

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH  
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

**Report of the**  
**Fourth External Programme and Management Review**  
**of the West Africa Rice Development Association**  
**(WARDA)**

TAC SECRETARIAT  
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

This report comprises:

- (a) Extract from *Summary of Proceedings and Decisions*, Mid-Term Meeting, 21-26 May 2000, Dresden, Germany
- (b) Letter from TAC Chairman and CGIAR Executive Secretary, transmitting the Report of the Fourth External Programme and Management Review
- (c) TAC Commentary on the External Review of WARDA
- (d) WARDA's response to the Report of the Fourth External Programme and Management Review
- (e) Transmittal letter from Panel Chairman to TAC Chairman and CGIAR Executive Secretary
- (f) Report of the Fourth External Programme and Management Review of the West Africa Rice Development Association (WARDA)

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**Report of the  
Fourth External Programme and Management Review  
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(WARDA)**

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

October 2001



From: The Secretariat

July 2000

CGIAR Mid-Term Meeting

May 21-26, 2000

Dresden, Germany

**Report of the Fourth External Program and Management Review of WARDA<sup>1</sup>**

At a parallel session chaired by Christine Grieder, an *ad hoc* committee of interested Members and participants discussed the report of the fourth External Program and Management Review of WARDA. The discussion of the review report was based on a presentation of the conclusions and recommendations by Mandi Rukuni, Panel Chair, the Center's response by Just Faaland, Board Chair, and Kanayo Nwanze, Director General, and the TAC commentary by Joachim von Braun, TAC Member.

**Highlights of the Committee Discussion**

The *ad hoc* committee:

- Concurred with the overall conclusions of the Review Panel and TAC that WARDA has transformed itself into a well managed scientific institution, with notable achievements such as the development of inter-specific rice hybrids, and praised the Center's partnerships and effective and efficient operation;
- Noted that WARDA's Board and Management welcomed all the Panel's recommendations but offered different views on two of them – namely, giving higher priority to crop and resource management of rainfed rice, and reorganizing the research program on rainfed rice;
- Noted that WARDA is in a unique position to recommend policy changes that are important to food security challenges in the region;
- Noted the high political commitment to WARDA, even though Membership contributions remain low;
- Agreed that the seasonality issues are important in the context of WARDA's work on the sustainability of rice-based production systems; and
- Agreed that WARDA should undertake a comprehensive analysis of gender issues.

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<sup>1</sup> Extract from *Summary of Proceedings and Decisions – External Program and Management Reviews*, CGIAR Mid-Term Meeting 2000, Dresden, Germany.

## **Conclusions and Recommendations**

The *ad hoc* committee:

- Thanked the Panel for an excellent report and WARDA for the high level of cooperation;
- Noted that some of the recommendations have already been implemented;
- Concluded that WARDA is poised to contribute further to rural development in the rice growing areas of Africa; and
- Strongly encouraged continued support to WARDA.

***Decision:*** *The Group endorsed the ad hoc committee's conclusions and recommendations.*

# Consultative Group on International Agricultural Research (CGIAR)

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## TECHNICAL ADVISORY COMMITTEE

Emil Q. Javier, Chairman

20 April 2000

Dear Mr. Serageldin,

I have the pleasure of transmitting to you the report of the Fourth External Programme and Management Review of the West Africa Rice Development Association (WARDA), which was conducted during November 1999 and January/February 2000 by a Panel chaired by Mandi Rukuni of Zimbabwe. The report and the response of WARDA's Board of Trustees and Management were discussed by TAC at its 78<sup>th</sup> meeting, held in Paris from 27<sup>th</sup> to 31<sup>st</sup> of March 2000. WARDA was represented at the meeting by Just Faaland, Chair of the Board, Lindsay Innes, Board Chair-designate, Kanayo Nwanze, the Director General, Amir Kassam, Deputy Director General, Programmes and Michael Goon, Deputy Director General, Administration and Finance.

There are two attachments to this letter, in addition to the report of the Panel. The first contains the TAC commentary, which summarizes TAC's and the CGIAR Secretariat's reactions to the Panel's report and WARDA's response. The second attachment is the response of WARDA to the report of the External Review.

We are pleased to note that the Panel's report is positive but critical. It shows that WARDA has transformed and emerged into a credible scientific institution with international leadership in rice research. Overcoming hybrid sterility barriers and the successful introgression of adaptation and tolerance genes from wild African rices (*Oryza glaberrima*) into the high-yielding rices of Asia is a major scientific breakthrough in rice improvement. This achievement at WARDA will have a major impact on rice production not only in Africa, but also in Asia and Latin America. WARDA will have to give greater attention to strengthening its capacity to monitor and assess the impact of its role.

TAC pointed out that the Panel report did not comprehensively discuss the Centre's Mission, Strategy and Priorities and requested that a section be added in time for MTM. In this connection, Chapter 3 has been revised to address TAC's concern.

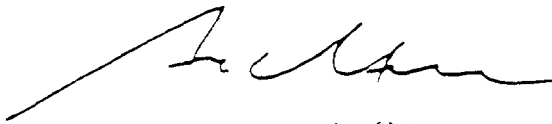
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Mr. Ismail Serageldin  
CGIAR Chair  
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1818 H Street, NW  
Washington, DC 20433  
USA

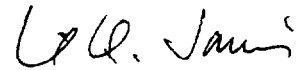
WARDA has crafted effective partnerships with its stakeholders and represents a successful example of regional cooperation. The Centre is financially healthier than reported in the last review. Governance of WARDA has improved and management has instituted measures that will ensure smooth running of the Centre. WARDA is therefore well positioned to contribute more towards greater food security in West and Central Africa.

We recommend continued strong support to WARDA. The Centre has important goals to achieve not only in rice based cropping systems, but more broader in sustainable agricultural production in West Africa.

Sincerely yours,



Alexander von der Osten  
Executive Secretary, CGIAR



Emil Q. Javier  
TAC Chair

## **TAC COMMENTARY ON THE FOURTH EXTERNAL PROGRAMME AND MANAGEMENT REVIEW OF WARDA**

### **Overall Statement**

The report of the Fourth External Programme and Management Review of WARDA was discussed at TAC 78 in the presence of the Panel Chair, Dr. Mandi Rukuni, the Chair and Chair designate of WARDA Board of Trustees, Dr. Just Faaland and Dr. Lindsay Innes respectively, the Director General of WARDA, Dr. Kanayo Nwanze, the Deputy Director General for Programmes, Dr. Amir Kassam, and the Deputy Director General for Administration and Finance, Mr. Michael Goon.

TAC thanks the Chair and members of the Panel for the evaluation of the Centre and its future role and strategic importance. The Panel found that WARDA has transformed itself into a well managed scientific institution with an exciting new story to tell in line with CGIAR's goals.

The Committee notes the report's objectivity and critical style but would have welcomed a more comprehensive analysis of the findings (including documentation of the Panel's analyses in annexes, especially on research products and personnel matters) to augment the conclusions. TAC is pleased with the remarkable progress attained in many areas of the Centre's work since the last EPMPR and congratulates the WARDA Board, management and staff. TAC accepts the report subject to a revision to incorporate a new section on the Centre's Mission, Strategy and Priorities (see below).

The Panel made twelve recommendations and several suggestions. TAC agrees in general, with the recommendations, notes that both the Board and Management of WARDA are in broad agreement with ten and offers a different perspective for two of them. TAC notes the positive spirit, in which the Centre's Management and Board absorbed the recommendations. TAC proposes the following commentary, prepared with inputs from the CGIAR Secretariat, to supplement the report.

### **Centre's Mission, Strategy and Priorities**

The Committee notes that WARDA is guided by its strategic plan 1990-2000, which is currently being updated. The Centre's mission statement has been refined to reflect food security and poverty alleviation and natural resource conservation. TAC points out that the Panel report does not comprehensively discuss the Centre's Mission, Strategy and Priorities. In this respect the report appears incomplete and the Committee requests that the report be revised (with assistance from the TAC Secretariat) in time for MTM'00. Also recent developments in the priority and programme strategy should be highlighted.

TAC is encouraged that WARDA's partners are involved in the formulation and implementation of the Centre's strategy and priorities through the Task Force mechanism thereby benefiting from the dual governance of the institution.

The unique character of WARDA's regional model presents an opportunity for drawing lessons on how a small centre can be cost effective in harnessing good science for solving the problems of small-holder farmers in low-income food-deficit countries. TAC observed that underlying this success is the strong sense of ownership by the stakeholders that creates accountability and comprehensiveness.

### **Quality and Relevance of Science**

TAC concurs with the Panel that the quality and relevance of science practised at the Centre is applaudable as evidenced by refereed publications, methodologies, and products of activities. Significant among the Centre's products is the development of the interspecific rice hybrids between *Oryza sativa* and *O. glaberrima*. The progenies are already contributing to the rice genepool not only in Africa but also in Asia and they are being used in the development of new plant types. While TAC applauds WARDA for these high quality products, it sympathizes with the low critical mass of social science and understands the quality aspects of their output. TAC recognizes the Centre's effort in undertaking CCERs, is concerned that these did not assess the quality of science and were not as helpful to the Panel as they could have been. It urges the Board and Management to institute corrective measures to improve the review process. The Committee sought an explanation for the reduced number of publications in 1999, and was informed by the Management that preparation for the 4<sup>th</sup> EPMR and additional demand for research planning, during that year appropriated more staff time than anticipated.

### **Achievements and Impact**

TAC shares the view of the Panel that WARDA should strengthen its capacity to monitor and assess impacts, appreciates that the Centre has taken appropriate steps for implementing this recommendation and encourages WARDA to maximise use of internal and external resources through collaboration. In this regard, the Centre should document its impact on food security, poverty reduction and natural resources management through a comprehensive analysis and interpretation of recently available WARDA-survey data that have apparently not been used to assess impact.

The review Panel assessed WARDA's achievements in areas of scientific leadership, partnership, capacity building and policy dialogue. It placed emphasis on three CGIAR goals of food security, poverty reduction and natural resources management. WARDA presented a long list of achievements to the Panel. The Panel discussed various achievements but did not have in-depth analyses on all of them to adequately relate achievements (outputs) with impact (outcomes).

## **Partnerships**

The Committee concurs with the Panel that WARDA has crafted successful partnerships for greater effectiveness and efficiency. The Centre recently hosted an international workshop on partnership for a global research system focusing on sub-Saharan Africa to share experiences on research coordination and collaboration with sister institutions. TAC noted that WARDA's partnership arrangements facilitate the engagement in participatory plant breeding and selection while allowing the Centre to focus on its programmes yet link with related ARIs.

## **Research Programmes**

During the review of Systemwide programmes with an Ecoregional Approach, and in the Centre's 1999-2000 MTP, it was noted that WARDA incorporated the Inland Valley Consortium (IVC) in its Programme IV to enhance the shift from characterization to technology development. The Centre Management has reaffirmed that the ecoregional approach will not be diluted and that the noble objectives of IVC, which are synergistic to those of WARDA's, will be promoted.

The Panel did not comprehensively address the gender issue with its attendant benefits to rural producers and consumers. In its discussion with the Panel Chair, absence of hard data was advanced as the major impediment. However, the Committee stresses the importance of gender disaggregated analysis. TAC was informed by the Centre that women are involved in participatory variety selection and the model for exploiting the interspecifics was targeted towards women (and children) in particular regarding reduction of weeding time and variety selection and related documentation.

The issue of whether WARDA should expand its mandate into East, Central and Southern Africa was examined by the Panel and discussed by the Board and Management. TAC does share the view of the Panel that WARDA should move cautiously conditional on resources, demand and negotiated relationship with IRRI. TAC is pleased that through INGER, SGRP and Task Force arrangements their improved germplasm has been made available to the rest of Africa.

The Committee notes that WARDA was involved in a leading Consortium on Human Health (HHC), which has been completed. The Panel gave high rating for the Consortium and concluded that its findings were useful although the results have not been published. TAC considers that coverage of HHC in the report is minimal at a time when strategic linkages between health and agriculture are being forged. It encourages the Centre to disseminate the findings.

The Panel gives credit to WARDA for having played an active role in initiating the development of a national biosafety policy in Cote d'Ivoire. TAC encourages the Centre to be open about the debate on transgenics since Africa can most probably use the experience of WARDA as a reference case on the important aspect of biosafety and yield and quality improvements from application of transgenics.

Capacity building efforts is an area , which many donors of agricultural research no longer find attractive, yet WARDA with its 5% expenditure on training appears successful. TAC is anxious to learn from WARDA's experience with using training workshops and Task Force mechanisms to enhance individual, group and institutional capacity building.

Sustainability of rice-based agricultural (or production) systems such as the environment in which WARDA works is critical for the future. The Panel's report treats this in chapter 8, and TAC points out that this issue is to be increasingly considered by WARDA. Linked to this is seasonality of rice, which affects food insecurity in the household. TAC would have welcomed a brief synthesis on this theme and suggests to WARDA to explicitly consider the potential of dry season rice in those ecologies where this has potential.

### **Effectiveness and Efficiency of Management**

The management of WARDA is commended for putting in place strategic directions, new policies and procedures for the efficient running of the Centre. Much has been accomplished and TAC is looking forward to the remaining issues being handled for a better working atmosphere. The Committee is confident that Governance at the Centre is solid and will get better as the Board continues to implement its own fiduciary responsibilities. TAC notes that on the basis of a detailed staff survey, the Panel diagnosed some problems of staff morale, which – as TAC was reassured – are currently being addressed by Management.

The Panel recorded positive interaction between WARDA and its Council of Ministers. TAC considers this as a positive development which can play a critical role in strengthening linkages with policy makers in the region and advancing opportunities for the impact as well as ownership of the Centre's work.

In 1997, WARDA put in place a five-year financial management plan to address the twin problems of cash flow and operating deficits. While recognizing that the persistent cash flow problem would be addressed mainly through more timely release of member pledges, TAC notes that the Centre negotiated a US\$2 million standby line of credit that has been drawn on prudently to manage unforeseen fluctuations in member disbursements. On the issue of eliminating operating deficits and building reserves, WARDA put in place a number of cost-control measures and tightened financial management processes to increase operating efficiencies. TAC commends the prudent financial management plan which is expected to eliminate the cumulative deficits and build reserves of about US\$2 million. The Committee applauds the effort of particular Member countries for having cleared their outstanding arrears and for paying on time.

### **Conclusion**

TAC believes that the transformation and development of WARDA as an emerging institution of excellence in rice research is a significant turn around. The achievements of increased yields from methods that are less dependent on external inputs deserve much more evaluation and support. WARDA should now consolidate its success by implementing

the new strategic directions it has set. The dual status of a CGIAR Centre and an Association within the umbrella of Council of Ministers is conducive for more effective policy intervention as it addresses food security challenges in the West and Central Africa. The Committee encourages WARDA to keep its focus on the impact of the poor as it brings modern science to bear upon CGIAR goals.



## West Africa Rice Development Association

### Association pour le Développement de la Riziculture en Afrique de l'Ouest

Office of the Board Chair - Bureau du Président du Conseil d'administration

**BOT: JF/pjk/01/00**

29 February, 2000

Dr Emil Javier  
Chairman  
Technical Advisory Committee  
Consultative Group on International Agricultural Research  
Institute of Plant Breeding  
University of the Philippines at Los Banos College  
Laguna, The Philippines

Mr. Alexander von der Osten  
Executive Secretary  
Consultative Group on International Agricultural Research  
The World Bank  
1818 H. Street, N.W.  
Washington, DC 20433 USA

Dear Dr. Javier and Mr. von der Osten,

On behalf of the Board of Trustees, Management and Staff of the West Africa Rice Development Association (WARDA) I have the privilege to express our sincere thanks for the Panel's Report on WARDA's Fourth External Programs and Management Review. We wish to place on record our appreciation to the Panel for having conducted the review in a highly participatory and efficient manner. The Board, Management and Staff greatly appreciated the opportunity to interact with the Panel.

We are particularly grateful that the Panel endorsed WARDA's vision, and recognized and acknowledged the Centre's substantial and significant achievements during the period under review. The Panel is strongly supportive of WARDA's future development as a Centre with an important role to play in rice research, technology transfer, capacity building and partnerships in Africa.

The Board fully agrees with the Panel that WARDA's main achievements are in two areas, namely the development of interspecific rice varieties and WARDA's effective partnerships. While the first emerges from WARDA's *raison d'être* and attests to the Centre's rapid transformation into an international centre of excellence, the second is its *modus operandi* and an effective means of collaboration, particularly with its NARS partners. As indicated by the Panel, by unlocking the treasure of genes in the African rice species, *Oryza glaberrima*, WARDA "presents a greater opportunity for the CGIAR and its partners to exploit the biodiversity that this rice centre of origin offers and that may be of tremendous value to the international rice research community."

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The Board endorses the Panel's conclusion in commending Management for implementing necessary changes in the Centre's overall operations. The Board recognizes its important role with Management in setting priorities and strategies and allocating resources so as to achieve the best balance, efficiency and effectiveness in WARDA's governance, management, research agenda and partnerships.

The Panel's report draws attention to the unique character of WARDA as both a CGIAR centre and a regional association of West and Central African countries. The Board also notes with satisfaction the Panel's conclusion that WARDA is today well positioned to contribute more towards a rice-based green revolution in the sub-region.

The Board and Management have reviewed the Panel's Executive Summary and Recommendations, and the many helpful major findings and suggestions throughout the report and have provided their response to each in the following pages.

Sincerely yours,



Just Faaland  
Chairman  
Board of Trustees

**West Africa Rice Development Association  
(WARDA)**

**WARDA's Board and Management Joint Response  
to the Report of the  
Fourth External Program and Management Review**

February 2000

## **WARDA's Board and Management Joint Response to the Report of the Fourth External Program and Management Review February 2000**

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WARDA's Board of Trustees and Management jointly present the following response to the Panel's report:

WARDA's Board, Management and Staff would like to commend and thank the Panel for its clear, perceptive and constructively critical and helpful report which will help WARDA to move forward.

Prior to the Review, WARDA's Board and Management raised a number of issues with the Panel, including WARDA's role in Africa; its institutional arrangements/linkages – including those with other CGIAR Centres; the best way to capture the human resource capital that exists within Africa's university system; WARDA's role in helping to improve the health and quality of life of Africa's rice farmers, and the kind and scope of WARDA's research in the field of biotechnology. The Panel addressed these, as well as other issues, in addition to adhering to the ToR for CGIAR EPMRs.

The Panel has highlighted twelve important recommendations. In addition, the report includes many pertinent findings and a number of suggestions from the Panel's analysis and deliberations. Some of the Panel's suggestions and recommendations are already being wholly or partly implemented, others under review are dependent on available funding.

In our response, we comment on each of the Panel's recommendations, findings and suggestions, all of which will also be taken into consideration in the development of WARDA's 2001-2010 Strategic Plan that is currently under preparation and which will be discussed by WARDA's Board at its meeting in June 2000.

### **CHAPTER 2 – ACHIEVEMENTS AND IMPACT**

*Recommendation 1: The Panel recommends that WARDA strengthen its capacity to monitor and assess the impact of its activities (p. 18).*

WARDA agrees that impact assessment is a priority at a time when promising technologies developed and tested during the last decade are reaching farmers' fields. Fully aware of the strategic importance of impact assessment in the forthcoming years, in 1997 WARDA set up two projects in the Policy Support Program which focus on impact assessment of new technologies. A series of impact assessment activities has been planned and funds will be secured for their implementation. WARDA will allocate a full-time position to impact assessment activities as soon as possible.

