage and fund collaborative projects when there are clear advantages in doing so. We believe that the ecoregional approach provides excellent opportunities for complementary inter-Centre cooperation.

6.3 Management

6.3.1 Funding

The lack of long-term stable funding for strategic ecoregional research is probably the single most important constraint on the effectiveness of the ecoregional approach in the programmes reviewed. In general, Centres were disappointed with the response from donors for ecoregional work, both through donor-funded special projects and through TAC-approved core budgets. The result is that Centres have had to be opportunistic in seeking funds, and the resulting research programmes tend to be donor-driven, disintegrated and focused on a strategic problem.

It seems that the first priority in consolidating ecoregional programmes should be to ensure long-term funding mechanisms. If the required CGIAR commitment is not attainable, then the CGIAR should reassess its future involvement in ecoregional research. However, this is a less desirable alternative that could lead to higher transaction costs and fragmentation. One possibility would be for individual Centres to actively seek support for the ecoregional

programmes from non-traditional donors, such as the private sector, foundations, regional and municipal governments, and the Global Environment Facility.

6.3.2 Costs of ecoregional research

The team was not provided with a comprehensive overview of the total funding and its origin – including human and financial resources – invested in specific ecoregional and benchmark sites. It also appears that CIP and CIAT could not provide good estimates of the resources invested by partners in the ecoregional programmes. Without such estimates it is difficult to comment on the cost-effectiveness of the research programmes or the success of ecoregional programmes in attracting additional resources. For purposes of transparency and accountability, Centres should be required to provide full costs of resources committed, including those of their partners.

6.3.3 Monitoring and evaluation

The Centres have recently moved toward a logframe approach to monitoring and evaluation for the ecoregional programmes. This will lead to a better definition of the objectives of the ecoregional programmes and to an assessment of impacts against objectives. To date, there has been little work on either *ex ante* or *ex post* assessment of impact in terms of biophysical and economic indicators. Both CIAT and CIP have initiated conceptual work on impact assessment and this should be a high priority for the future.

7. Itinerary

2 May
Review Team arrives CIAT.

3 May
Presentations and discussions in CIAT with CIAT directors and scientists.

4 May
Presentations and discussions with partner NGOs from Colombia and CIAT scientists (in place of cancelled field visit).

5 May
Travel Cali to Lima and review of CONDESAN activities in Colombia (missed connection in Bogota resulted in unexpected layover).

6 May
Travel to CIP field site at Cajamarca. Presentations and discussions with partner NGOs and local officials. Visit to farmers' fields.

7 May
Continued field visit. Return to Lima. Presentations and discussions with CIP scientists and directors.

8 May
Report writing and departure.

8. Key contacts

8.1 CIAT

Dr. Alejandro Imbach
Dr. G. Scobie
Dr. D. Pachico
Dr. R.Thomas
Dr. E. Barrios
Dr. R. Knapp,
Ing. Magnolia Hurtado (CIPASLA)
Ing. B. Muñoz (CORFOCIAL)
Dr. N. Beaulieu
Dr. G. Hyman
Dr. P. Kerridge
Dr. F. Holman
Dr. C. Wheatley
Dr. C. Ostertag,
Dr. M. Winograd
Dr. Ruben Darío Estrada.

8.2 CIP

Dr. Joshua Posner
Dr. H. Zandstra
Dr. Jose Valle-Riestra
Dr. W. Collins
Dr. R. Quiroz
Dr. M. Tapia
Dr. W. Bowen
Dr. Pablo Gutierrez (ASPADERUC)
Ing. Manuel Vazquez Salazar, Alcalde de la Encañada
Señora Rosa Abanto (farmer, La Encañada)
Ing. Juan Moncada (PRONAMACHS);
Ing. Julio Gamarra (INIA)
Dr. L. Sarmiento (U. de Cajamarca)
Dr. M. Holle (CONDESAN)
Dr. A.M. Ponce (Infoandina)
Dr. C.L. Velarde (CONDESAN-ILRI)