### CHAPTER 3 – WARDA's RESEARCH AND DEVELOPMENT PROGRAMS

***Recommendation 2: The Panel recommends that research on crop and resource management for rainfed rice receives a higher priority than at present (p. 26).***

WARDA appreciates this recommendation, as it strengthens its views expressed in the current MTP (p.18), where it is stated “that upland rice research will continue to be oriented more towards conservation and enhancement of the resource base while additional resources have been allocated towards the development of technologies to intensify cultivation in the lowland rice ecosystems. Both ecosystems need to benefit from stronger integrated natural resources management research which will receive greater emphasis during the 2000-2002 MTP period.” Crop and natural resources management currently comprises one third of the approved staff plan for 2000-2002, i.e. a similar resources allocation level as for varietal improvement, and is being addressed in a balanced approach. It is essential that a critical mass for both crop/resource management and varietal improvement be maintained if the potential gains are to be realized. The balance between research on crop and resource management and on varietal improvement will be annually reviewed in WARDA's planning.

***Recommendation 3: The Panel recommends that research on rainfed rice be consolidated along crop improvement and crop resource management lines (p.26)***

WARDA appreciates the thinking underlying this recommendation. In the past, research areas were organized along disciplinary lines. However, these were reorganized in 1997 into integrated projects targeted at defined sets of constraints and ecosystems, resulting in strong interdisciplinary research teams. We believe that consolidating research on rainfed rice, strictly along crop improvement and crop/resource management lines, will be counter-productive. The research strategies, particularly in the integrated projects, are aimed at both genetic enhancement and technologies for sustainable production and improved natural resources management. While WARDA will continue with integrated approaches to technology development, we will ensure that crop improvement and resource and crop management activities become more visible than at present.

***Recommendation 4: The Panel recommends an expansion of the Irrigated Rice Programme so as to address effectively irrigated systems beyond the Sahel with emphasis on breeding for the humid and sub-humid zone, and crop and natural resource management (p. 28).***

WARDA welcomes the Panel's support for an expansion of the Irrigated Rice Programme. In 1997, the Sahel Irrigated Rice Programme was expanded to become the Irrigated Rice Programme, in order to address irrigated systems in all agro-ecological zones in the region. Provision has been made for a modest expansion in this programme.

***Recommendation 5: The Panel recommends involvement of a full-time senior economist in the Irrigated Rice Programme. In addition to giving direction in research on cost of sustainable production and resource use efficiency, the programme should guide the rice production perspective to the household and community level (p. 28).***

WARDA fully agrees that it is now timely to involve a full-time senior economist in the Irrigated Rice Programme. From 1992 until now, two successive post-docs and a visiting scientist have filled the position of economist in the Irrigated Rice Programme for a total period of 5.5 person years. WARDA's MTP for 2000-2002 includes the provision for a post-doc production economist in this Programme. Subject to availability of funding, WARDA management will explore ways of providing the staff continuity that the Programme now deserves, so as to allow the Programme to address the issues highlighted in the recommendation in a consistent and productive manner.

***Recommendation 6: The Panel recommends that the Policy Support Programme develops a strategic and more coherent research agenda so as to address issues of food security, post-harvest opportunities, sectoral policy and seed marketing. WARDA should pursue more pro-active research collaboration on these issues with regional, other Southern and Northern University partners, particularly through the Task Force mechanism (p. 31).***

WARDA welcomes this recommendation, as it confirms the relevance of the research initiated and planned in the Policy Support Programme as stated in the 2000-2002 MTP (p. 75). WARDA agrees that the development of a consistent network of partners within and outside the region is required to fully implement and complete the Policy Support Programme agenda. Initial contacts have been made with regional and international research institutions to identify areas of collaboration in the policy domain, and to strengthen the collaboration, including the development of formal collaboration agreements with Universities in the region.

***Recommendation 7: The Panel recommends that WARDA develops a new strategic agenda on social and institutional constraints to technology adoption and gains a better understanding of existing knowledge systems in the region (p. 34).***

WARDA endorses this recommendation and recognizes the need to strengthen Program 4. Prior to the creation of Program 4, WARDA began work in this area through the RADORT (Research on Accelerated Diffusion of Rice Technologies) project from 1996-1999, in collaboration with Winrock International. Since Program 4 became operational in 1998, further steps have been taken to strengthen the themes highlighted in the recommendation.

***Recommendation 8: The Panel recommends that, due to the extension of new "NERICA" upland rice varieties which will lead to loss of indigenous genetic resources, WARDA should intensify the collection and conservation of indigenous upland rice varieties (p. 35).***

WARDA agrees with this recommendation. In recognition of possible genetic losses, the centre continues to conserve rice genetic variability of all indigenous rice germplasm in sub-Saharan Africa. Almost all countries in the region have been explored for germplasm collection and conservation, except for some isolated remote areas. WARDA will continue to undertake germplasm collection and conservation, including germplasm repatriation to NARS on request, in collaboration with other organizations and programs within and outside the CGIAR, such as IPGRI, SGRP, FAO, NARS and the sub-regional genetic resources networks. The centre recently consolidated its genetic conservation efforts into a Genetics Resources Unit and is in the process of extending the genebank facilities for medium and long-term conservation.

### Major Findings and Suggestions in Chapter 3

1. ***The Panel suggests that characterization work for watershed be integrated in such a way that it will facilitate the generation of technologies for intensified farming in rainfed lowland or lowland with partial water control (p. 24).***

WARDA welcomes this suggestion as supportive of the watershed management project in Program 1, which is aimed at addressing strategic research that feeds into two integrated ecosystems projects focused on technology generation.

2. ***The Panel suggests a closer collaboration between the physiologists and geneticists to promote genetic analyses for developing molecular markers (p. 25).***

WARDA is already addressing this issue. Several joint studies are currently undertaken by scientists in different disciplines for the development of marker-assisted breeding. Program Leaders will continue to ensure that close collaboration occurs between disciplinary groups.

3. ***The Panel suggests that the breeding for drought tolerance and blast resistance may be placed into an overall breeding project, because it is difficult to find a strong reason for organizing these areas as independent projects (p. 25)***

WARDA welcomes the suggestion as a strategy for the future. Meanwhile this work is being addressed in the three integrated projects in Program 1. Breeding activities at WARDA focus on specific ecosystems, while strategic, time-bound projects address drought and blast tolerance, the results of which feed into the integrated projects.

4. ***The Panel suggests that crop management research be reported with emphasis on potential impact rather than characterization and listing of constraints (p. 26).***

WARDA agrees and this issue is being addressed. The diversity of the rice growing ecologies demands a thorough appraisal of the constraints and opportunities which has been undertaken in a systematic approach from rainfed upland to rainfed lowland and irrigated ecologies and from the humid region to the Sahel. Incremental gains as a result of improved crop and natural resource management have been quantified and reported. These have been translated into technologies that offer opportunities to improve productivity and sustainability.

5. ***To consolidate WARDA's major capacity-building efforts, the Panel suggests that the training and information dissemination activities be transferred from Programme 4 to the respective Research Support Units engaged in these activities (p. 33).***

WARDA is considering this suggestion in the context of the strategic planning exercise for the period 2001-2010 currently underway.

6. ***The Panel suggests that in the year when the Task Force meeting is not held, a coordinating meeting between WARDA and representatives of NARS should be arranged to keep regular and faster supply of germplasm to NARS (p. 35).***

WARDA fully agrees with the importance of a regular and fast supply of germplasm to NARS and uses mail and courier services as the main vehicle of supply. The change from annual to bi-annual meetings does not adversely affect the exchange of material in the INGER programme, but does represent a financial saving that is used to support additional activities by NARS. Aside from the bi-annual meetings, particular Task Forces may deem it necessary to meet on specific issues of relevance to their disciplinary groups.

7. *The Panel, finally, would like to make the following two suggestions: (p. 40).*
- *Key publications for rice researchers, such as annual Programme Reports and WARDA Scientific Conference Proceedings should be published in a more timely manner; and*
  - *All functions of training and information should be consolidated within a coherent programme of support services. In addition, WARDA should develop an overreaching strategy for support services.*

WARDA acknowledges the need for more timely publishing of key publications and will ensure that steps are taken to correct any such deficiencies.

The second suggestion has partially been addressed in item 5 above. In addition, a programmatic strategy for support services has been developed (Programme Priorities and Strategies document). Management will review this document to fill any gaps.

## CHAPTER 4 – QUALITY AND RELEVANCE OF SCIENCE

### Major Findings and Suggestions in Chapter 4

1. *A careful review of publications is therefore warranted (p. 41).*

WARDA recognizes the need to further improve the publications record of its scientists, particularly in peer-reviewed international journals. WARDA also recognizes that scientists have inevitably been heavily involved in major planning exercises during a period of transition. More time for research, analysis of results and writing of publications will now be possible. To facilitate the preparation and quality of publications, WARDA has established a Publications Review Committee, and an Editorial Committee.

2. *The Panel suggests that WARDA considers ‘shared ownership’ with its partners. The IPR policy is also being developed for information and databases. The Panel suggests that WARDA speeds up the process where possible, in particular with respect to databases on rice and rice research (p. 44).*

WARDA agrees with the suggestion and has taken steps to develop an IPR policy. At the November 1999 Board meeting, a draft IPR policy document was discussed, and a revised data sharing policy statement (first approved by the Board in May 1997) was approved. WARDA is currently undergoing an IP Audit and will be addressing this issue, in line with other CGIAR centers.

3. *The Panel suggest (1) that the leaders of the 'disciplinary groups' ensure that all research activities make full use of existing information sources and professional networks in the preparation of new activities and in the analyses and publication of the results, and (2) that WARDA develops and revisits annually, a holistic diagram of key issues in sustainable promotion of rice production, and of how its research and that of its partners together cover the entire diagram (p.45).*

WARDA agrees. In the context of the preparation of its Strategic Plan for 2000-2010, WARDA is launching a comprehensive exercise of issue and constraints identification for prioritizing research objectives and sustainable promotion of rice production. For adjustments to its research agenda and impact strategies, WARDA will continue to rely on its on-going consultation processes with its partners.

4. *The panel suggests that WARDA reviews the importance of very small projects in its research programmes with respect to research efficiency: (1) they may cause fragmentation of research to an extent that quality and/or productivity falls below a minimum level; (2) the drive towards better experiments in new projects often leads to under-exploitation of valuable existing data sets (p. 45).*

WARDA is of the opinion that it is important to use small, time-bound, strategic projects to address key-issues that will feed into the overall integrated projects. With regard to quality, productivity and under-exploitation of datasets, WARDA will continue to rely on the annual review and planning processes and center commissioned external reviews.

5. *The Panel suggests that in commissioning future CCERs, the TOR should include explicit reference to science quality and relevance in order for the reports to provide useful inputs into the EPMR process of research institutes (p. 46).*

WARDA agrees. The second item in the TOR for the CCER on Program Strategy and Management (June 1999) in fact deals with relevance and quality of science.

## CHAPTER 5 – PARTNERSHIPS

*Recommendation 9: The Panel recommends that WARDA develops a strategy for managing and periodically reviewing its partnerships for greater effectiveness and efficiency (p. 52).*

Each of WARDA's diverse partnerships has periodic reviews built into its normal evaluation and monitoring process. WARDA agrees that there is a need to clearly document the Centre's formal process for the management and review of its partnerships.

## CHAPTER 6 – GOVERNANCE

***Recommendation 10: The Panel recommends that the Board of Trustees (p. 61):***

- i. Assists the COM in the search process for positions on the WARDA Board;***

The Board agrees. The Secretary to the Board makes an annual canvas to the COM. In addition, the Director General, as Secretary to the COM, will explore, on behalf of the Board, more efficient methods of identifying nationals of member states without impinging upon Article VII.2(a) of the WARDA Constitution.

- ii. Institutes a formal annual evaluation process for each Trustee, including the Board Chair;***

The Board agrees to review this recommendation and has already discussed suitable means of such assessment. At its meeting in June 2000, the Board will formalize this process through the Nominating Committee. Prior to that meeting, the Chairperson of the NC will continue to consult available material, including that from the CGIAR (p. 58) on evaluation process.

- iii. Ensures that the Program Committee plays a more active role in providing guidance and oversight to the Centre in programme strategies and priority setting;***

The Board agrees and will explore with Management how the effectiveness of the PC can be improved so as to enhance Board involvement in setting priorities and Programme strategies.

- iv. Pursues avenues to allow Trustees to be better prepared for meetings. Each Trustee should receive the essential meeting documents at least 7 days before the scheduled meetings.***

The Board agrees and has been assured by Management that documents will be delivered to Board members well in advance of meetings. Additionally, the Board will consider the merit of a “Reading Day” at Bouaké, prior to Board meetings.

### Major Findings and Suggestions in Chapter 6

- 1. The Panel encourages the Council of Ministers to use every opportunity to acquaint their Ministers of Finance of the strong case for funding support to WARDA and suggests that WARDA staff make available suitable impact assessment material and country-specific data that shows WARDA’s contribution to agricultural development in each Member State (p. 53).***

The Secretary to the Council of Ministers (namely WARDA’s Director General) will make known the Panel’s suggestion to the COM.

WARDA will provide Member States information on the Association’s impact in individual countries.

2. *The Panel also suggests that the COM is the most appropriate forum for WARDA to brief the Member States on the region's rice situation – both overall and at the international level – and for establishing a dialog at the highest levels in respect of the specific national agricultural policy issues that arise in the work being done by WARDA (p. 54).*

This suggestion is most welcome and will be drawn to the attention of the Council. Management will explore with the Chair of Council, the inclusion of such an item on the agenda of the next Session of the Council in 2001.

3. *To aid this priority-setting process, Board members should be encouraged to systematically visit key field sites – possibly linked to regularly-scheduled Board events so as to save on costs and time (p. 59).*

Visits have, in fact, already been made by several Board members to WARDA's Sahel station in Senegal and the Board, together with Management, will arrange similar visits to key sites whenever possible.

4. *In order that the Board can effectively carry out its fiduciary responsibilities, the Panel further strongly suggests that (de minimus) the members of the Audit, and the AFC receive monthly updates on:*

- *Budget-vs-actual incomes and expenditures;*
- *A rolling 12-month cash-flow forecast; and*
- *An accompanying commentary that addresses the issues raised by the data and outlines what Management is doing about the issues raised (p. 60).*

The Director General already receives on a monthly basis, reports on budget-vs-actual incomes and expenditures, and a rolling cash flow forecast. This information, along with a commentary by Management, will also be provided to the Chairpersons of the Board and Audit Committee on a monthly basis.

## CHAPTER 7 – MANAGEMENT

*Recommendation 11: The Panel recommends that Management takes such actions as necessary to capitalize on the strengths and address the weaknesses identified in the Staff Survey, and that the Board replicates the Survey every 18 months to monitor progress and to provide feedback to the Staff, and Management (p. 64).*

WARDA agrees and the Board and Management have taken particular note of this recommendation. As was recorded in the report (page 61, last para), WARDA had already taken steps to address staff issues by retaining a Human Resources Specialist of the Organizational Change Program (OCP) to assist Management. A Senior Management Team (SMT) retreat held in September 1999 identified three sets of issues – more consultation for increased transparency and participation, attracting and retaining high caliber staff, and building and sustaining morale – as challenges to be addressed by the SMT over the next 12 months. The SMT comprises members of the Executive Management Committee (EMC), the Programs Management Committee (PMC) and the Administration and Finance Committee (AFC). One of the outcomes of the retreat was the commissioning of a comprehensive, diagnostic staff survey to be conducted by the OCP in mid-2000, the timing of which will

now be reviewed by the Board and Management in the light of the Staff Survey carried out by the Panel.

***Recommendation 12: The Panel recommends that WARDA fills vacant positions within the shortest time possible in order to ensure efficiency of programme implementation (p. 66).***

WARDA agrees and will continue to endeavour to fill vacant positions within the shortest time possible without compromising quality of the appointment.

### **Major Findings and Suggestions in Chapter 7**

1. ***The Survey also indicates some concerns among the staff, including some discomfort with the Centre Management Team's leadership style, with employment conditions, and particularly with the perceived lack – at the centre-wide level – of recognition for personal achievements, and also with career prospects (p. 64).***

Board and Management agree that it is important to address such concerns and will continue to seek ways and means for their resolution.

2. ***Through the Staff Survey, however, the Panel found, that although the staff are aware of WARDA policies and procedures and work rules, communication between Senior Management and staff is still inadequate. The survey shows that staff feel that they are not adequately involved or consulted in the process of policy formulation (page 67).***

Board and Management note the concerns expressed by staff to the Panel. At the SMT retreat held in September 1999, three sets of issues were identified – more consultation for increased transparency and participation, attracting and retaining high caliber staff, and building and sustaining morale -- are challenges which will be addressed by the SMT over the next 12 months. Management will proactively pursue these through staff participatory channels to achieve its objective of creating an enabling institutional environment for good science.

3. ***Nevertheless as clearly demonstrated by the results of the Staff Survey, not all staff are happy with the performance of the HR function at WARDA at this time. The Panel believes that initiatives to be taken in respect of the Survey results should address the perceived problems – and progress in this respect will be measured in subsequent surveys. (p. 67).***

One of the recommendations of the Gormbley Report of 1996, was the creation of the HR function which, as recorded in the Panel Report, became operational only in late 1997. Since then, HR has been further strengthened with the recruitment of an experienced Personnel Officer at the GSS Managerial level. Management believes that much has been achieved since then, and will continue to take necessary steps to achieve a higher level of performance in HR services. The Board will monitor and evaluate progress in this area.

4. ***WARDA does not have these skills (SUN System) and relies instead on personnel from other centers with similar SUN installations. Some in-house capability, at an***

*appropriate level of expertise, will be necessary for about two years to bring this system up to its capabilities and to provide staff with timely accurate information. (p. 69).*

Management is aware of the need to provide SUN System support in-house and has plans to recruit a SUN System Administrator at the senior GSS level in year 2000. Steps have been taken at the system-wide level among SUN System users to share their in-house expertise with other centers which will result in the creation of a CGIAR SUN System User Support Group. Management believes that this inter-center effort is a highly cost effective and efficient approach within the CGIAR.

5. *The Panel strongly suggests that the BoT ask for a definitive Program of Action, with completion dates, and closely monitor progress against this agreed timetable. (p. 69).*

The Board agrees. The Audit Committee will pay close attention to this suggestion. The Head of Finance is already putting together a programme of action with expected completion dates to be presented to the Board at its June 2000 meeting.

6. *The Panel is also concerned that, in trying to save administrative costs, WARDA may have under-sourced its administrative and financial competencies to such an extent that there will continue to be difficulties in bringing closure to the planned improvements and therefore provide an acceptable level of service. (p. 69).*

Management wishes to draw attention to the information provided in different documents to the Panel which shows that Administration and Finance has now been completely reorganized. This change has resulted in strengthened administrative and financial competencies. New positions have been created and staff recruited at both the IRS and senior GSS levels. Also, in a few cases, positions have been reclassified and upgraded with the recruitment of professionally qualified and experienced individuals. Management is confident that the added investment in these additional positions will provide services to meet research requirements at a much enhanced level. Progress in this area will be closely monitored by the Board.

## **CHAPTER 8 – THE FUTURE OF WARDA**

### **Major Findings and Suggestions in Chapter 8**

1. *In summary, expanding activities to ECSA will require caution and informed judgement into building partnerships (p. 73).*

WARDA fully shares the concern of the Panel and recognizes the need to utilize its limited resources, both human and financial, in the most cost effective and efficient manner. On the issue of expansion into the ECSA region, the 21<sup>st</sup> Council of Ministers in Accra expressed the view that “WARDA is already extending its mandate and geographical coverage through the Rice Task Forces and encourages WARDA to continue in this direction. The COM also re-iterated that: “Membership in the Association shall be open to all African States in accordance with the provisions of this statement and of Article XII of the WARDA Constitution”.

In continuation of previous discussions, WARDA and IRRI are planning a joint mission to consult with NARS and sub-regional organizations in ECSA to explore how best to respond to the needs of the region.

2. ***The Panel suggests that WARDA explores to what extent households communities and government in the Sahel and the region could improve the conditions for sustainable rice production. Conclusions should be presented to the stakeholders and the Council of Ministers (p. 74).***

WARDA appreciates the analysis and information contained in Table 8.1 and agrees that there is a lack of scope in research coverage related to aspects at household, community and national levels. It will take this point into consideration in its planning processes to address the deficiencies highlighted by the Panel. WARDA already has mechanisms of communicating effectively with its stakeholders and the Council of Ministers, and will use these to convey conclusions.

3. ***The Panel therefore suggest that WARDA, in collaboration with its partners, position itself to provide more strategic support to the growing rice sector of the region. This can be achieved by first commissioning rice sectors studies for a number of major producing countries (p. 75).***

WARDA has supported and implemented several rice studies in partnership with the Agricultural Planning Bureau in Mauritania, Senegal, Niger, Sierra Leone, Mali and Côte d'Ivoire. These have been restricted to the boundaries set by the Policy Analysis Matrix tool used to guide the studies. New studies are planned for 2000 in Guinea, and for 2001 in Nigeria and Ghana, and these will benefit from the Panel's suggestion regarding rice sector studies.

4. ***The Panel suggests that WARDA develops an exit strategy for any project-based research on a transient issue, and any issue which is not core to its research program (p. 76).***

WARDA fully agrees that such projects should be terminated on time and effectively.

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**Dr. Emil Q. JAVIER**

Chair

Technical Advisory Committee

February 10, 2000

**Alexander von der OSTEN**

Executive Secretary

Consultative Group on International Agricultural Research

Dear Dr. Javier and Mr. von der Osten,

On behalf of the Panel that conducted the Fourth External Programme and Management Review (EPMR) of the West Africa Rice Development Association (WARDA), I am delighted to transmit our report to you.

The Panel found WARDA in a healthier scientific and financial situation than at the time of the Third EPMR. Our report alludes to WARDA's successes in two main areas. WARDA is emerging as a Centre of excellence in rice research, and the development of interspecific varieties of rice has won the Centre international recognition. WARDA has also done well in crafting effective and low-cost approaches to partnership with NARS in West and Central Africa. Both achievements are contributing immensely to the growing impact on rice production and consumption.

The development of interspecific rice varieties is a significant international public good. This development demonstrates that *Oryza glaberrima*, an indigenous African rice, has a treasure of genes that will now be of value to the global rice research community. In Africa, rice production and consumption continues to grow, and rice in West Africa is now a US\$ 2.8 billion industry. More and more poor African families are eating rice. It follows therefore, that every year that passes, the justification for international investment in rice research in Africa grows. The collection of germplasm of the African rice is more urgent than before, and cutting edge science-led research is worth continuing on the African continent, as the centre of origin of the *glaberrima* sp.

The Panel is most grateful to the Centre for affording us an intense open exchange that allowed us to remain critical on both the strengths and weaknesses of the Centre. The Panel believes that the Centre is now mature enough to address successfully the programme and management weaknesses discussed in our report.

./...

At WARDA, the Panel would like to thank the outgoing Chair of the Board, Just Faaland, who not only guided the Centre through its most trying period, but also facilitated our review. The Panel would also like to thank the Director General, Kanayo Nwanze and two Deputy Director Generals, Amir Kassam and Michael Goon and the Executive Assistant to the Director General, Justin Kouka. Our gratitude goes also to Issaka Yougbaré for backing up our Secretariat and doing a marvelous job. For our final phase, the Panel was based at the WARDA/ADRAO Guest House for three weeks. The Panel is most grateful to the Guest House staff for their hospitality and courteous attitude that we enjoyed there.

We also want to acknowledge the support received from the resources persons assigned to the Panel, Selcuk Ozgediz from the CGIAR Secretariat and Shellemiah Keya, the Panel's Secretary from the TAC Secretariat. Their knowledge of the CGIAR system enriched our assessment for the benefit of WARDA. Rosanna Corazzi from the TAC Secretariat worked harmoniously and tirelessly with the Panel for the production of the report.

I believe that my colleagues would join me in expressing gratitude for the opportunity to participate in this review. Finally, I hope that the process and the report will be of value to WARDA and the CGIAR.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Mandi Rukuni', written in a cursive style.

Mandi Rukuni  
Chair, WARDA EPMR Panel

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH  
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

**REPORT OF THE  
FOURTH EXTERNAL PROGRAMME AND MANAGEMENT REVIEW  
OF THE  
WEST AFRICA RICE DEVELOPMENT ASSOCIATION  
(WARDA)**

**Review Panel:** Mandi Rukuni (Chair)  
John Griffith  
Hiroshi Ikehashi  
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Frits Penning de Vries  
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TAC SECRETARIAT  
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

February 2000

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## FOREWORD

This is the Report of the External Review Panel appointed to evaluate the Programme and Management of the West African Rice Development Association (WARDA). The membership of the Panel and their background are given in Appendix I. The Terms of Reference for the Fourth External Programme and Management Review (EPMR) of WARDA are shown in Appendix II, the Panel's itinerary is in Appendix IV.

In conducting the review the Panel was guided by its Terms of Reference and the Guidelines for the CGIAR review process. The Panel's assessment of WARDA's implementation of its programme and activities was assisted by the Centre's response to the recommendations of the 1993 External Review attached as Appendix III. The Panel also used the reports of the Centre Commissioned External Reviews (CCERs) undertaken during the review period.

The Panel approached the review exercise in a frank, participatory and transparent manner. The information on which the Panel based its analysis, assessment and conclusions was gathered during staff presentations, individual interview with staff, Management, Board, a few farmers, NARS and CGIAR partners. A staff survey was conducted to appreciate the institutional climate of WARDA. Some Panel members also met with National Programme Leaders, and Government officials in Ghana, Nigeria, Côte d'Ivoire, Guinea and Senegal.

Finally, the Panel examined all published and internal documents produced by WARDA staff, committees and collaborators. These included products of research dissemination and communication materials, computer software packages, electronic reports and databases. A list of documents used by the Panel is shown in Appendix V.

## EXECUTIVE SUMMARY AND RECOMMENDATIONS

Africa recently became the second continent after Asia in terms of harvested rice area. Both production and consumption of rice is growing in West and Central Africa (WCA) – the most important rice growing region in Sub-Saharan Africa - and there is greater need to increase productivity and reduce costs of rice production and consumption. Such development will contribute significantly to the food security of the region. There is therefore sufficient justification to continue with international rice research so as to meet the needs of Sub-Saharan Africa.

Since the Third EPMR, WARDA has emerged as a more mature scientific institution. The growing confidence of the Centre is witnessed in the revised mission statement which now addresses the food security of WCA directly. WARDA now has developed and transformed in two major respects. The development of inter-specific rice hybrids has won the Centre scientific recognition internationally. Second, WARDA continues to craft effective partnerships that promote its goal and mandate. The Centre's location in a region where *Oryza glaberrima* originated now presents a greater opportunity for the CGIAR and its partners to exploit the biodiversity that this rice Centre of origin offers and that may be of tremendous value to the international rice research community.

Not enough has been done to analyze and document WARDA's actual and potential impacts on food security, poverty reduction and natural resource conservation. The few studies to date, however, point at tremendous potential impact from the spreading varietal adoption and advances in crop and natural resources management, particularly on rainfed and irrigated rice. In total 197 improved varieties have been released and another 122 targeted for the next five years. Never before has the varietal release pipeline been so full in the region.

Varietal adoption has been highest under irrigation where average gross revenues per hectare have increased by US\$232 due to germplasm enhancement and improved management. Impact on upland rice is much lower and is expected to grow faster with the advent of inter-specific rices, now code named New Rice for Africa (NERICA).

WARDA's scientific achievements are well documented and span areas of crop improvement, crop and natural resources management, integrated pest management, social sciences and post-harvest technology. WARDA has also contributed to the human capital building and institutional development of its NARS partners. The Centre has contributed to policy dialogue on rice, developed effective partnerships, training and disseminated information through publication.

Research at WARDA is divided into 4 programmes: rainfed rice; irrigated rice; policy support; and system development and technology transfer. The rainfed and irrigated rice programmes are well established and are executing world class science. Research on policy and technology transfer, however, is quite limited in scope. Given the early gains from crop improvement, the Panel believes that greater emphasis should be given to crop and resources management research since future gains on the yield gap

will be from improved management. On irrigated rice, the Panel believes that WARDA needs to go beyond the Sahel environment. Future social science research also needs to place emphasis on: identifying constraints to adoption; understanding knowledge systems and diffusion paradigms in the region; understanding the role of rice in food security; post-harvest opportunities; sectoral policies; and seed marketing and input delivering systems.

The Panel felt that given the relatively large number of research management structures: 4 programmes, 19 projects, 7 task forces and 2 consortia, there is room for simplification which should lead to increased efficiency.

The quality and relevance of science at WARDA is generally good. On assessing quality, the Panel had hoped to draw upon CCER reports, but these did not provide adequate assessment in the quality of science. The component of strategic as compared to applied research has increased from 37% to 60% since the last EPMR. Scientists are averaging 1.9 publications per year, which is a reasonable figure for a small Centre. About 40% of the publications appear in internationally refereed journals. Dissemination products of WARDA and selected scientists have received international recognition. WARDA scientists have been grouped into four scientific disciplines for the purposes of maintaining quality standards. These are: rice breeding, NRM, IPM and social sciences.

WARDA continues with its unique character of being a CG Centre and at the same time a regional association of West and Central African countries. The Council of Ministers (CoM) is at the top of WARDA's governance structure, with the Board of Trustees (BoT) providing strategic and management guidance to the Centre. Both the CoM and BoT have done well in guiding WARDA through crisis periods to its current standing. The Board continues to struggle in acquiring quality candidates for Board positions. The Panel also identified areas for improving the effectiveness of the Board and its committees.

WARDA recognizes the resource limitations in pursuing its regional agenda. The Centre continues to foster partnerships so as to harness more support for its objective. This approach requires strong NARS and WARDA has to continually make such investments. WARDA has partnerships through Task Forces, research consortia, system-wide and ecoregional programmes, as well as collaborative research partnerships with CGIAR Centres, ARIs and individual visiting scientists.

The Management at WARDA has also accomplished much over the past few years. Management changed the strategic direction of the Centre's activities, at the same time instituting new policies, procedures and financial controls to correct past funding and expenditure deficiencies. Today, there is greater efficiency and stability but Management still has to deal with unfinished business with staff morale issues. A staff survey carried out by the Panel showed that this is mainly on issues of working conditions and communication, although staff are quite satisfied with and committed to their work.

The Panel believes that WARDA has a bright future and poised to play a key role in the unfolding rice production revolution in WCA. WARDA has to give top priority to consolidating its successes in WCA. This is important in the face of limited

financial resources. WARDA in consultation with IRRI has been examining the desirability and feasibility of expanding their mandate area to Eastern, Central and Southern Africa (ECSA). The Panel believes that if WARDA is to take its scientific leadership to ECSA, then that should be on the principle that there is a proactive move on the part of ECSA and that ECSA governments and NARS would invest in appropriate institutional structures and modalities that would lead to cost reduction and efficient utilization of WARDA's resources. NARS and regional research organizations in ECSA would have to manage the task force type activities.

As rice production intensifies in WCA, WARDA needs to address concomitant issues of natural resources management and use that opportunity to address broader household and community concerns around use of inland valleys.

In conclusion, WARDA is well positioned to contribute more towards a rice-based green revolution in WCA. Yet, WARDA needs to deepen the understanding of rice sector dynamics in the region through on-going analyses and research, so that the Centre can best identify key leverage points for intervention. WARDA is at the cross road where scientific breakthrough will yield large production increase in many developing countries where poor rice farmers now lag behind the technology curve. A fundamental difference is that WARDA is now developing technologies that are adapted to the African environment, without modifying the environment to fit the technology.

## **RECOMMENDATIONS**

### **CHAPTER 2 – ACHIEVEMENTS AND IMPACT**

1. The Panel recommends that WARDA strengthen its capacity to monitor and assess the impact of its activities.

### **CHAPTER 3 – WARDA's RESEARCH AND DEVELOPMENT PROGRAMMES**

2. The Panel recommends that research on crop and natural resources management for rainfed rice receives a higher priority than at present.
3. The Panel recommends that research on rainfed rice be consolidated along crop improvement and crop and natural resources management lines.
4. The Panel recommends an expansion of the Irrigated Rice Programme so as to address effectively irrigated systems beyond the Sahel with emphasis on breeding for the humid and sub-humid zone, and crop and natural resources management.
5. The Panel recommends involvement of a full time senior economist in the Irrigated Rice Programme. In addition to giving direction in research on cost of sustainable production and resource use efficiency, the programme should guide the rice production perspective to the household and community level.

6. The Panel recommends that the Policy Support Programme develops a strategic and more coherent research agenda so as to address issues of food security, post-harvest opportunities, sectoral policy and seed marketing. WARDA should pursue more pro-active research collaboration on these issues with regional, other Southern and Northern university partners, particularly through the Task Force mechanism.
7. The Panel recommends that WARDA develops a new strategic research agenda on social and institutional constraints to technology adoption and gains a better understanding of existing knowledge systems in the region.
8. The Panel recommends that, due to the extension of new “NERICA” upland rice varieties which will lead to loss of indigenous genetic resources, WARDA should intensify the collection and conservation of indigenous upland rice varieties.

#### **CHAPTER 5 – PARTNERSHIPS**

9. The Panel recommends that WARDA develops a strategy for managing and periodically reviewing its partnerships for greater effectiveness and efficiency.

#### **CHAPTER 6 - GOVERNANCE**

10. The Panel recommends that the Board of Trustees:
  - i) Assists the COM in the search process for positions on the WARDA Board;
  - ii) Institutes a formal annual evaluation process for each Trustee, including the Board Chair;
  - iii) Ensures that the Programme Committee plays a more active role in providing guidance and oversight to the Centre in programme strategies and priority setting;
  - iv) Pursues avenues to allow Trustees to be better prepared for meetings. Each Trustee should receive the essential meeting documents at least 7 days before the scheduled meetings.

#### **CHAPTER 7 – MANAGEMENT**

11. The Panel recommends that Management takes such actions as necessary to capitalize on the strengths and address the weaknesses identified in the Staff Survey, and that the Board replicate the Survey every 18 months to monitor progress and to provide feedback to the Staff, and Management.
12. The Panel recommends that WARDA fills vacant positions within the shortest time possible in order to ensure efficiency of programme implementation.

## CHAPTER 1 – INTRODUCTION

### 1.1 WARDA in the Regional and Global Rice Economy

#### 1.1.1 The Growing Importance of Rice in Africa

In 1997, Africa became the second largest continent in terms of harvested rice area, replacing the Americas from this slot. During the period 1987-97, rice area expanded rapidly in all regions of Africa with West Africa growing fastest, realizing an area expansion of 1.59 million hectares to a total of 4.38 million hectares. Table 1.1 provides rice production details for the seven largest producing countries in West Africa. For the African continent as a whole, rice represents 2.9% of world production, but rice production in Africa is growing faster than in any other continent (3.3%/year against 2.6% for the world over the period 1961/1963 to 1996/1998). Rice production is growing faster in West Africa (4.3%/year) than in Sub-Saharan Africa as a whole (3.3%/year). In West Africa, planted area increased at 2.8%/year while yields increased at 1.4%/year in 1997. However, volume of rice production is still trailing far behind that of maize and millet/sorghum in Africa. The development and use of inland valley swamps in Sub-Saharan Africa is accelerating the pace of rice production.

In terms of cultivated area, rice is the second most important cereal crop in the world, after wheat, and the third most important cereal crop in terms of production, consumption and exports after wheat and maize. By 2020, rice is expected to be the major staple food crop for half of the world's population. Asia is by far the largest producer, consumer and exporter of rice, with over 90% of the world's totals. In order of importance, China, India, Indonesia, Bangladesh and Vietnam were the largest producers in 1998/99, while the largest exporters in 1998 were Thailand, India, Vietnam and China.

West Africa is a small rice producer in the world, with only 1.3% of production, but a significant importer, with 8.4% of world imports (average 1996/98). It produces two-thirds of the rice in Sub-Saharan Africa. The size of the rice economy in West Africa exceeds US\$ 2.75 billion annually and is largely composed of US\$ 1.85 billion in local production and US\$ 0.9 to 1.0 billion in imports. Senegal, Côte d'Ivoire and Nigeria are the largest importing countries. Nigeria alone produces about 50% of the subregion's rice. Recently, Mali has become more-or-less self-sufficient in rice, a major achievement, but production is also increasing rapidly (over 10%/year) in several other West African countries (Ghana, Nigeria, Togo, Mauritania), albeit often from a low base.

The global growth rate in rice consumption is about 1.9% per year (1983-1995). The figure for Sub-Saharan Africa as a whole is 3.9% and that for West and Central Africa (WCA) is 4.6%. Rice is therefore already important in WARDA's mandated region and will become increasingly so in the future. There is therefore a justification to continue with international rice research that meets the needs of Sub-Saharan Africa.

**Table 1.1 - Rice Area, Yield and Production Summary  
of Selected Countries in West Africa**

Country	Area (‘000 ha)	Production (‘000 t)	Yield (t/ha)	% Area in ecology				
				Rainfed Upland	Rainfed Lowland	Irrigated Lowland	Mangrove Swamp	Deep- water Floating
Nigeria	1.784	3.122	1.75	35	45	12	0	8
Guinea	445	668	1.50	69	19	1	11	0
Cote d’Ivoire	750	1,223	1.63	74	19	7	0	0
Sierra Leone	289	392	1.35	67	22	2	7	2
Mali	302	463	1.53	3	25	32	0	40
Ghana	96	202	2.10	9	81	10	0	0
Senegal	70	160	2.29	5	43	45	7	0
Total	3,737	6,229	1.66	45.6	34.2	11.1	2.0	7.2

Source: FAO, 1999 (1996 data); WARDA Task Force Estimates; IAEG Germplasm Impact Survey Results 1999.

### 1.1.2 The Policy Environment for Rice in West and Central Africa

What is particularly striking in Africa is the large diversity of rice production systems, ranging from rainfed rice in the wetter uplands, to irrigated rice in the dry Sahel. The continuum covers uplands to lowlands, including inland valleys and mangrove and deep water systems. Land preparation ranges from mechanized to animal traction and hoe cultivation systems. Intensity of inputs varies from high levels found in most irrigated rice schemes to no external input systems in the uplands. The holdings span from large scale to small scale, *sativa* type to *glaberrima* to inter-specifics as in Guinea (Conakry), financially profitable as in the Office du Niger in Mali to marginal profitability as in some large scale irrigation systems in the Senegal River valley in Senegal. This enormous and complex diversity which is unique in the world is often ill understood by policy makers, researchers and development agents and poses a great challenge to rice development in Africa.

Rice policies in most West and Central African countries have drastically changed since the Third EPMR of WARDA. Structural adjustment, economic liberalisation, the devaluation of the FCFA Franc in January 1994, the near-total liberalisation of rice imports and the withdrawal of the state from large irrigated rice production schemes have dramatically changed incentives for local rice production and marketing.

Overall, the economic environment is now much more conducive to local production and marketing, although the institutional weaknesses in the supporting structures for food crop production (seed, fertiliser and other input supply, agricultural research and extension, agricultural credit) have hampered more rapid increases in production, particularly in input intensive irrigated production systems. At the same time, inadequacies in the marketing (milling, transport, attention to quality, credit) of locally produced rice often favour imports which benefit from economies of scale, quality superiority, and import financing schemes offered by large banks. More attention is now going to post-harvest operations and marketing, with small rice hullers being introduced widely, more emphasis being placed on grain quality and increasing competition in the marketing chain, which lowers marketing costs.