ANNEX VI

BACKGROUND INFORMATION ON SYSTEMWIDE PROGRAMMES WITH AN ECOREGIONAL APPROACH

DESK STUDY IN SUPPORT OF THE ECOREGIONAL REVIEW
PREPARED BY EKKEHARD KÜRSCHNER, CONSULTANT'S REPORT TO TAC, TAC SECRETARIAT, FAO, 00100 ROME

The desk study was conducted at the TAC-Secretariat in preparation for the review of Systemwide programmes with an ecoregional approach. The paper intends to bring some key issues emerging from the current programmes to the attention of TAC and to equip the review panel with a basis on which to conduct the review.

The study is built upon an analysis of background information on the approach, documentation on current programmes, a survey of stakeholder opinions, recent reviews by the CGIAR and the Centres, and related efforts and activities by others, as well as comments made to the consultant and participation in discussions, including interaction with the TAC Study on CGIAR NARS Collaborative Relationships. It consists of the following sections:

1. Background on concept and implementation of the approach, including its definition, complemented by changes in science and the institutional settings.

2. A brief sketch on each of the programmes together with observations on their main features.

3. The findings of a stakeholder survey on the performance of the programmes giving suggestions for improving their efficiency and effectiveness.

4. Implications from recent reviews by the CGIAR and the Centres, as well as programme developments directly related to the ecoregional review.

5. A perspective on how the ecoregional approach and its implementation by the CGIAR relate to other efforts and actors in connected fields.

6. An analysis of the various documents and survey of stakeholders in order to highlight emerging issues for TAC and the review panel to validate or clarify during the main phase of the review.

To facilitate the exchange of information on the Ecoregional Review and to provide the opportunity to submit the questionnaire on-line WebPages were developed and posted at the TAC WebSite: http://www.cgiar.org/tac/ ecoweb01.htm). This also provided an efficient way for TAC to interact with stakeholders and could be of use in the future.

Conclusions and recommendations

Current programmes represent a diverse set of initiatives at various stages of implementation. They vary significantly in research design and focus, consortium organization and in terms of

partnership. The conclusions presented here focus on strategic issues of Systemwide importance and are meant to complement the criteria identified in the Terms of Reference approved by TAC:

- The concept of the ecoregional approach seems to remain a valid concept. Despite difficulties, NARS and Centres want to continue with the approach.

- The expected outputs of the programmes need clarification, for example in addressing the environmental and human aspects of sustainability and partnership.

- The definition of "ecoregional" needs urgent clarification. It may be helpful to develop a more pragmatic definition of an ecoregion as a recommended domain.

- There is a need to verify and review the extent to which natural resources management and productivity research have mutually enriched each other to date through these programmes.

- The information available on the added value of these programmes is not sufficient. An overview of the costs of the programmes, the contributions of the various partners and the use of funds is required to estimate transaction costs.

- The extent to which programmes are able to extend location-specific work to a broader environment needs to be reviewed, including the role of extrapolation (out- and upscaling).

- It may be worthwhile to review the balance between characterization as opposed to technology development, and work on social aspects and human dimensions as opposed to biophysical research, and assess whether this balance matches the original intention of the ecoregional approach.

- While recognizing the progress made in developing partnerships, there seems no evidence as yet of the effectiveness of the process of participatory agenda setting by consortia in directing and focusing programmes on key natural resources management issues. Also, it may be useful to assess whether the scope of partnerships in the multi-institutional consortia is appropriate and whether they have proved to be effective.

- Organizing collaborative research and managing the research process may require more attention. The review panel may want to offer advice on developing monitoring and evaluation mechanisms for assessing management and research. At present there is no mechanism in place to share good practices and experiences across the System.

- The main phase could benefit from visiting programmes that have been in operation for some time and which have gained experience in addressing some of the above issues. During visits, the opportunity should be taken to interact and consult with NARS partners.

There is certainly a need to identify priority issues among those listed above. Some may be more appropriately addressed by the Centres and their consortium partners directly, while strategic issues for the CGIAR need further attention and clarification at the System level, through mechanisms such as those proposed for the follow-up of the System Review.

Rome, March 1999

LANDMARKS OF THE ECOREGIONAL APPROACH

- TAC Report on "Sustainable Agricultural Production: Implications for International Agricultural Research", 1988
- TAC Report on the Expansion of the CGIAR, 1990 Concept of Ecoregional Activities endorsed by the CGIAR at ICW 1990
- TAC Report to MTM 1991 on an Ecoregional Approach to Research in the CGIAR, 1991
- Paper by TAC Chair on Ecoregional Basis for International Research Investment", Airlie House Policy Conference, 1991
- Consultations on the draft report CGIAR Priorities and Strategies with regional associations of NARS in Asia, Latin America, West and Southern Africa and WANA, 1991-92
- Draft Chapter 13 of TAC's Report on CGIAR Priorities and Strategies, MTM 1992
- TAC/Centre Directors Working Group Report on the Ecoregional Approach to Research in the CGIAR, 1993
- Operationalizing the Ecoregional Approach – Puerto Rico, CGIAR Workshop, MTM 1993
- Report of the CGIAR Task Force for an Action Plan to Follow-up on UNCED, 1993, ICW 93
- Final Draft Report on CGIAR Priorities and Strategies, ICW 93
- TAC/SPAAR/Centre Directors Interaction with African NARS leaders. TAC 64, Bouake, June 1994
- Defining Systemwide/Ecoregional Initiatives. CDC Workshop. IPGRI 1994
- Review of Systemwide Programme Proposals. TAC Report to the Group. ICW 94
- CGIAR High-level Meeting on the Renewal of the CGIAR: Lucerne Declaration and Action Plan. February 1995
- Clarifying Systemwide and Ecoregional Concepts. TAC Meeting Lima, March 1995
- Ecoregional and Sustainability CGIAR Task Force Reports by Ndiritu and Rabbinge. MTM 1995
- Workshop on Ecoregional Research. CDC, ISNAR, August 1996
- TAC Report on Priorities and Strategies for Soil and Water Aspects of NRM, ICW 96
- Chapter 7 of Report on CGIAR Priorities and Strategies for Resource Allocation, ICW 97
- Emerging Issues and Future Directions. Report on Progress by Centre Directors based on Dr. M.P. Collinson's Study. Centre Directors Committee, Washington D.C., October 1998

ANNEX VIII

LIST OF SELECTED CONTACTS

CGIAR Systemwide Programmes with an Ecoregional Approach

i. Desert Margins Programme for sub-Saharan Africa

DMP Coordination Office, ICRISAT-Sahelian Center
BP 12404, Niamey, Niger;
Tel: +227 722529; Fax: +227 734329;
Email: S.Koala@cgiar.org;
Web: http://www.cgiar.org/icrisat/text/research/networks/gnet2.html#top

ii. Programme for the Warm Humid and sub-Humid Tropics of sub-Saharan Africa

EPHTA Coordinator, International Institute of Tropical Agriculture (IITA),
c/o L.W. Lambourn & Co., Carolyn House, 26 Dingwall Road, Croydon CR9 3EE, UK;
E-mail: e.atayi@cgiar.org; Web: http://www.cgiar.org/iita/partner/ephta.htm

Inland Valley Consortium (IVC) / Consortium Bas-Fonds
Secretariat c/o WARDA/ADRAO
01 BP 2551 Bouake 01, Cote d'Ivoire
Tel. +225 63 45 14; Fax. +225 63 47 14; Email: ivc@cgiar.org

iii. Programme for the Humid and sub-Humid Tropics of Asia
(incl. Systems Research Network for Ecoregional Land Use Planning in Tropical Asia)