### **1.1.3 Potential Impact for the Poor and the Hungry**

The importance of rice in terms of household food security is growing in Africa, and more so for the poorer families. Rice has food qualities superior to traditional cereals and roots and tubers. It is quick and easy to prepare, requires less cooking time and has good keeping qualities. It is therefore a widely preferred food, also by the poor, particularly in urban and peri-urban environments. But even in rural settings, it reduces the burden on women in the household, and provides adequate nutrition, even if only few other foods are available. It is thus not surprising that in a priority ranking exercise CORAF researchers in Coastal West Africa rated rice the number one food crop, while it was rated second (after vegetables) in Sahelian West Africa.

Although rice is one of the traditional crops of Africa, its status as a minor crop has possibly led to the misperception that it is a new or alien crop to Africa. Now that rice is growing in importance, the realization is also growing that its production potential, particularly in the wetter agro-ecologies, and wetlands/inland valleys is enormous. Thus, Africa has the agro-ecological potential to become a future rice-bowl and even a rice supplier for other continents given the right incentives, infrastructure, policies and institutions. What we are witnessing now may be the beginning of a continuous expansion in local rice production outstripping more and more population growth. By itself, rice in WCA is arguably a small green revolution that is unfolding. But as long as imports are increasing then the rice battle is not won. And WARDA, an institution supported by 17 member states, is at the helm of the battle. With its many partners in the countries and overseas, it is at the heart of rice-led development as an 'open Centre' of excellence in rice research and development.

## **1.2 Recent Evolution of WARDA as an Institution**

Judging from the report of the Third EPMR, the Centre has arguably matured more by the time of the Fourth EPMR. This has inevitably come with its own growing pains as the Panel found such evidence in both key areas of science as well as in management. But going back to the time of the third EPMR of WARDA in 1993, TAC had approved a Medium-Term Plan; WARDA had recruited a cadre of high-calibre scientists; the Phase I construction of the Headquarters and Main Research Centre at M'bé was complete; the Task Forces and 'open Centre' modes of partnership had recently been introduced; regular group training courses were being conducted in

various disciplines; and a Library and Communications Centre had been built and established.

### **1.2.1 Key Developments since the Third EPMR**

Since 1993, WARDA has expanded its Programme, positioned itself along the research-to-development continuum, including systems development and technology transfer, rather than constraining itself to technology generation alone. In line with evolution with the CGIAR as a whole, WARDA has explicitly re-focused its mission from “strengthening NARS” to include poverty eradication and natural-resource conservation. Its client group has broadened from solely NARS and extension partners, to include the whole range of stakeholders, such as farmers and policy-makers. In direct response to the identified priorities and potentials of African agricultural development, WARDA’s mission and programme structure have evolved to focus on three complementary imperatives, namely technology generation and evaluation, technology dissemination and support to NARS, and policy support. All these changes are reflected in its refined mission statement:

*“... to contribute to food security and poverty eradication in poor rural and urban populations, particularly in West and Central Africa, through research, partnerships, capacity strengthening and policy support on rice-based systems, and in ways that promote sustainable agricultural development based on environmentally sound management of natural resources.”*

The CGIAR as a whole went through a funding crisis in 1993/94. However, through a combination of pro-active resource mobilization and public-awareness activities targeted at both donor and member states, the Association’s income in 1998 had reached the level of 1993 (US\$ 9.1 million) from the 1994 low (US\$ 6.9 million). Member states’ contributions increased from 0.3% of total budget in 1995, to 4.5% in 1997, and 10.7% in 1998. WARDA’s institutional context as both an IARC and an Association of member states remains a unique model in the CGIAR. At the apex of WARDA lies its Council of Ministers. The increase in payments since 1993 attests to both political and financial support and ownership by member states. (See Section 1.2.3.)

### **1.2.2 Current Organizational and Programme Structure**

The Centre’s management structure has been re-organized. Two Deputy Directors General (DDGs) have been appointed, one to head Programmes (Research) and the other Administration & Finance Divisions, these positions having been upgraded from Divisional Directors. Some of the responsibilities formerly held in the Director General’s Office have been devolved to the DDGs. In addition, Committees have been established at management level to facilitate institute wide decision making:

- Executive Management Committee (EMC), comprising DG and DDGs;
- Administration & Finance Committee (AFC), comprising DDG-A&F, DDG-P, Head of Finance, Head of Human Resources and Administrative Services, Head of Operations;

- Programme Management Committee (PMC), comprising DDG-P, DDG-A&F and Programme Leaders (or their representatives);
- Senior Management Team (SMT), comprising all (9) members of EMC, AFC and PMC.

The former Research Division, with its two-Programme structure (Continuum; Sahel Irrigated Rice) has been remodelled into four research Programmes (Rainfed Rice; Irrigated Rice; Policy Support; Systems Development & Technology Transfer) and six Programme Support Units (Biometrics; Genetic Resources; Information & Documentation [IDC]; Quarantine/Biosafety; Systems Analysis & GIS; Training & Fellowships [TFU]).

### **1.2.3 Infrastructure Development**

In 1996, the Board of Trustees approved the Phase II Capital Development Programme. Construction has since been completed to include the Research Annex and the Information and Documentation Centre. The total cost for Phase II was estimated at US\$1.9 million. Of this amount, the actual cost of the two buildings was entirely financed by member states at the tune of US\$1.15 million and the Panel commends the COM for this support. Since 1997, a molecular-biology facility has been established at WARDA to facilitate the in-house use of anther-culture and gene-mapping, and to prepare WARDA for marker-assisted selection of breeding materials.

### **1.2.4 The ‘Open Centre’ Concept and Collaborative Partnerships**

A key thrust of the CG’s work is the strengthening of NARS. In 1991, WARDA established Task Forces, after a concentrated consultation process, to specifically address NARS’ needs from their collaboration with IARCs. In 1993, the Task Forces had only been in operation for 1–2 years and were still evolving. This novel method of research coordination and collaboration proved immensely successful. The Task Forces were merged with the CORAF Rice Network in 1999 to form a single regional rice R&D network “West and Central Africa Regional Rice Research and Development Network” (ROCARIZ), with the Secretariat at WARDA. The ‘Consortium’ concept was introduced in 1994, with the creation of the Inland Valley Consortium.

Today WARDA participates in another consortium: the Human Health Consortium (HHC). There is also the Interspecific Hybridization Project (IHP). These are discussed in greater detail in Chapter 5.

### **1.2.5 New Rice for Africa**

The Panel believes that the development and dissemination of inter-specific rice cultivars (code named New Rice for Africa [NERICA]) is the most exciting development ever at WARDA. It is not surprising therefore that the New Rice for Africa will continue to be a major component of WARDA’s work as we enter the 21<sup>st</sup> Century—and that it has revolutionized the approach to rice breeding, and opened the prospect for sustainable rice cultivation throughout the subregion and beyond. The IHP has broadened the genetic base of rice for use world-wide, and arguably sets the stage for a Green Revolution in rice in Sub-Saharan Africa.

### 1.3 Action Responses by WARDA to the Third EPMR

The Third EPMR was a highly constructive contribution to the development of WARDA. Since the Third EPMR, WARDA took the necessary action to implement the recommendations and succeeded with varying degrees. The Centre's description of the responses to the last EPMR is contained in Appendix IV, and the following is a summary of the Panel's assessment of actions taken by WARDA in response to the Third EPMR:

- The recommendation that WARDA takes steps to cooperate with institutions such as IFPRI in undertaking research on the effects of markets, infrastructure and government policies on adoption of improved rice technology was partially implemented. WARDA has joined IFPRI's 2020 Network and continue to explore the possibilities of a joint IFPRI-WARDA appointment. With support from the African Development Bank, WARDA initiated its own policy work on the economic competitiveness of rice production systems in West Africa. Meanwhile, WARDA's policy research has become more closely associated with the World Bank and USAID.
- WARDA now maintains a second core scientist position in the Sahel Programme. WARDA has also responded with innovative use of associate scientists, post-doctoral fellows and visiting scientists. In the meantime, WARDA believes that it is necessary to post three scientists in Senegal: one breeder, one agronomist and one economist.
- In response to the recommendation that the Centre explores with IWMI the possibility of joint eco-regional initiative on irrigated areas of the Sahel, WARDA signed an MOU with IWMI and this resulted in a joint appointment at M'bé. IWMI has since become a member of the Inland Valley Consortium (IVC). Both organizations are also actively involved in the System Wide Initiative on Water Management (SWIM), and in developing a regional water initiative with the Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles (CORAF), the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), the Centre d'Étude Du Machinisme Agricole du Génie Rural des Eaux et Forêts (CEMAGREF), IRD (ex-ORSTOM) and NARS of WCA.
- A recommendation was made for WARDA to intensify efforts to mobilise funding for the Mangrove Swamp Rice Network activities. WARDA continues to support the Special Mangrove Project, and the Network activities through the Task Force mechanism. Funding is provided from donor support to the Rice Task Force network. As per the recommendation, WARDA has successfully devolved the Mangrove Rice Programme to NARS coordinated by Sierra Leone. WARDA continues its support through the Mangrove Rice Task Force and provides funds on a competitive basis.
- The recommendation that WARDA restore the position of Trainer was not implemented and recruitment is now planned for the year 2000.

- The recommendation that WARDA should run INGER-Africa as a unitary network has been implemented and since 1997 INGER was fully transferred from IITA to WARDA. The Task Force on Genetic Exchange for WCA has now been fully integrated with INGER-Africa and the whole transfer process did not interrupt germplasm flow to ECA countries.
- Efforts at WARDA to recruit more women in senior positions have faced some obstacles. In the period 1996-99, WARDA interviewed 8 women for senior positions, 4 were offered positions, 3 declined and the 1 recruited left in 1997 for health reasons. Female scientists, associate staff and senior regionally recruited staff have, however, increased.
- Donor support for WARDA has improved since the last EPMR. In addition, contributions by WARDA member states have improved considerably, as noted above.
- WARDA has also built on its 'Open Centre' character and continued to rely on collaborative relationships with greater success with NARSs and IARCs, than with the private sector and NGOs. WARDA also responded positively to the recommendation to partner with IITA and others to establish the Inland Valley Consortium (IVC).

#### 1.4 Review Approach and This Report

The Fourth EPMR was conducted as an open consultative process and started by spending considerable time at M'bé, the headquarters of WARDA, interacting with the Board, scientists and senior management. The initial phase of the Review coincided with WARDA's Board of Trustees meeting week and the Panel had ample opportunity to interact with the Board and its Committees. At the end of the first week of the initial phase, the Panel split into two sub-panels and visited five countries: Côte d'Ivoire, Ghana, Guinea, Nigeria and Senegal. These field visits allowed the Panel to assess some of WARDA's programmes, as well as dialogue with some of WARDA's NARS partners, as well as other stakeholders.

In approaching its task, the Panel interpreted its terms of reference and placed emphasis on five areas:

- *The alignment between WARDA's programmes, strategy and priorities, with the CGIAR goal, and of course in relation to needs of West and Central Africa.* The Panel examined the extent to which resource allocation actually matches the stated priorities, and therefore how well the Board provides direction and guidance for these processes. These issues are addressed in various chapters of the report with issues of governance addressed more in Chapter 6.

- *The relevance, coherence, and effectiveness of WARDA's four Programmes in contributing to WARDA's mission.* Chapter 3 of the report is devoted to this issue. The Panel assessed the Programmes for evidence of scientific leadership and technological innovations, as well as the critical mass in scientific capacity and disciplinary mix needed for such achievements. Partnership, so crucial in WARDA's modus operandi is treated in Chapter 5.
- *Quality of science at WARDA* as evidenced by refereed publications and/or other peer review processes and relevance of scientific methods, projects and activities to the priority problems in question. Quality and relevance issues are featured in Chapter 4.
- *Effectiveness and Efficiency of Management.* The Panel examined the adequacy of skills and resources needed for the task, the appropriateness of the Centre's organizational structure, and the success of Management in creating a conducive culture and work environment for good science and productive team work and relationships. The Panel also examined the issue of funding at WARDA, and the efficiency in use of funds and financial management. Management issues are covered in Chapter 7.
- *Achievements and impact.* The Panel examines this issue in detail in Chapter 2, and places emphasis on the three CGIAR target impact areas of food security, poverty reduction, and natural resource conservation. WARDA's achievements are also discussed in the key areas of scientific leadership, partnerships, capacity building and policy dialogue.

## CHAPTER 2 - ACHIEVEMENTS AND IMPACT

### 2.1 WARDA's Impact and Achievements

The transformation and development of WARDA is recognizable in two major respects. First as an emerging credible Centre of scientific excellence, and second as an institutional innovator in crafting effective partnerships. Overall, WARDA is now firmly recognized as a strong scientific research institute, a leader in its own right in rice research, which attracts scientific interest world-wide. Progress through the rice interspecific hybridization project and in other areas have transformed WARDA from a premier rice development organization on a regional basis to a Centre of excellence in rice research. This of course is not to say that WARDA has given up its development mandate. Even here, WARDA has pioneered new participatory ways, as an open Centre, in developing partnerships with stakeholders through the Task Forces, the Inland Valley Consortium, the Human Health Consortium, Participatory Varietal Selection (PVS), Participatory Rice Breeding (PRB) and through coalition building around specific technologies. This too has attracted interest world-wide as a novel mode of collaboration and a cost-effective way to bring science to bear on the problems of the poor.

WARDA, as with other CGIAR Centres, targets impact in three major areas: food security; poverty reduction; and natural resource protection, through achievements in research, partnerships, capacity building and policy dialogue. In assessing the impact of WARDA's work, the Panel had little in the form of documented evidence on these three major areas. Several adoption and impact studies on varietal release have been undertaken within the framework of the Rice Economics Task Force, and an ex-post impact study was done by independent researchers from Purdue University on the adoption rate of a series of Sahel cultivars in the Senegal river valley. The Panel received one study<sup>1</sup> which attempts to assess the extent of adoption of WARDA varieties and related germplasm and their impact. But it is difficult to adequately assess both the potential and actual impact solely on the basis of these studies, some of the anecdotal evidence provided, and questions asked by the Panel.

WARDA's achievements, however, are well documented<sup>2</sup>. The Panel believes that WARDA's achievements during the period 1994 to 1999 have been significant. These achievements have laid a solid foundation for far reaching impacts on food security in the region. The approach in this chapter, therefore, is to discuss those major achievements of WARDA that have high potential for impact on the lives of rice-producing and eating West and Central Africans, and beyond, and then to report on measurable impacts.

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<sup>1</sup> "Ecological Diversity and Rice Varietal Improvement in West Africa" by Timothy Dalton and Robert Guei, draft dated 29 October 1999, WARDA. The study was financed by the Impact Assessment and Evaluation Group

<sup>2</sup> Reference is made to the document which WARDA prepared for this EPMR, "Achievements since the Third External Program and Management Review", M'bé/Bouaké, 1999.

## 2.2 Scientific Achievements

WARDA has had significant scientific achievements in terms of providing research leadership as well as producing applied technologies and knowledge that contributes to the well-being of intended beneficiaries. The Panel reviewed Centre-wide achievements in the following areas: crop improvement, crop and natural resources management, integrated pest management, social sciences and post-harvest.

### 2.2.1 Crop Improvement

WARDA has had major achievements in crop improvement. These include the development of high-yielding stress-tolerant/resistant rice varieties for irrigated and rainfed ecologies (including new interspecific varieties). These are gaining acceptance among the farming community and continue to spread through the subregion. WARDA's varieties obtained through traditional breeding methods have been released in several countries, having been primarily promoted through the Task Forces. In total, 17 improved rice varieties (nine of these for the upland and eight for rainfed lowland ecosystems) have recently been released in 9 countries of the sub-region. For irrigated rice in the Sahel, a WARDA introduced variety (Sahel 108) is suited for double-cropping and now occupies 25–30% of the irrigated rice area in the wet season and more than 75% in the hot dry season in the Senegal River valley in Senegal and Mauritania. Two other varieties (Sahel 201, 202) were also introduced by WARDA and are now spreading. Moreover, high numbers of varieties are in the pipeline for release over the next five years.

Through successful introgressive hybridization of *O. glaberrima* and *O. sativa* (dubbed 'NERICA' for New Rice for Africa), WARDA has developed (since 1992) high-yielding, low- and high-input responsive, multiple stress (insects, disease, soil acidity, drought) resistant/tolerant, weed-competitive rice varieties. In terms of scientific achievement, overcoming hybrid sterility by using anther culture in rice interspecific hybridization is a milestone and has opened a new horizon. Since 1994, stable and fertile *O. sativa* x *O. glaberrima* varieties appeared at WARDA for the first time in the history of rice breeding. It is estimated that in the next five years, 37 new varieties for uplands are expected to be released - including NERICA varieties. The new plant type combines the early vigour and leafiness of *O. glaberrima* with the yield characteristics of *O. sativa*. Many progenies exhibit high tillering and droopy leaves at the vegetative stage and erect upper leaves at the reproductive stage. The droopy lower leaves keep weeds under check as they are smothered. The erect upper leaves during the reproductive stage enable the plant to intercept much more sunlight and uniformly disperse the light within the canopy to enhance higher photosynthetic activity – an important requirement for high-yielding capacity.

The high grain yield observed in the NERICA's compared to the *O. glaberrima* parent is the result of panicles with secondary branches, a trait inherited from *O. sativa*, giving the ability to respond to added inputs by producing more spikelets and grain. Many NERICA's have higher protein content than the two parents, an important advantage for poor rural families who could do with more protein in their diet.

Physiological studies on interspecific progenies revealed the mechanisms behind improved competition for light, guiding the breeding work at WARDA. Physiological

studies conducted in the Sahel revealed the mechanisms of salinity tolerance and tolerance to extreme temperatures, guiding breeders in the development of germplasm suited for double cropping and salinity prone environments. Highly fertile and stable interspecific (*O. glaberrima* x *O. sativa indica*) progenies have been developed for irrigated rice systems with high yield potential and high resistance to Rice Yellow Mottle Virus (RYMV).

*Oryza glaberrima* and NERICA's now draw a lot of attention from research institutes in other continents, particularly Asia. Thus, IRRI is now using *O. glaberrima* accessions into its new plant type genome for direct-seeded, rainfed lowland conditions. At the Yunnan Academy of Agricultural Sciences in China, interspecific hybrid progenies are being used to enhance *indica/japonica* hybrid vigor. At CIAT, Colombia, interspecific crosses are being evaluated. Cornell University in the USA, IRD in France, JIRCAS, Tokyo University, and the Kyoto University in Japan now have established concrete collaborative activities with WARDA on rice interspecific hybridization.

The above notwithstanding, it is realized that WARDA has only just begun making use of the extended potential of the *Oryza glaberrima* and *O. sativa* genepools. Further plant-type development is required to develop suitable material for specific ecologies, especially for the rainfed and irrigated lowlands.

### 2.2.2 Crop and Natural Resources Management

WARDA has undertaken extensive studies in the key agro-ecologies to determine the incremental yield response to improved crop and natural resources management. Approaches for the stabilization of the fragile uplands include the selection of well-adapted legume cover crops that reduce weed infestation and supply nitrogen to the succeeding rice crop. This can be enhanced by efficient use of rock-phosphate. Approaches for the rainfed lowland ecology include improved crop, water and nutrient management and the selection of well-adapted cultivars for given management levels. In irrigated systems, rice yield, productivity and profitability greatly improved by improving timing, mode and dosage of crop and natural resources management interventions, especially fertilizers, and herbicides. Recommendations have been transferred to extension services in Mauritania and Senegal and are now in large-scale extension phase. WARDA has conducted innovative systems analysis and modelling research over the past 5 years. Based on this work, a crop management decision tool RIDEV was developed that advises farmers on best timing of crop management interventions. This was complemented by the development of a crop growth model ORYZAS to determine potential rice yields. Research has also shown how to avoid or minimize soil degradation.