Coordination Office, Social Sciences Division, IRRI
PO Box 3127, Makati Central Post Office (MCPO). 1271 Makati City, Philippines
Tel.: +(63-2) 845-0563 (office ext. 627); Fax. + (63-2) 891-1292; 845-0606
Email: skam@irri.cgiar.org; Web: http://www.cgiar.org/irri

iv. On-farm Water Husbandry Programme for West Asia and North Africa

Natural Resource Management Programme, ICARDA
P.O. Box 5466, Aleppo, Syria
Email: icarda@cgiar.org; Web: http://www.cgiar.org/icarda

v. Programme for Rice/Wheat Based Cropping Systems in the Indo-Gangetic Plain

RWC Facilitation Unit (CIMMYT India Office), IARI Campus (Old NBPGR Building),
Pusa, New Delhi 110012
Tel.: +91 (11) 5822940, 5819554; Fax: + 91 (11) 5822938
Email: r.iyer@cgiar.org or rwc@cgiar.org; Web: http://www.cgiar.org/cimmyt

vi. Programme for Enhancing Agricultural Research Effectiveness in Tropical America

Coordination Office CIAT Headquarters
Apartado Aéreo 6713, Cali, Colombia
Tel.: (57-2) 445-0000; Fax: (57-2) 445-0073
E-mail: ciat@cgiar.org; Web: http://www.ciat.cgiar.org/frames/fra_part.htm

vii. Alternatives to Slash and Burn Agriculture Programme.

Global Coordination Office, International Centre for Research in Agroforestry (ICRAF)
PO Box 30677, Nairobi, Kenya
Tel.: +254 2 521450 or +1 650 833 6645; Fax: +254 2 521001 or +1 650 833 6646
Email: ICRAF@cgiar.org;
Web: http://wwwscas.cit.cornell.edu/ecf3/MyPages/ASB/ASBMain.html

viii. Sustainable Mountain Agricultural Development Programme

African Highlands Initiative
Coordination Office ASARECA/ICRAF Entebbe, Uganda
Web: http://www.cgiar.org/icraf/syswide/ahi.htm

CONDESAN (Consorcio Para el Desarrollo Sostenible de la Ecorregión Andina)
Coordination Office, Centro Internacional de la Papa / International Potato Center (CIP)
P.O. Box 1558, Lima 12, PERU
Tel. +(51-1) 3496017; Fax. +(51-1) 3495638;
Email: j.posner@cgiar.org; Web: http://www.cgiar.org/cip/pir/condesan/natres.htm

Other Programmes of CGIAR Centres and Affiliated Research Centres

Agroecology in Action

An NGO initiative for promoting sustainable agriculture among researchers and farmers in the developing world. (There are several related activities aiming at enhancing capacity building and human resource development such as the Sustainable Agriculture Networking and Extension (SANE), a UNDP sponsored programme).
Web: http://www.ids.ac.uk/eldis/isg/links.html

Cornell University, Cornell International Institute for Food, Agriculture and Development (CIIFAD), Box 14, Kennedy Hall, Cornell University, Ithaca, NY 14853 USA

FAO Agro-ecological zoning projects

An example is the Utilization of Agro-Ecological Zone Database and Installation of a Geographic Information System for Agricultural Development in Bangladesh; this project led to the establishment of a Bangladesh Land Resources Information System organized by the Bangladesh Agricultural Research Council with FAO technical assistance.
Web: http://www.fao.org/waicent/FaoInfo/Agricult/AGL/AGLS/ssbgd.HTM

Institut de recherche pour le développement (IRD formerly ORSTOM) 213, rue La Fayette, 75480 PARIS CEDEX 10; Tel : (33) 1 48 03 77 77; Fax : (33) 1 48 03 08 29

Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) Centre de recherche de Montpellier; BP 5035, 34032 Montpellier Cedex 1, France; Tel.: +33 4 67 61 58 00; Fax: +33 4 67 61 59 86

Geographic Information Systems Network (GIS-net)

A discussion forum for the application of GIS in the area of land use and management by the German Agency for Technical Cooperation (GTZ)
Web: http://www.gtz.de/lamin/englisch/index.html

Soil Water Nutrient Management Programme (SWNM)