An innovative method was developed to quantitatively assess flooded areas. Radar-based remote sensing indicated that with a simplistic algorithm three hydrological categories could be distinguished: bare flooded land, flooded with plant cover, and non-flooded. Through further refinement and validation of this technology, demarcations of locations, as well as extent and duration of floods can be determined.

### **2.2.3 Integrated Pest Management**

Research into the characterisation of weed species, pest ecology, the development of diagnostic tools, efficient and reliable screening methods all have contributed to the development of effective and farmer-oriented integrated pest management strategies for the various agro-ecologies. Host-plant resistance plays a major role in the development of pest management strategies. Detailed studies are being conducted on pathogen diversity (blast and RYMV), RYMV epidemiology, identification of donor lines to host plant resistance to RYMV, blast, African Rice Gall Midge (AfRGM), pest ecology, and incidence of nematodes. Weed competitive plant types have made a major contribution to weed management practices in upland areas and these studies have now been extended to lowland ecologies. Integrated weed management practices have been developed that combine best-bet crops, water and nutrient management practices (timing and dosage) to enhance crop competitiveness.

### **2.2.4 Social Sciences**

A Farm Management Household Survey database has been established, laying the foundations for micro-economic analysis of farmer behaviour in the main ecologies and rice farming systems. Production functions have been estimated to analyse the impact of different rice production technologies on labour use. Four rice sector studies have been conducted including a detailed analysis of local rice production competitiveness by main commodity sub-system. These studies confirmed the influence of production site (distance from coast) and level of input use and underlined the positive impact of small-scale processing technologies on the overall competitiveness of African rice economy. Policy studies have been conducted on intensification of rice production, e.g. rice quality and pricing, and gender issues. Also, a comprehensive review of varietal improvement in the sub-region and its economic impact has been completed.

The analytical foundation of the policy debate among decision-makers and government policy analysts has improved. The implementation of a common methodology in each country has also contributed to strengthening the communication among policy analysts in the region. Comprehensive reviews of the rice sector in Senegal, Mauritania, Niger, Mali, Côte d'Ivoire and Sierra Leone were aimed at providing the necessary information for policy making and prioritizing research needs.

### **2.2.5 Post Harvest**

The ADRAO/SAED/SISMAR/ISRA Rice Thresher/Cleaner (ASI) was developed through collaboration with SAED and ISRA in Senegal from a prototype which came from IRRI. Using the ASI, labour for winnowing, cleaning and sifting, which is usually supplied by the farm household, is minimized. The ASI further avoids grain losses from delays, reduces total harvest and post-harvest costs, provides local employment in agro-industry, and reduces calendar constraints to rice double-cropping. Financial analysis of the thresher-cleaner confirmed that its use can generate substantial returns to capital investment (20–161%) and hereby increase farmers' financial benefits significantly. The influence of N management, time of harvesting and storage conditions on grain quality has been also determined.

### **2.3 Human Capacity Building and Institutional Development**

WARDA continues with its major role of building the capacity of its partner NARS through various categories of training. Much of this work has been conducted through the Task Forces and collaborative mechanisms such as IVC and HHC. New modes of capacity building have been introduced, for example, the NARS Visiting Scientist scheme, and formation and support of the mangrove network.

The major accomplishment of WARDA in regional rice policy research in West Africa is capacity building. Various workshops organized by WARDA and held in each country have contributed to improve policy analysis capacity in the region.

Through the AfricaLink project, implemented through WARDA, the Centre has significantly contributed to improving electronic connectivity of NARS in order to strengthen information exchange and management within West and Central Africa and the rest of Africa and the world. From 1997 to present, 51 institutions requested WARDA to connect some 150 sites for e-mail access to about 1200 research scientists throughout the region. To date, 100 sites in 15 countries for 29 institutions have been connected.

### **2.4 Policy Dialogue**

A Policy Analysis Matrix (PAM) Network has been developed to facilitate data exchange between rice economists and to guide rice policy development. Three workshops were organized on Agricultural Policy Analysis, and about 60 policy economists were trained in PAM.

The findings of the HHC support current policies to develop wetland farming in the subregion. Decision-makers now have the scientific evidence they need to alleviate health concerns and support their health policies as they relate to wetlands development. Moreover, the research findings and their implications are available to policy-makers world-wide through the Internet.

WARDA's Task Forces have been merged with CORAF's rice research network. This is an important institutional development, leading towards better integration of regional research activities, avoiding overlap and rationalising the division of work between partners. Some member countries have adopted community-based seed production systems (CBSS) with regards to certified seed policies. In Côte d'Ivoire, WARDA has been instrumental in setting up biosafety regulations. WARDA helped to revive varietal release committees in Côte d'Ivoire, Senegal, Mauritania and Ghana.

### **2.5 Effective Partnerships**

WARDA as an open Centre has developed effective partnerships with its many stakeholders. Reference is made to Chapter 5 for details. In the early 1990's, WARDA pioneered the concept of "Task Forces". Beyond this WARDA coordinates INGER-

Africa, is engaged in the IVC and HHC consortia and numerous collaborative research activities with partner institutions.

Task Forces have also allowed WARDA access to farmers in pursuing its R&D agenda. Training workshops have been held to promote improved and new rice technologies, including methods of Participatory Varietal Selection (PVS), which were introduced in 1996, and Community Based Seed Production System (CBSS). Although not a WARDA innovation, the PVS approach involves the NARS and farmers in the breeding programme early on thus allowing for accelerated spread of the new varieties. To date, PVS has spread to 17 countries in the region establishing a solid PVS network. The PVS has covered 64 sites, involving over 3000 farmers.

Interspecific crosses and other new varieties are also being distributed widely in the region via the International Network for Genetic Evaluation of Rice (INGER-Africa) trials and On-farm trials. With the CBSS, the time required from release of a variety to production of sufficient seed for distribution to a large number of farmers, usually six to seven years, is shortened to no more than four years. Numerous collaborative research partnerships have been established with advanced institutes such as Cornell, John Innes, NRI, and Wageningen to enable WARDA to address strategic issues.

## **2.6 Publications and Information Dissemination**

Between 1993 and 1999 (inclusive), WARDA staff published 138 journal articles, 78 conference papers, and 35 book chapters. In the same period, at least 30 research and training titles were published under the WARDA imprint, including 7 books, 3 directories, and 3 proceedings. Two public awareness films (on the New Rice for Africa and Sahel Rice Farming) and numerous brochures and publications have been released.

WARDA continues to develop printed publications for its partners and peers. Furthermore, efficient and cost-effective media for rapid dissemination of information, including videos, electronic forms and Web-publishing are being pursued. This will be enhanced through WARDA's new communications hardware (Integrated Voice and Data Network, IVDN), which is expected to be in place later this year.

## **2.7 Impact of WARDA's Work**

Production patterns differ dramatically across the region. Varietal adoption and rate of return studies have been limited to a few ecologies, (largely the mangrove and irrigated systems and several case studies of the lowlands). In what follows, impact from regional varietal improvement will be reported. Impact from crop and natural resources management advances is clear at the farm level, yet no formal impact analyses have been conducted. But certainly substantial benefits have been gained from improved crop husbandry, fertilizer applications and timing recommendations for irrigated and lowland rice production. Thus, more research on impact is needed at WARDA, and not only in terms of the effects of varietal improvement.

For the Sahelian irrigated sector, independent researchers Monica Fisher, William Masters and Mamadou Sidibé of Purdue University estimate that the payoff to research, development and spread of three high-yielding irrigated rice varieties (Sahel 201, 202 and 108) by WARDA's Sahel station, in collaboration with ISRA, is likely to exceed 100% per year over the period 1995-2004. The estimated internal rate of return is in fact 116% with a standard variation of 39%. The Sahel varieties were developed in Asia, introduced by WARDA for the Sahel environment and are now being extended by NARS and development organizations. They are rapidly replacing earlier introductions in the Senegal River delta in Senegal and Mauritania. Sahel 108 is superior due to its short-duration cycle, particularly for double-cropping. It yields approximately 10% more than the existing varieties (Jaya and I Kong Pao) in the wet season and about 11% more in the dry season.

The varietal release history by country and ecology is given in Table 2.1. In total, 197 improved varieties have been released with more than 122 targeted for release in the next five years (2000-2004). On the average, about eight varieties per year have been released since 1980.

The irrigated ecology has the highest adoption rate of improved varieties and has benefitted the greatest from the introduction of materials developed in Asia (see Table 2.2). By contrast, adoption rates in the uplands are the lowest for all ecologies. In Côte d'Ivoire, approximately 50% of all upland area is planted with introduced varieties. Later introductions occupy only about 8% of uplands. Adoption levels for the rainfed lowland ecology are slightly higher than in the uplands. The diffusion rates are also high for the mangrove (Guinea, Sierra Leone) and deep-water ecology (Mali). Overall, Nigeria has the highest rates of varietal adoption, but most of the varieties were adopted more than 15 years ago.

Varietal improvement has increased farm revenues (on average by US\$ 100 per hectare) but much more so in irrigated and rainfed lowland areas (Table 2.3). On average, gross revenues per hectare in the irrigated areas have increased by US\$ 232 as a result of varietal improvement and by only US\$ 32 in the uplands - the two extremes. Thus the poorest farmers, who predominantly live in the uplands, have not yet benefitted.

On a national scale, countries with the most irrigated or lowland areas have obviously also gained the most. The lesson here is that small-scale farmers in the resource poor uplands, mangrove swamps and deepwater floating areas have not benefitted to the same degree as those in more favourable rice growing ecologies<sup>3</sup>. This is all the more reason why the expected impact of the interspecific NERICA varieties, which are targeted on the rainfed uplands, may be particularly high in terms of food security, poverty alleviation, and natural resource protection.

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<sup>3</sup> Source: Timothy J. Dalton and Robert G. Guei, "Ecological diversity and Rice Varietal Improvement in West Africa, draft document, WARDA, 29 October 1999.

**Table 2.1 - Varietal Release History by Country and Ecology**

Country and Ecology	Pre-80	80-84	85-89	90-94	95-99	00-04	Total
<b>Nigeria</b>							
Irrigated			7		4	6	17
Rainfed Lowland	7	4	3	1		7	22
Upland	1	1	6	5		1	14
Mangrove							
<b>Guinea</b>							
Rainfed			3		5	6	14
Upland				2	2	5	9
Mangrove	6		1	4	2		13
<b>Côte d'Ivoire</b>							
Irrigated	3	3	1		5	2	14
Rainfed Lowland	4	3	1		1	2	11
Upland	6	7			14	4	31
<b>Sierra Leone</b>							
Irrigated	3		4				7
Rainfed Lowland			6				6
Upland	1		7		1		9
Mangrove	5		1	2		6	14
<b>Mali</b>							
Irrigated	4	2	3	3	1	11	24
Rainfed Lowland		2	1			11	14
Upland	1					10	11
Floating	3	2				2	7
<b>Ghana</b>							
Irrigated			1		1	11	13
Rainfed Lowland		2	4		1	11	18
Upland						10	10
<b>Senegal</b>							
Irrigated	2			3	2	7	14
Rainfed Lowland	2	1	2		4		9
Upland		3			1		4
Mangrove			1		3	1	5
<b>Total</b>							
Irrigated	12	5	16	6	13	37	89
Rainfed Lowland	13	12	20	1	11	37	94
Upland	9	11	13	7	18	38	96
Floating	3	2				2	7
Mangrove	11		3	6	5	8	33
<b>Grand Total</b>	<b>48</b>	<b>30</b>	<b>52</b>	<b>20</b>	<b>47</b>	<b>122</b>	<b>319</b>

Source: Timothy J. Dalton and Robert G. Guei, "Ecological diversity and Rice Varietal Improvement in West Africa, draft document, WARDA, 29 October 1999.

**Table 2.2 - Diffusion Rates for Introduced Varieties  
(Percentage of area cultivated)**

Country	Total rice Area ('000 ha)	Ecology				
		Upland	Rainfed Lowland	Irrigated Lowland	Mangrove	Deep-water
Nigeria	1784	98	97	100		
Guinea	445	20	55		39	
Côte d'Ivoire	750	50 <sup>1</sup>	30	95		
Sierra Leone	289	60	72	67	80	
Mali	302	10	20	99		70
Ghana	96		80	65		
Senegal	70	30	30	100		

Source: Timothy J. Dalton and Robert G. Guei, "Ecological diversity and Rice Varietal Improvement in West Africa, draft document, WARDA, 29 October 1999..

<sup>1</sup> This rate drops to 8% if Latin America traditional varieties, introduced in the 1960s, are excluded.

In Guinea, Western Côte d'Ivoire, Liberia and Sierra Leone it is expected that the NERICAs will be widely adopted by resource poor, small scale farmers who form the bulk of the rice farming population in the humid forest zone, with yields up to 25-40% higher, even without fertilizers<sup>4</sup>. Early maturity, ability to suppress weeds, disease resistance and drought tolerance are special strengths of these varieties, even in cases where there is no yield advantage. It is expected that widespread adoption should lead to a 10-20% increase in national production at current input use levels. Much higher increase in labour productivity is expected because of the use of relatively less labour in weeding. A large-scale seed multiplication effort is now underway in Guinea, spearheaded by SNPRV, IRAG and SG2000/Guinea. At least 11,000 ha should be under NERICAs in 2001, roughly 5% of the rainfed upland rice area. In Nigeria, the formal seed certification and multiplication system is likely to prove to be a bottleneck to early and widespread diffusion of the new varieties. Efforts need therefore to be put on PVS and CBSS to accelerate possible impact there.

In conclusion, case studies conducted in several countries over the past eight years indicate that all other things being equal the returns to investment in varietal development, have always exceeded 20% annually, and in selected cases, upwards of 100% per year. Rice varietal improvement in West Africa contributes annually, on the average, US\$ 348 million to the regional economy and could be as high as US\$ 837 million. Without regional efforts in varietal improvement, the regional balance of payment deficit for rice imports would have been 40% higher, or an additional 658,000

<sup>4</sup> Consultancy report for the Rockefeller Foundation "Assessment of the Prospects of the WARDA Interspecific Rice Varieties in West Africa", Dunstan S.C. Spencer and James Edwin, December 1999, 32 pages.

ha of land would have needed to be under rice cultivation to maintain consumption at its current level. Over 43% of this gain is attributable to CGIAR germplasm improvement programmes either as direct varietal products or as parents used by national breeding programmes in the creation of released varieties.

Until now, varietal gains have largely occurred in more favorable rice producing ecologies: the irrigated and rainfed lowlands. But this is expected to change dramatically with the spread and adoption of interspecific NERICAs to poor small-holder upland farmers. Many of these varieties have shown large productivity gains over local varieties in widespread farmer controlled evaluations. The financial value of such a gain in Guinea, Côte d'Ivoire and Sierra Leone, assuming a 10% adoption rate would amount to nearly US\$ 8 million per year, and nearly US\$ 20 million at 25% adoption rates. The interspecific varieties may thus provide the initial steps to launch an agrarian transformation in the important rice producing countries in Africa. WARDA now has many new interspecific varieties in the pipeline for the rainfed areas and for the irrigated systems.

**Table 2.3 - Distributional Impact of Varietal Improvement  
(US\$ thousands)**

Total Gains	Rainfed Upland	Rainfed Lowland	Irrigated Lowland	Mangrove Swamp	Deep-water Floating	Total	Gain/ha (US\$)
Nigeria	24,041	145,168	39,251			208,461	117
Guinea	7,600	19,001		3,605		30,206	68
Cote d'Ivoire	13,658	7,014	22,474			43,147	58
Sierra Leone	9,738	7,482	818	1,578		19,616	68
Mali	24	299	27,861		8,677	36,862	122
Ghana		29,659	1,498			31,157	325
Senegal	0	304	4,516			4,819	69
Total	55,062	208,927	96,419	5,182	8,677	374,267	100
Gain/ha (US\$)	32	163	232	69	32	100	

Source: Timothy J. Dalton and Robert G. Guei, "Ecological diversity and Rice Varietal Improvement in West Africa, draft document, WARDA, 29 October 1999.

### Recommendation

**The Panel recommends that WARDA strengthen its capacity to monitor and assess the impact of its activities.**

## **CHAPTER 3 – WARDA’S RESEARCH AND DEVELOPMENT PROGRAMMES**

### **3.1 WARDA's Mission, Priorities and Strategies**

In this Chapter, the Panel discusses WARDA’s research and development programmes and reports its findings, analyses and recommendations with respect to the relevance, effectiveness and scientific contributions of the programmes to WARDA’s achievements. The Panel’s retrospective analysis rested on CGIAR Priorities and Strategies for Resource Allocation during 1998-2000, and the rolling MTPs based on the Strategic Plan 1990-2000. The Panel examined the implementation of the Centre’s Plan in the context of their broad congruency with CGIAR Priorities and goals for poverty alleviation. The perspective assessment of the Programmes benefited from the Centre’s preliminary draft on Programme Priorities and Strategies 1999-2005, the Third CGIAR System Review Report, and the ongoing CGIAR vision and strategy exercise. The Centre’s programme strategy has been driven by the dynamics of rice production in West and Central Africa. New technology drives WARDA’s overall strategy, especially targeting gains from land and labour productivity for small-holder farmers. WARDA’s formal mandate remains unchanged since the Association’s original constitution of 1970. But what appears to have gradually changed is the interpretation of the mandate from an implied desire for self-sufficiency to a greater emphasis on food security. While food self-sufficiency as a strategy puts emphasis on import substitution, a food security strategy is more attainable. This is so because such a policy takes advantage of a mix of options including local production for family food security; storage and marketing at national level so as to move rice from surplus to deficit areas; and a trade policy that allows for imports, so as to cover deficits appropriately.

#### **3.1.1 Priority Setting at WARDA**

According to WARDA its research priorities derives from the overarching goals of the CGIAR through the application of two principles. First, it targets problems that constrain the productivity and threaten the sustainability of the resource base. Second, the Centre seeks solutions to these problems through the development of technologies that must be affordable to low income farming households and relevant to women rice farmers in particular, compatible with their production objectives and systems. It is also broadly participative, involving national scientists and development agencies. WARDA’s priority setting process entails constant updating to incorporate the most recent information on emerging production problems associated with particular research directions and alternative sources of supply.

The Panel analysed these underlying principles in so far as they relate to the review period based on documented evidence. The work which now defines the priorities of WARDA's research started as early as 1991 with the first planning meetings of the regional rice Task Forces. Scientists nominated to represent national programmes identified and ranked the biophysical production constraints within each major rice growing environment of their respective countries. These qualitative assessments provided a first estimate of production problems. A reduced set of the most significant constraints which were derived in this way formed the basis for developing research

priorities and for planning regional collaborative research. Since then annual Task Force review and planning meetings have subsequently provided WARDA with the opportunity to revisit those priorities, and make adjustments based on updated information.

To augment the above exercise WARDA scientists regularly engage in a series of state-of-the-art reviews on the major rice disciplines. These reviews highlight results of past studies quantifying yield losses caused by the principal biophysical stresses and the progress achieved by past research. The reviews also help to identify the most important knowledge gaps that block progress in applied research. Simultaneously, past on-farm characterisation and diagnostic research conducted by WARDA and its partners to quantify yield gaps under farmer conditions, assist to clarify, and document how farmers perceive and rank their production problems. The Centre also uses an iterative Delphi method through which WARDA scientists draw on its diverse data of rice-based cropping systems.