An interdisciplinary and multi-institutional approach implementing four regional consortia based on The Zschortau Plan for the implementation of soil, water, and nutrient management research, DSE-ZEL Food and Agriculture Development Centre Feldafing-Zschortau and IBSRAM Bangkok. 255 p. (p. 13, p. 24). 1995. Convenors: IBSRAM and CIAT

International Board for Soil Research and Management (IBSRAM)
PO Box 9-109, Jatujak, Bangkok 10900, THAILAND
Tel. +66 2 941 2500; Fax +66 2 5611230
Email: craswell@ibsram.org

International Center for Integrated Mountain Agriculture Development (ICIMOD)

Activities in the Hidukush Himalayas implemented in relation to the Global Mountain Development Programme (GMP)
Web: http://www.icimod.org.sg

Systemwide Livestock Programme

International Lifestock Research Center (ILRI), Coordinator SLP
ILRI-Ethiopia, P.O. Box 5689, Addis Ababa, Ethiopia
Tel. +(251-1) 613215; Fax: +(251-1) 611892; Email: ILRI-Ethiopia@cgiar.org

World Overview of Conservation Approaches and Technologies (WOCAT)
Web: http://www.giub.unibe.ch/cde/projects/wocat.htm

Tropical Soil Biology and Fertility Programme, TSFB/UNEP Block B,
Room 124/130, Dr. Mike Swift, P.O. Box 30592, Nairobi, Kenya
Tel: +(254-2) 622655/622584; Fax: +(254-2) 521159; E-mail: Mike.Swift@unep.org

Wageningen Agricultural University (WAU) and SC-DLO
PO Box 341, AH Wageningen ; Tel. +31-317 48 30 79 / 48 47 58 ; Fax +31-317 48 45 75

Donors and Funding Programmes

Danish International Development Assistance (Danida)
Department of Research and Dcoumentation, Minstry of Foreign Affairs
2, Asiatisk Plads, DK-1448 Copenhagen K, Denmark
Tel.: +45-33 921047; Fax: +45-32 920493; http://www.um.dk.

Department for International Development (DFID)
Natural Resources and Research Department: Strategy 1998: Achieving Sustainable Livelihoods through Renewable Natural Resources Research.
DFID, 94 Victoria Street, London SW1E 5JL, U.K.

Ecoregional Trust Fund
A fund to support methodological initiatives by Centres and by NARS. The fund is administered by ISNAR following explicit guidelines for submitting proposals. As of 1998 five projects were funded: regional scaling of field-level economic-biophysical models (CIP); integrating remote sensing, GIS and dynamic models (MLUM) for the Andes

(CONDESAN/CIP); network to develop systems methodology for ecoregional land-use planning in tropical Asia (IRRI); resource use optimization at village and district level in the desert margins of West Africa (ICRISAT); and methodologies for integrating data across geographic scales in a data-rich environment for the sustainable development of the lowland savannahs in Latin America (CIAT).

Secretariat Ecoregional Fund at ISNAR
P. O. Box 93375; 2509 AJ The Hague, The Netherlands
Tel. +31 (70) 349-6100; Fax: +31 (70) 381-9677
Email: ISNAR@cgiar.org ; Web: http://www.cgiar.org/isnar/flyer.html

Swiss Agency for Development and Cooperation (SDC)
CH 3003 Bern, Switzerland; Tel.: +41 31 322 3446; Fax: +41 31 324 1693;
Email: Paul.Egger@deza.admin.ch

The Netherlands Ministry of Foreign Affairs,
Research and Developing Countries Division; P.O. Box 20061; 2500 EB The Hague,
The Netherlands

ANNEX IX

DOCUMENTS PROVIDED TO THE REVIEW PANEL

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3. Center Directors' Committee, 1998. Progress in the Ecoregional Initiatives - Emerging Issues and Future Directions. Washington, D.C. October 1998.

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9. CGIAR. 1995. Report of the Task Force on Ecoregional Approaches to Research. Mid-Term Meeting 1995 (chaired by Cyrus Ndiritu) MTM/95/09 30 p.

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