WARDA recognizes that by using biophysical constraints alone to drive the priority setting exercise it excluded important social, institutional and economic factors that affect the ultimate adoption and social impact of new technologies. Accordingly, the Centre periodically assesses the need for additional research thrusts by defining areas in which there are compelling evidence that its research foci may make significant contribution towards technical change and sustainable improvement of productivity. For example, using this approach, the following cross cutting themes were identified and included as integral components of research: Technology Transfer and/or the wellbeing of rice farming households (Human Health in Lowland Rice Systems), farm level production economics research and research to improve grain quality.

Linking research priority to resource allocation starts by teams of WARDA scientists whose disciplinary inputs are considered essential to solving the priority constraints within each thrust being identified. Working in a series of group sessions, the teams develop strategies for research that would serve WARDA as the basis of formulating operational research projects. The teams explicitly take into consideration WARDA's comparative advantage in terms of scientific expertise and facilities. The potential to out-source research products from collaborating institutions with predominant capacities in special areas is examined as well. For those activities considered as being in the comparative advantage of WARDA, each scientist proposes research inputs that he or she could contribute to the team approach. After several iterations, with other project teams to ensure cross project complementarity, and review by management, the research projects are designed and submitted for the MTP. Based on further reviews by scientists and management, the projects profiled in this Chapter were proposed.

The project portfolio allows WARDA to strategically position itself along the research to development continuum. WARDA management and scientists have a clear elucidation of the priority setting process in the context of R-to-D continuum and the criteria for allocating research activities across the four Programmes of the Centre.

### **3.1.2 Panel Assessment of the Process**

WARDA's mission and programme structure have evolved to focus efforts on three complementary imperatives, namely technology generation and evaluation, technology dissemination and support to NARS, and policy support. All these changes are reflected in the Centre's refined mission statement (Sec. 1.2.1) In matching its mission and mandate, WARDA has continued to maintain scientific excellence in rice genetic improvement, strengthened its research on improved rice based systems, exercised responsibility for the sustainable development of inland valley agroecosystems and shared its products with East, Central and Southern Africa. WARDA recognizes the need to develop a permanent in-house capacity to guide management in future priority setting and resource allocation decision making. With this objective, two projects on ex-ante and ex-post impact analyses were included in the 1998 –2000 MTP and beyond to complement the research portfolio. The Panel believes that WARDA has developed effective priority setting processes, that are transparent, scientific and participatory.

### **3.1.3 Priorities**

The Panel's evaluation revealed that WARDA categorizes its priorities according to four rice growing environments. WARDA's research focuses on the arid and semi-arid tropics, the warm sub-humid tropics and the warm humid tropics of West Africa. It comprises the four rice growing environments found in Africa: the continuum that includes upland, rainfed lowland and irrigated agroecosystems in the humid and sub-humid zone; the Sahel irrigated rice agroecosystem; mangrove swamp rice system; and deep water/floating rice systems. The first priority environment is the humid and sub-humid zone. The Centre selected this zone because it is where the vast majority of resource poor farmers grow rice. This environment represents about approximately 83% of the total rice area in West Africa. It is noted that approximately 72% of the WARDA's resources were allocated to activities in this environment during the review period. The second priority environment is the Sahel agroecosystem which although represents only 7% of total rice growing area has been selected for its enormous future production potential. WARDA allocates 24% of its effort to this environment. The Centre gives third priority to research in mangrove swamps because of its small share in the regional rice area and resources allocated to the effort are approximately 4%. The Panel's view is that these priorities are consistent with those of WARDA and are in broad agreement with those of the CGIAR.

### **3.1.4 Strategies**

The Panel examined WARDA's strategy for the period 1990-2000, which identified the national agricultural research system as its priority client. WARDA works together with national research institutes, universities, research and development policy makers, and both public and private development agencies and farmers. The target group for WARDA research is resource-poor smallholder farm families who produce more than 80% of the regions rice, and have greater potential leverage on regional production and also because their future welfare is most at risk from environmental degradation. Particular effort is made to target women rice farmers, who have been too often marginalized from technical change.

West Africa continues to be WARDA's primary geographical focus. However, there is growing demand from ECSA countries for research, training and documentation support from WARDA and the council of Ministers continue to encourage WARDA management to explore options to meet this demand and to ensure a more efficient flow of research from West Africa to other parts of the continent. As part of this effort, WARDA and the International Rice Research Institute (IRRI) have recently created a new partnership for collaborative action. The partnership ensures close and frequent consultation for coordinated, complementary and cost effective response to new research opportunities throughout Sub-Saharan Africa. One of the core elements of the WARDA-IRRI partnership is the location and management of INGER-Africa from WARDA's headquarters in Côte d'Ivoire, with the aim of strengthening the exchange of rice germplasm throughout the continent. In support of this initiative, a modern quarantine unit, has been established, 1999/early 2000, at WARDA headquarters in Côte d'Ivoire to ensure safe movement of rice germplasm into from and within Africa. The Panel's assessment is that these strategies are adequate and consistent with the Centre's mission.

During the period 1990-1996 and supported by a new institutional structure, WARDA implemented in 1997 a programme structure that focuses on four interrelated programmes in its MTP for 1998-2000 as discussed in Chapter 7. The new structure consists of two technology generation programmes, the Rainfed Rice Programme and the Irrigated Rice Programme; a Policy Support Programme; and an expanded and strengthened Systems Development and Technology Transfer Programme renamed in 1999 from the old Information and Technology Transfer Programme. WARDA's priorities and strategies for 1999 – 2005 show scheduled research outputs with milestones. The Panel notes that a logframe approach, consistent with the broader CGIAR framework, has been adopted in the programmes and projects for the current MTP.

WARDA continues to work in all rice growing ecosystems but with a top priority for rain-fed rice production systems followed by irrigated systems. WARDA has identified the key challenges for rice development in these ecosystems and attempted to quantify opportunities for productivity gains due to research investment into these challenges. The Panel, guided by the programme strategies, priorities, and opportunities at hand, examined how all these match with the resources allocated to various research programmes.

In the rest of this Chapter each of the four programmes is discussed and assessed, with emphasis on strategic focus, design and relevance to the challenges. The Panel assesses the future direction of each programme and makes appropriate suggestions and recommendations.

### **3.2 Programme 1: Rainfed Rice**

#### **3.2.1 Programme Objectives and Activities**

The Rainfed Rice Programme is one of the two technology generation programmes in the new institutional structure since 1997. In compliance with WARDA's formal mandate, the strategic objectives of this programme are, first, to

develop low cost technical packages and to create rice varieties well adapted to low levels of management for the upland rice area, and second, to develop more robust and higher yielding varieties, and low cost water management practices for the rainfed lowlands. Programme 1 is highly relevant to WARDA's goal because the humid zones are suitable for rainfed rice, and there is no other staple cereal that can ecologically compete with rice in such ecologies. Currently, some 40% of the total rice area is rainfed upland, located in the humid and sub-humid zones, and cultivated by resource-poor small holder farmers in the region. There are some 200 million ha of inland valleys in Sub-Saharan Africa of which less than 10% is cultivated. In West Africa alone, there are 50 million ha of which less than 5% is cultivated.

Average yields on farmers' fields are estimated to be 1.0 and 1.4 t ha<sup>-1</sup> for rainfed upland and rainfed-lowland, respectively, against potential yield estimates of 1.4-4.5 and 2.5-5.0 t ha<sup>-1</sup>, respectively. The wide yield gaps and the fact that these ecologies cover about 80% of the rice growing area justify research on varietal improvement and crop and natural resources management. The programme is comprised of seven projects, which are organized for two major target systems, upland and rainfed lowland. Each of the ecosystems is approached by two disciplinary areas, varietal improvement and crop and natural resources management. The three integrated projects in Programme 1, (i) intensification of the lowlands, (ii) stabilization of the upland and (iii) development of new plant types, address the challenge of improved, integrated crop and natural resources management in the major rainfed production ecologies. There are four strategic research projects; out of which (i) drought tolerance, and (ii) blast resistance, are organized to support the integrated projects together with (iii) watershed management and (iv) iron-toxicity management. The strategic projects, except for the 'watershed', are providing support to the screening of germplasm against respective stress.

There are 81 activities, 131 tasks, and the average allocation of WARDA scientist's time is 0.18 years to each activity, and 0.11 years to each task. Each researcher seems to have five activities or 10 tasks per year on average. There is a possibility that the fragmented activities or tasks constrain scientists with unnecessary reporting and documentation.

For lowland rice research, the strategic focus is on more stable yielding cultivars and reducing cost of water, soil and crop management. For upland rice, the major issues are soil fertility and erosion due to shortened fallow periods, and weeds. The new plant type research focuses on the development of new cultivars adapted to low external inputs, and stresses including drought, blast, weeds, acidity and iron toxicity.

Throughout the region, (17 countries) only five, i.e. Nigeria, Sierra Leone, Senegal, Burkina Faso and Benin have the capacity for hybridization and subsequent selection of early segregation materials. Given the weakness of NARS, in general, the Task Forces (described in Chapter 5) have functioned as a key network for germplasm improvement. The Task Forces have also produced a large number of research data in Integrated Pest Management and Crop Management. Thus, the technologies generated by Programme 1 have been tested and evaluated through the Task Forces to cover the whole region.

The contribution of Programme 1 to WARDA's achievements is captured in Chapter 2. In summary, the development of the New Rice for Africa at WARDA is an epoch making innovation and highly commendable. Characterization studies have been conducted in lowland ecologies to determine the effect of field management, such as bunding, weed control and fertilizer application. The Programme is also addressing soil fertility decline in upland rice due to weed infestation, loss of soil organic matter, and shortened fallow.

In view of both the widened potential by the success of breeding and the intensification in rice production by moving toward rainfed and semi- irrigated lowland in the region, the achievements from crop management or agronomic measures will become increasingly important in the future. In this context, the Panel suggests that the research in crop and field management should be explicitly placed in the entire programme.

### **3.2.2 Assessment**

The Panel noted that the relocation of the breeding work from IITA had been successfully completed in 1991 with the transfer of a senior breeder by WARDA's programme. This is evident in the fact that many 'WITA varieties' (which represent the WARDA-IITA production) have been adopted in the region, and performed well in certain hot-spot tests.

The Panel was provided with evidence on the acceptability, performance and wider extension of the New Rice for Africa (NERICA) by a series of consultant reports, discussion with farmers, use of new varieties outside the region and demand of NERICA by NARS. The success in this area is highly commendable as one of the most outstanding achievements globally in rice breeding. The methodology in the plant breeding which includes traditional and innovative approaches is highly efficient and relevant for generating new varieties. Further progress of the breeding is expected by adoption of marker-assisted selection against biotic and abiotic stresses. The Panel estimated that the molecular technologies at WARDA are feasible in terms of cost and efficiency.

Against a stereotyped view that the resource-poor farmers may not make substantial investments, WARDA scientists have confirmed a driving force for intensification both in urbanisation of lowland areas and in upland farming areas where fallow period is shortened under increasing population pressure. In this context, the improved farm management with more inputs envisaged for lowland and upland is also relevant for farmers, and would contribute greatly to increased stability of rice production in the future. Despite the commendable results, the scientific publication of the results of improved agronomic practices seems to be rather fragmented as is noticed in the Programme Reports 1996–1997, 1998 and the achievements are yet to be developed into extension materials. The Panel suggests that systematic efforts be instituted to disseminate the results.

In view of the increasing importance of lowlands with partial water control in rainfed ecosystem there is an urgent need to explore the potential of such areas with the introduction of adapted varieties and improved field management. However, the place of watershed research does not seem to be clear in the Programme. The Panel suggests

the characterisation work for watershed be integrated in such a way that it will facilitate the generation of technologies for intensified farming in rainfed lowland or lowland with partial water control.

The Panel noted that there were some well-organised screening nurseries in the field, where a large number of breeding lines are regularly scored for drought tolerance against check varieties. However, the cumulated data from the screening has not yet been fully analysed to determine long-term genetic gains of the drought tolerance, rendering the information unavailable to the breeders. In terms of genetic markers for drought, the work is still in the early stages of development. The Panel observed that the physiological approach to improving drought tolerance are not likely to yield substantial progress in the short term, except in the area for screening technologies. The Panel, therefore, suggests a closer collaboration between the physiologists and geneticists to promote genetic analyses for developing molecular markers.

The breeding for blast resistance is a long-term research and one of the most difficult areas in rice breeding. Many ideas are proposed, but few have proved to be effective, hence a re-examination of the approach is worthwhile. There appears to be some breeding lines at WARDA which exhibit a kind of durable resistance, but the past experience has never fully endorsed this concept. Careful monitoring of the disease incidences is necessary, a part of which can be facilitated by DNA finger printing of fungus strains.

The Panel suggests that the breeding for drought tolerance and blast resistance may be placed into an overall breeding project, because it is difficult to find a strong reason for organizing these areas as independent projects. Since weeds are cited as a major challenge, research on weed control should be given a higher priority. The Panel noted highly commendable research on RYMV which has been achieved by an interdisciplinary approach by pathologists and geneticists, but this area is not included in the Programme 1.

Certain combinations of varietal tolerance and agronomic practices were demonstrated to be effective to mitigating the yield loss due to iron-toxicity. Past experiences in rice breeding show that genetic tolerance to this stress is clearer than its tolerance to any other stresses. Thus, there is a good hope that the project is giving positive impact to lowland farming. However, what was presented to the Panel was more related to severity of the stress and its characterization rather than the impact of the past research in farmers' fields. The Panel suggests that the emphasis of the research should be oriented to extension of the past research gains to farmers.

The Panel highly commends the overall achievements in Programme 1. However, the Panel considers the following two points worthy mentioning specifically in relation to Programme 1. First, despite remarkable achievements from improved farm management research there is inadequate presentation of the impact. The predicted yield increase by the adoption of new farm management technologies may be presented together with estimated areas of possible adoption. The inadequate impact presentation may be due to the time since the present programme was formulated. The reason for this may also be the stress under which WARDA had to justify the Centre's position citing unique ecosystems in the region. Research proposals may be needed to

characterize the unique situations with a list of constraints. The Panel suggests that crop and natural resources management research be reported.

Second, in terms of the critical mass of scientists, the Panel confirmed that a few senior scientists have overwhelming administrative responsibilities and there are a group of relatively younger scientists who may need closer guidance. The workload for senior scientists to generate programme proposals and for travel may be of a transient nature due to the reorganization of the programme structure that took place during the last two years. The Panel is afraid that a part of such workload may be attributable to the rather fragmented structures of the Programme 1.

### **Recommendations**

**The Panel recommends that research on crop and natural resources management for rainfed rice receives a higher priority than at present.**

**The Panel recommends that research on rainfed rice be consolidated along crop improvement and crop and natural resource management lines.**

## **3.3 Programme 2: Irrigated Rice**

### **3.3.1 Programme Objectives and Activities**

Programme 2 activities are all contained in the Sahel programme and include: breeding, physiological analyses, economic analyses, development of alternative cropping systems, management of weed problems, management of soil problems, and management of water systems.

Irrigated rice in West Africa is grown on approximately 0.5 Mha, 60% of which is in the Sahel and the remainder in the Savanna and Humid forest agroecological zones. The total area of irrigable land, and hence potential irrigated rice land, is still 10 times larger. In the Senegal River Valley and Mali, average irrigated farmers' yields are 4 to 5 t ha<sup>-1</sup> crop<sup>-1</sup>, with potential yields varying from 6 to 11 t ha<sup>-1</sup> crop<sup>-1</sup>. Potential yield gains from improved crop and natural resources management are therefore tremendous. Cropping intensity is currently 1.1 rice crops year<sup>-1</sup>, with a potential of 1.5 to 2.0 rice crops year<sup>-1</sup>. Elsewhere in the region, actual yields are around 3 t ha<sup>-1</sup> crop<sup>-1</sup>, indicating considerable scope for yield gains. Cropping intensity is about 1.5 crops year<sup>-1</sup>, with a potential of 2 - 2.5 crops year<sup>-1</sup>. Actual yield levels are already at an 'Asian' level in most countries, but the yield gap is still significant and the nutrient use efficiency is generally low.

WARDA's current Irrigated Rice Programme is carried out in three projects:

- Improvement of resource-use efficiency in irrigated rice-based systems;
- Development of profitable land and water use systems preventing soil degradation in Sahelian rice irrigation systems;
- Integrated management of rice yellow mottle virus (RYMV) in lowland ecosystems.

Research on improved soil fertility and weed management are top priorities of Programme 2 because these are expected to have the highest pay-offs. Improved weed management is most important when rice is directly seeded, as is common in the larger irrigation systems in the Sahel.

Following market reforms, area planted to irrigated rice in Senegal increased from 31 kha in 1989 to 63 kha in 1993 due to private initiatives, but this expansion halted after the currency devaluation because of large scale imports of cheap Asian broken rice. But farmers adjusted and are competitive again with average yields now moving towards 5t ha<sup>-1</sup>. Land locked countries such as Mali are less exposed to the world market, and irrigated rice cropping is highly profitable with average crop yields exceeding 5t ha<sup>-1</sup> (Office du Niger).

WARDA collaborates with NARS of all 17 member countries in the Rice Breeding Task Force, and with NARS of 8 member countries in the Sahel Natural Resource Management Task Force. Outside this Task Force mechanism, WARDA's Irrigated Rice research programme has developed a large number of joint research activities with national agricultural research and extension systems (NARES), especially since 1995. These were funded to a large extent through restricted core funds or funded by NARS themselves.

There are still major opportunities to increase rice production in irrigated systems, both in production area and in hectare yields. There are still several key issues to address in irrigated rice research: reduction of production cost, sustainability with respect to dynamics of the environments, and maintenance of rice yield potentials.

The Sahel Station was originally at Richard Toll, Senegal River valley under the Liberia-based WARDA. In 1990, WARDA established the Sahel Irrigated Rice Programme at the ISRA station in St. Louis, Senegal. Due to its growing needs for research facilities, WARDA moved the station in 1992 to Ndiaye, 35 km from St. Louis for integrated breeding and natural resource management research. The activities of the Sahel Programme, and later the Irrigated Rice Programme, were largely based and led from St. Louis. The activities comprised eco-physiological and genetic studies on temperature stresses, varietal selection, and leading a NARS-WARDA network to study genotype x environment interactions at benchmark sites. Simulation tools were developed to match varieties and cropping calendars and to quantify climatic risks associated with different scenarios.

In 1999 WARDA scientists contributed 4.0 scientist years to the programme, while NARS contributed about 4.4, and ARI's about 0.2 scientist years. Scientists based at M'bé have gradually become involved. The Panel suggests that Programme 2 maintains the current three projects and continue cooperation in the Task Forces. The Task Forces have also been valuable in setting priorities, which appear consistent with WARDA priorities.

Contributions of Programme 2 to WARDA's achievements are discussed in Chapter 2. In summary, high yielding (6-8 t ha<sup>-1</sup>) varieties for irrigated systems (Sahel 108, 201, 202) have provided a breakthrough, because one of them allows double cropping. The breeding programme produced a large number of progenies from *O. glaberrima* x *O. sativa indica* crosses, with very promising characteristics, including

RYMV resistance. Farmer participatory work in Mauritania and Senegal demonstrated that improved soil fertility and weed management is highly profitable, and increases net revenues of farmers by as much as 80%. Research has also demonstrated that contrary to a common belief, irrigated rice cropping reduces salinity in the Senegal River delta, even if conducted without drainage. Detailed physiological studies on varietal response to extreme temperatures in the Sahel led to the development of the RIDEV (Rice DEVELOPMENT) decision tool, that is now used to advise farmers on timing of crop and natural resources management interventions. The ASI thresher-cleaner prototype was developed through collaboration with SAED and ISRA in Senegal, with backstopping from an IRRI agricultural engineer; and a 100-page manual for extension agents was produced on irrigated rice production.

### 3.3.2 Assessment

Because of the complex nature of irrigated systems, the Panel believes that the focus should be less on fields and more on farm household and communities. A household - small community focus would provide a logical place for integrated biophysical and socio-economic research, and provide more locally adapted technologies and practices. For instance, the requirements for farmers in inland valleys that grow rice and other crops in small plots are quite different from those who specialize on irrigated rice in river plains.

While the relevance of the research conducted is good, the quality high to very high, productivity has been high, the Panel urges WARDA to explore how the research can include more socio-economics and attention to post harvest operations. Research, i.e. priority setting, design, execution, publication, is done in intimate partnership with NARS. As a consequence, WARDA's leadership is strong and well appreciated.

Irrigated systems in the Sahel differ in important aspects from those in the more humid areas. New research activities are therefore to be undertaken. There are also less scientific partners addressing these issues in the humid areas than in the Sahel. The current Programme is too small to address the major issues in West and Central African irrigated systems beyond the Sahel.

### Recommendations

**The Panel recommends an expansion of the Irrigated Rice Programme so as to address effectively irrigated systems beyond the Sahel with emphasis on breeding for the humid and sub-humid zone, and crop and natural resource management.**

**The Panel recommends involvement of a full-time senior economist in the Irrigated Rice Programme. In addition to giving direction in research on cost of sustainable production and resource use efficiency, the programme should guide the rice production perspective to the household and community level.**

### 3.4 Programme 3 - Policy Support

#### 3.4.1 Programme Objectives and Activities

West- and Central Africa has seen major changes in economic policies as part of structural adjustment, and the policy environment has an overwhelming effect on the uptake of technologies, as well as on food security, poverty alleviation and natural resources management. The major objective of Programme 3 therefore is to assess the policy environment and inform policy reforms so that the policy environment is conducive to sustainable rice development in the region. WARDA has therefore studied the rice comparative advantage and competitiveness in West Africa since the early 1990s using a Policy Analysis Matrix (PAM) approach.

WARDA's Programme 3 comprises 5 projects as follows:

- Rice policy formulation in the post-structural adjustment era;
- Ex-ante impact assessment of rice research;
- Ex-post assessment of rice research impact;
- Characterization of rice environments prone to seasonal shallow flooding;
- Reducing human health risks in lowland rice ecosystems.

Only the first 3 projects constitute WARDA's core socio-economic research programme. Since the early 1990's when WARDA's socio-economic research programme was revitalized, two main themes were followed: *i)* Policy research on the rice subsector to determine comparative advantage and competitiveness of rice production and marketing in West and Central Africa and *ii)* Ex-ante technology evaluation which helped to develop appropriate technologies. The latter in fact also includes ex-post studies of adoption. These two main themes still are the main research thrusts in social sciences at WARDA. Research on the characterization of rice environments prone to a seasonal shallow flooding project was initiated by WARDA in 1996/1997. The project was initially a regional GIS database for one of the potentially major rice ecologies, but currently it is largely implemented by an IWMI researcher based at WARDA, to assess the production potential of this specific (rice) ecosystem. Research on reducing the human health risks in lowland rice systems is executed by a research consortium activity wherein WARDA is the coordinating institution. Its main aim is to address the question whether rice production intensification has an influence on the prevalence of vector borne diseases. The project has been on-going since 1995.

PAM-studies have become an on-going activity at WARDA, absorbing scarce manpower in the socio-economics programme. Although full results are now available for four countries (Senegal, Mauritania, Niger and Sierra Leone) and two more are nearly completed, PAM work still has to start in Guinea and Nigeria. Also, few publications are available at WARDA regarding the PAM studies. The backlog is due to the interruptions in the policy economist position, which remained vacant for a year, and the management and administrative responsibilities put on the policy economist.

The Rice Economics Task Force, composed of social scientists from each of the member NARS, has been quite effective in the adoption studies. Applying a common analytical approach with NARS colleagues, the Task Force has increased the effectiveness of the WARDA production economist. Between 1993 and 1997, the Task

Force conducted 36 studies on four themes: adoption studies (12), cost of production studies (13), impact assessment (8) and mega projects (3). Mega projects are interdisciplinary projects that cut across Task Forces, e.g. improved fallow systems.

With Programme 3, the Human Health Consortium is developing an interactive graphical PC-based simulation model, as a decision support system which integrates the agricultural, environmental and socio-anthropological determinants of malaria and schistosomiasis. This will assist governments in the formulation and application of inter-sectoral policies that promote the integration of rice ecosystem management for vector-borne disease control.

Programme 3 has contributed to WARDA's achievements as discussed in Chapter 2. In summary, the most significant contribution has been capacity building and the availability of analytical tools for assessing the competitiveness of rice production in four countries (Senegal, Mauritania, Niger and Sierra Leone). Economic studies at WARDA show the variability of profitability and competitiveness across the region. Adoption studies demonstrate the importance of technology specific characteristics and the value of improved varieties that address multiple objectives; and health related research points at minimal negative impacts due to expansion of rice growing.

#### 3.4.2 Assessment

Lack of continuity in WARDA's socio-economic research programme, both on the production economics and policy sides, has really disrupted progress. Given the small number of socio-economists at WARDA, their relative professional isolation, and the financial constraints put on them, research output has suffered as witnessed by the relatively low publication output.<sup>1</sup>

Data collection for PAM-analysis in the countries is cumbersome and time-consuming and is always better done by WARDA's partners. WARDA could then serve in a backstopping role for national PAM studies. There is a need to make an overall synthesis of the PAM-results across agro-ecologies, production systems and countries. This needs to be published and made widely available. The monitoring of rice markets in West and Central Africa in collaboration with CIRAD is commended. This collaboration is taking a new form through the linkage with Rice Monitoring Groups in Guinea, Mali and Senegal.

The ex-ante and ex-post impact assessment projects have also suffered from staff constraints. This has resulted in a large database on farm management and household economics at WARDA being poorly exploited. Projects 3.2 on ex-ante and 3.3 on ex-post research could be merged into one project, saving possibly on administrative and management resources.

Data from field studies need to be much better documented and archived properly for easy retrieval in a WARDA institutional database. Collection protocols and procedures need to be better documented. For instance, the WARDA Farm

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<sup>1</sup> Since the last WARDA EPMP in 1992/1993, 13 publications were published by WARDA social scientists in refereed international journals, of which 9 by Akinwumi A. Adesina who left WARDA in 1995.

Management and Household Survey (FMHS) has many files in the database that are not usable due to weak or absent collection protocols and procedures. There is a need to extrapolate and validate the farm level results to larger agro-ecological zones and areas. It will be particularly important to monitor adoption and impact of NERICAs on household food security and poverty alleviation.

As the impact of varietal improvement activities at WARDA requires further evaluation, a regional rice research impact study would be extremely valuable.<sup>2</sup> Regarding the human health project, important research results were obtained which show no real negative effects on human health of intensification in lowland rice farming.

The Panel strongly suggests that future research in Programme 3 gives priority to policy research that is relevant to accelerated rice development through policy change. An important research issue is the influence of rice production/consumption on household food security, nutrition and poverty. In certain parts of Africa, rice is considered a luxury food, in other parts, particularly in West Africa, it provides food security even to the poorest families, particularly in urban centres. But more needs to be known about the particular role rice is playing in household food security.

A second important issue is post-harvest rice technology, particularly in adding value and raising women's incomes. A third key research need is for rice subsector studies. Although emphasis has been on the efficiency and costs of local rice production and on the policy environment, rice marketing performance of locally produced rice as compared to imported rice has not received adequate attention. A fourth issue is seed sector development for rapid dissemination of new seed technologies, particularly following the demise of parastatals responsible for seed multiplication and distribution. The policy support programme is monitoring the development of the CBSS mechanism. Evaluation and institutional analysis of the effectiveness of the mechanism with respect to the current system is planned.

### **Recommendation**

**The Panel recommends that the Policy Support Programme develops a strategic and more coherent research agenda so as to address issues of food security, post-harvest opportunities, sectoral policy and seed marketing. WARDA should pursue more pro-active research collaboration on these issues with regional, other Southern and Northern University partners, particularly through the Task Force mechanism.**

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<sup>2</sup> The best study available is: "Ecological Diversity and Rice Varietal Improvement in West Africa" by Timothy Dalton and Robert Guei, draft dated 29 October 1999, WARDA. The study was financed by the Impact Assessment and Evaluation Group.

### **3.5 Programme 4: Systems Development and Technology Transfer**

#### **3.5.1 Programme Objectives and Activities**

The main objectives of Programme 4 are:

- to assist in the analysis of constraints to technology adoption;
- to evaluate the performance of technologies and practices for improved productivity and sustainability of rice-based production systems;
- to improve the professional skills of researchers, extensionists, and farmers through group or individual training activities; and
- to create an electronic database of rice-based technologies that will be accessible to all stakeholders through the Internet.

Task Force (TF) mechanisms are the main channels for the implementation of all these activities.

Linkages between the responsibilities for technology generation and technology transfer have often been poor between WARDA and the NARS. Historically, the model was such that, WARDA developed the technology, handed it to the national research structures for adaptation and then delivered the technology to extension services. With the improved Task Force process, the development of basic technologies and their adaptation to local settings are as much as possible performed by WARDA and NARS based on respective comparative advantages.

WARDA's approach to regional capacity-building and information transfer - two important elements of the current programme - has evolved considerably over the years. Between 1994 and 1997 training and information communication activities were coordinated through the Training and Communication Division. The current content and structure of Programme 4 was approved by the WARDA Board of Trustees in 1997, becoming operational in 1998 as the Information and Technology Transfer Programme. During the majority of 1998 the programme was overseen by an interim Programme Leader until the arrival of the Technology Transfer Specialist and current Programme Leader. Following the arrival of the present Deputy Director General for Programmes, the programme's focus was enlarged during 1999 to its current focus on Systems Development and Technology Transfer.

Between 1998 and 1999 Programme 4 comprised three projects:

- Accelerated transfer of new rice technologies, (which aims to identify the major constraints to transfer of rice technologies and to assess the effectiveness of alternative technology-transfer approaches);
- Training for agricultural technology transfer; and
- Information dissemination for transfer of agricultural technologies.

For the MTP 2000-2002 period, however, Programme 4 will have five projects:

- Irrigated systems development and technology transfer;
- Uplands systems development and technology transfer;

- Inland valley systems development and technology transfer;
- Training for technology transfer; and
- Information dissemination for technology transfer.

Programme 4 has contributed to WARDA's achievements as elaborated in Chapter 2. In summary, the "Research on Accelerated Diffusion of Rice Technologies" (RADORT) was carried out in Côte d'Ivoire, The Gambia, and Senegal, to analyse constraints to rice production and technology adoption.

Training courses on seed production, varietal release and Community-Based Seed Systems (CBSS) have been organized in Ghana, Côte d'Ivoire and Guinea. The CBSS work in Guinea and Côte d'Ivoire will be expanded as national programmes.

### 3.5.2 Assessment

The Systems Development and Technology Transfer Programme is very new and operational only since 1998. The programme's early development has been constrained by a lack of personnel. The current programme leader did not arrive until the end of 1998, and has been supported by the addition of a Technology Transfer Agronomist consultant since mid-1999. The agronomist position will be filled by a permanent IRS scientist in 2000. Despite these constraints, and the late arrival of key donor funds to support planned activities, the programme was able to complete the majority of its planned activities in 1999, with the remainder being postponed to 2000. The programme's training and information dissemination activities have been implemented in collaboration with scientists from across all WARDA's other programmes. The major accomplishments of these activities have been in the area of capacity-building of NARES.

The Panel acknowledges WARDA's effort on moving away from a top down process of technology generation and transfer, and its development of a new vision for technology transfer.

The Panel urges WARDA to establish a research agenda on technology transfer needs, and to focus on the major constraints on technology adoption so as to understand the major constraints to rapid adoption of rice technologies, and to continue its understanding and use of the existing knowledge and social systems to speed technology diffusion, as is being done in the use of indigenous knowledge and social exchange networks in the CBSS work.

To be effective in all its objectives, the programme may require a disciplinary mix of scientists, including sociology and anthropology, which are not currently available.

To consolidate WARDA's major capacity-building efforts, the Panel suggests that the training and information dissemination activities be transferred from Programme 4 to the respective Research Support Units engaged in these activities.

For the MTP 2000-2002, the IVC has been integrated as a project in Programme 4. The eco-regional research activities of the IVC are concentrated at key sites, with

NARS carrying out the vast majority of the field work. WARDA plays a catalytic role in coordinating a common research agenda.

### **Recommendation**

**The Panel recommends that WARDA develops a new strategic research agenda on social and institutional constraints to technology adoption and gains a better understanding of existing knowledge systems in the region.**

## **3.6 Support Units**

### **3.6.1 Biometrics**

The Panel found that WARDA possesses adequate scientific capability in the area of biometrics, which is presently covered by a senior scientist and a research assistant. The statistician is serving a variety of needs at the headquarters, and visits the St. Louis station twice a year. In addition to such professional advice to scientists at WARDA, the Unit provides training to NARS in collaboration with the University of Reading. Outstanding participants may then be supported by their institutions for a six month professional training at the University of Reading. This approach should be supported in view of human resources development in the region.

### **3.6.2 Genetic Resource Unit (GRU) and International Network For Genetic Evaluation on Rice (INGER)**

The INGER-Africa (formerly IRTP) had played a key role in providing genetic materials wherever they were required. To meet specific situations in Africa INGER-Africa was formulated in 1985 with a coordinating function located at IITA. In compliance with the transfer of the overall rice research and germplasm conservation responsibility in the region to WARDA, a decision was made in 1990 to transfer INGER-Africa to WARDA. During the same period, WARDA and its NARS partners initiated the Task Force mechanism for the WCA region. Since a new Task Force for germplasm exchange mechanism was formalized in May, 1994, the INGER-Africa has functioned through the Task Force with annual meeting for organizing nurseries and exchanging data. In the Task Force, INGER-Africa nurseries were tailored to meet the specific needs of each national programme to be accommodated into their relatively small capacity. The physical operation of INGER-Africa was transferred from IITA to WARDA in April, 1997. The new INGER-Africa has been functioning under the following principles: to provide genetic diversity and variability, targeted supply of valuable germplasm to increase the share of useful materials to specific NARS need; and to avoid overloading the NARS.

The Panel notes that the responsibility for rice germplasm conservation was finally transferred from IITA to WARDA in April 1999, and since July 1999, a new unit has been established for germplasm conservation, characterization and documentation, and added to the INGER-Africa, thus a single Genetic Resources Unit (GRU) covering INGER-Africa and Genebank has been created.

It is highly commendable that the basic function for distributing genetic materials has been continued through the transition period with the annual distribution of samples ranging from 2,500 to 5,000, which also covered countries in the ECSA region. Since 1992, 10 varieties for rainfed lowland, 9 varieties for upland, 10 varieties for irrigated and 17 varieties for mangrove swamp have been released through this network.

The Panel found a high level processing of seed materials and remarkable development of facilities. However, the present assignment of a senior scientist and a research assistant to the whole functions of INGER-Africa and GRU is a bottle-neck for further development of the programme, although a specialist has been added for information management. There are a variety of needs for training, monitoring, collection of germplasm, and information analyses, each of which is equal or larger than a supporting unit. If the manpower is to be restricted, the function of the unit would only be focused to core gene bank operations and to the distribution of elite materials to NARS.

The function of INGER-Africa seems to have been affected by the reorganization of Task Force activities which changed its meetings from an annual cycle to once every 2 years, while INGER-Africa would be served better by annual meetings. Alternative measures should be taken to keep close coordination between WARDA and NARS. In this regard, the Panel suggests that in the year when the Task Force meeting is not held, a coordinating meeting between WARDA and representatives of NARS should be arranged to keep regular and faster supply of germplasm to NARS.

The Panel understands the need of long-term seed storage at WARDA, which will save the cost for seed regeneration, secure the germplasm from loss of longevity and serve as a duplicate storage.

It is estimated that in the next five years 37 new varieties for upland rice are expected to be released including "NERICA". In light of the adoption of the new varieties, it will be important to intensify the collection and conservation of indigenous genetic resources of rice in the region, including the *in situ* conservation of the landraces. The collection and conservation of indigenous upland rice varieties should be intensified through the Genetic Resources Unit.

## **Recommendation**

**The Panel recommends that, due to the extension of new "NERICA" upland rice varieties which will lead to loss of indigenous genetic resources, WARDA should intensify the collection and conservation of indigenous upland rice varieties.**

### **3.6.3 Information and Documentation Centre (IDC)**

All staff papers are internally reviewed by a committee. WARDA is an important clearinghouse for the publication of Task Forces (NARS) research results. Documents with a large distribution such as annual reports are printed by private companies (Côte d'Ivoire, Europe, India). WARDA operates in two languages, requiring that documents be edited and translated (English/French) prior to printing. Every important document is available in English/French. Since the last EPMR in

1992/1993, of the 25 major publications which appeared in English, 20 were published in French. Thus, of all CGIAR Centres, WARDA probably has the best English/French language balance.

All major meetings are conducted bilingually, with simultaneous interpretation provided mainly by outsourcing. Due to editorial staff shortages and lack of funding for contracting outside expertise, there is a two-year or more backlog of publications. Among these are conference proceedings and the Annual Programme Reports.

As all CGIAR-Centres now have a web-page, so has WARDA, and some research briefs are available on the web in PDF (Acrobat) format. But there is no policy yet to systematically put all major publications on the web, for lack of a webmaster. In the future, WARDA will have to invest in this web-based activity, once its Communication Centre has acquired the requisite hardware (IVDN, Internet) and software.

The Library and Documentation Centre is planning to move soon to its new building which has just been completed. There are about 14,000 volumes in the library, and about 1,000 journal titles, of which about 300 are current. In 1998, about 800 books or publications were added to the library and 3000 issues of journals/magazines. Most of these are received free, or as exchange or are acquired at low cost. Only 71 key scientific journals are acquired, at a cost of about US\$32,000, out of a total budget of only US\$35,000 for library acquisitions. Recently, The Cornell University Essential Electronic Agricultural Library (TEEAL) on CD-Rom covering 130 journals from 1983 to 1998 was acquired on a special budget provision and it is intended to subscribe to updates. Also, the major scientific CD-Rom databases on tropical agriculture are available at WARDA. Via the Internet, WARDA will be able to access the IRRRI library information system.

The WARDA library operates the West Africa Rice Information System (WARIS) to respond to rice information needs of Member Countries. An important component of WARIS is the West African Rice Bibliographic Database (WARBI) which contains annotated bibliographical references of all conventional and non-conventional literature available in the library with comprehensive coverage of rice literature relevant to Africa. The number of bibliographical records was 16050 at the end of September 1999. More than 8000 pages of documents were delivered in 1998 in the framework of the Selective Dissemination of Information (SDI) service and about 1800 bibliographical references were provided. About 150 literature searches were performed in 1998 for WARDA scientists and collaborating scientists of the Task Forces.

WARDA's mailing list database contains about 3000 addresses of institutions and individuals receiving WARDA publications. The Rice Scientists Database (RSCWA), established in 1991, contains biodata, research profiles, and on-going research programmes of 280 researchers working on rice at WARDA and Member Countries. This database is continuously updated and used for the SDI service, the distribution of Current Contents at WARDA and the compilation of directories.

Through the USAID funded AfricaLink project, WARDA, in collaboration with CORAF and CTA (for the organization of a workshop) was instrumental in connecting

some 100 national agricultural research and extension sites in West and Central Africa, providing access to the Internet to nearly 1000 national researchers. A second phase is planned under the aegis of CORAF, but with continued input from WARDA. WARDA's documentalist is AfricaLink project coordinator.

A rice technology data base is now being established at WARDA. It is planned to be a relational/geo-referenced database on rice technologies and socioeconomic environments. This database will be accessible through WARDA's Web site and through local area networks (LAN) in select NARES in the future. WARDA is thus in the forefront in developing the capacity in the NARES to use the potentials of electronic information and communication technologies, with particular application to rice technologies.

Information dissemination for technology transfer is now a separate project (4.5) in Programme 4 in the 2000-2002 MTP. The project coordinator is the head of the documentation Centre.

The Panel commends WARDA for the high quality of its publications. The main constraint appears to be shortage of funding.

#### **3.6.4 Training and Fellowships Unit**

A new programme structure was introduced in 1997 to widen the scope of training with the goal of accelerating the transfer of technology. The aim was to establish closer linkages between training activities and on-going research and technology transfer at WARDA and the regional rice research and development network. Training activities aim at building national capacities for technology generation, evaluation and transfer to end-users. The Training and Fellowship Unit (TAFU) in principle should facilitate training activities. These include group training, short term attachment, research scholars and visiting fellows. In the MTP 2000-2002, Training for Agricultural Technology Transfer has become project 4.4.

In terms of achievements, a total of 45 group training courses were organized since 1990 with 846 group training participants (rice researchers, technicians, agricultural extension personnel, research managers, agricultural information scientists and NGO staff), of which 89% were male and 11% female. Over the last three years, on average 4 to 5 group training courses were organized per year. The programmes themselves, in liaison with the Task Forces, organize and conduct the training courses, including the preparation of training materials. Since 1993, a total of 108 students (M.Sc., Doc. 3e Cycle, Doc. Univ., M.Phil. and Ph.D.) spent some time in residence at WARDA, of which 81% were male and 19% female. WARDA itself offers no student fellowships on a regular basis, but the programmes attract students through special projects or on an ad hoc basis. There is a students' office at WARDA facilitating access to all of the facilities by the participants.

The TAFU has been without a coordinator since November 1997, with the head of biometrics filling in as interim. Also, a senior consultant training coordinator has been hired recently to fill the void until a permanent training coordinator is recruited. As a result, training at WARDA has suffered from this interruption. Budgetary allocation for training over the period 1994-1999 is shown in Table 3.1. The table

shows that during this period, WARDA's budgetary allocation to training has dropped from about 8% to about 5-6% of the Centre budget.

The consultant is now assessing training needs and formulating a multi-year plan for WARDA's training activities. Greater emphasis in future training will be placed on participatory approaches, variety selection, technology transfer and community-based seed production in order to accelerate diffusion and adoption of new rice technologies. Presently, training and fellowships at WARDA are to a large extent left to the initiative of programme leaders, project coordinators and Task Force facilitators. The programmes are responsible for meeting the training needs of NARS partners.

**Table 3.1: Training Expenses at WARDA, 1994-1999,  
in US\$'000 and Percentage of WARDA Budget**

Year	Unrestricted	Restricted <sup>1/</sup>	Total	Percentage of WARDA budget
1994	19	587	606	8.0
1995	15	381	396	4.3
1996	150	213	363	3.7
1997	365	126	491	4.8
1998	476	178	654	6.9
1999	388	199	587	6.0
Total/Average	1413	1684	3098	5.5

<sup>1/</sup> UNDP, AfDB and Norway

Source: WARDA

WARDA is in need of a better defined and articulated training strategy which responds to the training needs in rice research and development in its mandate region and which enhances its technology generation and dissemination mission. As an association of 17 member countries, WARDA has a responsibility in capacity building in rice research and development in these countries and has a unique comparative advantage to do so. NARES expect WARDA to play a prominent role in rice research and capacity building. Unless the TAFU, which has had a vacancy open for over two years, becomes fully operational, training and fellowships at WARDA will remain an ad hoc activity.

### 3.6.5 Quarantine/Biosafety

The main objective of the project is to establish plant quarantine and seed health testing facilities in Côte d'Ivoire. The long-term development objective is to prevent introduction of seed borne pest and diseases and to develop a regional capacity for operating such facilities among the West African countries since the project can be the cornerstone to strengthen domestic quarantine capabilities. These facilities will serve as support to the regional OAU/STR Phytosanitary Unit in Cameroon. WARDA and the Danish Government Institute of Seed Pathology, Denmark (DGISP) have jointly formulated this project. The facilities are composed of a plant quarantine building with laboratories and office space, a crop work area with screen houses and facilities for

drainage/irrigation and land development. The facilities are designed to handle 1400 seed samples per year. The Panel was pleased to know that the plant quarantine building (with laboratories and office facilities) and crop work area facilities had been handed over to WARDA in November 1998 and November 1999 respectively. The construction of the drainage and irrigation facilities and the screen house are yet to be finished.

In order to increase awareness of seed borne pathogens in the region and to train individuals in selected testing methodologies, a one-week training course has been organized by WARDA. The project is under the direct supervision of the pathologist who is also the IPM Task Force coordinator. There is no specific personnel for this project. WARDA is also involved in the development of country-specific biosafety regulations.

The Centre has also played an active role in initiating the development of a national biosafety policy in Côte d'Ivoire. Transgenic RYMV resistant plants which have been developed from popular West African cultivars need to be tested against native isolates of RYMV. A containment facility is being constructed in order to test transgenic plants as soon as the regulation is available in Côte d'Ivoire. The Panel urges that this project be better staffed. The Panel was pleased to note that the CGIAR, IPR audit established that WARDA did not violate intellectual property rights.

The Panel further urges WARDA to use its comparative advantage in the region (National Experts Committee, Council of Ministers) for the development of national biosafety policies in Member States, and support the harmonization of national policies at the regional level.

### **3.6.6 Systems Analysis and GIS Unit**

This Unit was established in July 1999 drawing together the modelling research group and the GIS lab that has mainly been working on IVC and HHC issues. The characterization studies that have been conducted under the IVC and as part of other research activities have been incorporated into the GIS databases at WARDA. The modelling research group has primarily focussed on plant type development for key ecologies. The establishment of the Systems Analysis and GIS Unit is expected to facilitate research priority setting, extrapolation of research findings and ex-ante and ex-post impact analyses.

### **3.6.7 Overall Assessment**

The Panel believes that there is considerable inefficiency and fragmentation as a result of certain functions such as training and information functions being located in Programmes as well as in Support Units. Moreover, WARDA's concept of a research - to development continuum - would be well-articulated if Support Services were provided with an overall strategy and professional leadership.

### 3.7 Conclusions on the Research Programmes

As discussed in Chapter 1, WARDA's new mission statement places greater emphasis on achieving impact in three areas: food security, poverty reduction and natural resources management. The Panel believes that WARDA now needs to un-pack these intended impacts, so as to determine the implications for their research programme. In particular there is need for greater understanding of rice food security at three levels: household, national and regional. It would appear that WARDA's research programme has strategic focus on poverty, developing technologies that not only increase productivity of land and labour, but also technologies that are more responsive to low levels of inputs such as water, fertilizers and labour.

It would appear that there is justification for all four programmes. Programmes 1 and 2, however, do generate new knowledge through research, while Programmes 3 and 4 lack research content and have little or no critical mass of scientists nor an appropriate mix to address the policy and institutional questions. This imbalance will slacken the pace at which WARDA achieves its research-to-development paradigm, and more importantly, WARDA's contribution towards the emerging rice production revolution in West Africa may be curtailed.

The Panel, finally, would like to make the following two suggestions:

- key publications for rice researchers, such as annual Programme Reports and WARDA Scientific Conference Proceedings should be published in a more timely manner; and
- all functions of training and information should be consolidated within a coherent programme of support services. In addition, WARDA should develop an overreaching strategy for support services.

## CHAPTER 4 - QUALITY AND RELEVANCE OF SCIENCE

### 4.1 Approach

The Panel attempted to assess the quality of science as practised at WARDA, based on the degree to which research at WARDA has made use of modern insights and techniques. The relevance of the science addresses the contribution of the methodologies to achieving the research objectives and the degree to which research techniques are appropriate in addressing the problem in question. The Panel used the following sources: WARDA's list of achievements since the Third EPMR, its list of staff publications 1993-1999, the Programme Report 1996-1997 and draft Programme Report 1998, the report of the National Experts Meeting (1998), reprints of many individual publications, 4 Internally Managed and Centre Commissioned External Reviews (Breeding 1994; Crop and Natural Resources Management 1995; Integrated Pest Management 1996; and Strategy and Programmes 1999), the consultancy report on Agriculture-Health linkages (2000), WARDA's Strategic Plan 1990-2000, and discussions with senior staff members. The Panel considered the entire period since the last EPMR (1994-1999). Because of significant changes in staffing during this period, the average situation in that period is not the same as the current situation.

The Third EPMR observed that 37% of the research resources were devoted to strategic research. This compares to 60% in 2000, indicating a shift towards more strategic research, which is in agreement with the Centre's intention of becoming a more scientific institution. But did WARDA succeed? We believe that WARDA made good progress towards this goal.

### 4.2 Evidence of Quality and of Relevance

Achievement of research comes in many forms: improved varieties, management recommendations and equipment prototypes, policy advice, new research techniques, and reports and publications. The quality of new varieties and recommendations is established in field testing, results of which are documented. Policy advice is also based on its published documents. In other words, while publications and reports are not WARDA's primary output, they do convey the institutions findings to others. The published articles in international and peer reviewed journals also testifies to scientific quality. A careful review of publications is therefore warranted.

Table 4.1 provides a rough approximation of WARDA's output in publications (research articles, conference proceedings, and books). 'Rough' because there are many variables that lead to large fluctuations and make results difficult to interpret.

**Table 4.1 –Publications of WARDA Scientists  
by Year and Research Area \***

Research area	'94	'95	'96	'97	'98	'99	Average
Breeding and Molecular sciences	4(3)	1(3)	6(4)	14(7)	6(7)	7(6)	1.3
Agronomy, Physiology	10(5)	15(6)	5(5)	11(6)	20(6)	7(6)	2.0
Soil science, hydro- logy, land management	10(3)	11(3)	8(3)	7(2)	26(4)	9(3)	3.9
Integrated pest management	7(5)	6(5)	4(5)	7(6)	14(3)	3(4)	1.5
Social sciences, Economics, Health	6(1)	6(1)	3(2)	3(3)	5(5)	1(4)	1.5
Overall	37(17)	39(18)	26(19)	42(24)	71(25)	27(23)	1.9

**\*Legend:**

The table shows, by calendar year and area of research, the number of publications that appeared and in parentheses the number of internationally recruited staff at WARDA that took part in the research programmes in that year (referred to as 'scientists').

'Average' refers to publications per person per year in the entire period; data for 1993 were incomplete.

Some important conclusions can be derived from this table:

- Scientists at WARDA produce about 40 publications per year. About 40% of these are in peer-reviewed Journals. With an average of 21 scientists at the institute, this comes to 0.75 peer-reviewed articles per scientist per year. This is a respectable number, but still moderate for a scientific institute.
- The high number in the Soils area in 1998 refers particularly to the Proceedings of the IVC workshop in 1996, where many non-WARDA staff contributed.
- There is no obvious overall trend, even though there were 30% more scientists at WARDA in the second part of this EPMR period than in the first. The Panel is concerned about the low number of publications in 1999.
- The research areas of breeding, IPM and social sciences have a relatively lower output, and should put in more effort into quality assurance of their work through peer-reviewed publications.

It has not been possible for the Panel to compare these data with similar information about publications before 1993. It was also not possible to quantify to what extent the international science community appreciates WARDA's publications, e.g. as seen through number of quotations of WARDA publications.

With respect to relevance of its science, the Panel commends WARDA for its adoption of participatory approaches in all its research programmes, and for the use of indigenous knowledge to accelerate the research about key features of rainfed rice and about irrigated rice cultivation. The Panel encourages WARDA to continue to involve these new approaches in a systematic manner, and to do this always together with NARS partners.

Evidence of relevance was indirect but substantial, and derived from WARDA's partners in rice research and from scientists in advanced research centres. Task Force members confirmed to Panel members during field visits that research priorities are regularly revisited together with NARS partners, and that WARDA responds by adjusting its programmes and projects. The National Experts Meeting in 1998 confirmed that WARDA's research addresses issues that are widely recognized as relevant. The fact that many national and international scientists are keen to collaborate with WARDA staff is further evidence of the quality of WARDA's research.

### 4.3 Specific Quality Features in Rice Breeding

The tools of systems analysis and modelling, that comprised adaptation of existing models, experimental work and theoretical analyses, were very effectively employed in directing WARDA's research activities in the areas of breeding and natural-resources management. This use of systems analysis in research and research design for rice production is a strong example of the value of the Production Ecology approach.

The development of the New Rice for Africa is evidence of an excellent use of scientific tools and indigenous knowledge to solve highly relevant problems: raising the yield ceiling, competitiveness with respect to weeds, and resistance to stresses. The breakthrough was a result of evaluation of local farming conditions and of the competitiveness of local *glaberrima* varieties with droopy lower leaves, a trait long regarded as inferior to erect leaves. The breeding method to develop the New Rice for Africa was also unique, as it involved interspecific hybrids of *Oryza sativa* and *O. glaberrima*. Such crosses were not successful elsewhere due to hybrid sterility, but another culture, creatively utilized, overcame this barrier.

While WARDA has very good facilities for screening new varieties, the Panel urges that breeders should resist the temptation of judging resistance after too short a period.

The supply of primers by advanced institutes (Cornell University and CIRAD) is adequate to implement marker-assisted selection, even though WARDA is not fully equipped with advanced molecular technologies for cloning and sequencing of genes. Co-dominant molecular markers have also been identified for marker-assisted breeding.

#### **4.4 Specific Quality Features in Natural Resources Management and Integrated Pest Management**

The research on irrigated rice, more than in the rainfed lowland, combined in depth explanatory studies on rice physiology, soil science, agronomy and breeding. In addition to being of high international quality, testified by a large set of publications and by the Internally Managed External Review on the Crop and Natural Resources Management, it also brought to WARDA's research a clear perspective on crucial issues on sustainable management of soils, that were subsequently addressed in the Irrigated Rice Programme. The use of modelling as a tool for the development of extension material has been very effective and serves as an example for similar work at WARDA and other institutes.

WARDA's IPM research started in 1993 with a modern method of priority-setting. The IMER-IPM testified that the research was of good quality, suggested further improvements, and advised the Centre to move more experimental work off-farm. This advice has been followed, through "farmer field schools", and this implementation mechanism should be encouraged further through NARS. A systematic approach to damage mechanisms, population dynamics and protection strategies, that helps understanding of the importance of pest damage and its dynamics, is not yet present.

Ownership of genetic resources should be respected and acknowledged through Intellectual Property Rights (IPR). WARDA is following the developments in the CGIAR with respect to a policy for IPR. The Panel suggests that WARDA considers 'shared ownership' with its partners. The IPR policy is also being developed for information and databases. The Panel suggests that WARDA speeds up the process where possible, in particular with respect to databases on rice and rice research.

#### **4.5 Specific Quality Features in Social Sciences**

Particularly innovative in adoption studies was the use of LOGIT, TOBIT and PROBIT methods based on limited dependent variable regression analysis. But while conditional probabilities of adoption of the improved variety can be calculated, and conclusions could be used for genetic improvement programmes addressing multiple objectives, analyses are not yet complete.

With respect to the Policy Analysis Matrix, emphasis was on training policy analysts in the countries, as Member State economists were doing the analysis. While a lot has been accomplished in terms of capacity building, local data collection and analysis, and the research is highly appreciated in WCA, only a little came out in Annual Reports, and none in publications, synthesis reports or other documents so that external quality checks were not in place.

WARDA is monitoring the rice situation in its mandate area and publishes results in 'Rice Trends in Sub-Saharan Africa' and other reports. The Panel encourages WARDA to ensure that such publications become an authoritative source of information for national and regional analyses, through timely publications and wide distribution.

The agriculture-health linkages project is of a high scientific quality as testified by (1) the partners and scientists involved, (2) the reviews of its Scientific Advisory Committee, (3) the quality of the first scientific presentations at national, regional and international meetings, and their quality. Nevertheless, scientific findings have not yet been fully analyzed and published.

#### **4.6 Processes and Mechanisms to Control Quality and Relevance**

Until recently WARDA managed the quality of its research internally through project staff consultations supplemented by support units (e.g. biometrics), interaction with the DDG-P, an internal publication committee, personal performance assessments, and interactions with the Programme Committee of the Board. Calibration of WARDA's level of science with that of the international community occurred through (centre-commissioned) external reviews, presentations at international meetings, visits of international scientists to WARDA programmes, etc. The Panel suggests that WARDA uses a Citation analysis on its Website and other related means to identify areas where impact of publications deserves more emphasis.

The Panel appreciates that, by the end of 1999, the ongoing practices of managing research quality and relevance were institutionalized, by assigning 4 senior scientists the responsibility for 'quality and relevance' of the science in the areas of 'gene management', 'crop and natural resources', 'integrated pest management' and 'social sciences'. The Panel suggests (1) that the leaders of the 'disciplinary groups' ensure that all research activities make full use of existing information sources and professional networks in the preparation of new activities and in the analyses and publication of the results, and (2) that WARDA develops and revisits annually, a holistic diagram of key issues in sustainable promotion of rice production, and of how its research and that of its partners together cover the entire diagram (see Section 8.3).

The Panel suggests that WARDA reviews the importance of very small projects in its research programmes with respect to research efficiency: (1) they may cause fragmentation of research to an extent that quality and/or productivity falls below a minimum level; (2) the drive towards better experiments in new projects often leads to under-exploitation of valuable existing data sets.

#### **4.7 Centre Commissioned External Reviews**

Table 4.2 lists the CCERs and IMERs that were undertaken by WARDA since the last EPMR. The first two of these IMERs were conducted in late 1994 and early 1995 prior to the introduction of the TAC-CGIAR guideline of 1995. Although the latter one drew upon the said guidelines, the Centre did not consider it as a CCER. The Panel found that the recommendation of the IMER on IPM was implemented and added value to that programme. The two CCERs carried out in 1999, one on programme strategy and the other on Financial Management, both provided information that the Panel has used in other Sections of the report, but could not rely on these to address the quality of science.

In assessing the disciplinary sciences for quality and relevance, therefore, the Panel was unable to rely on CCERs. The Panel suggests that in commissioning future CCERs, the TOR should include an explicit reference to science quality and relevance in order for the reports to provide useful input into the EPMR process of research institutes. The CCERs also need to be sufficiently recent for such purposes.

**Table 4.2 - CCERs AND IMERs CONDUCTED BY WARDA – 1994-1999**

<b>Date conducted</b>	<b>Title</b>	<b>CCER/IMER</b>	<b>Board Response date</b>
24 Sep – 3 Oct 1994	Rice Breeding Activities at WARDA	IMER	—
26-30 Sep 1995	Crop and Natural Resources Management Research Activities	IMER	
26-30 Sep 1995	Joint Response of WARDA's Crop and Natural Resources Management Research Staff to the Report of the 1995 Internally Managed External Review	IMER	—
16-23 Sep 1996	WARDA's Integrated Pest Management Research Activities	IMER	—
16-23 Sep 1996	Preliminary Responses by WARDA Scientists to Recommendations of the 1996 IPM-IMER	IMER	—
3-20 May 1999	Financial Management & Control: Findings and Recommendations & Detailed Report	CCER	Jul-1999
14-20 Jun 1999	CCER Report on Strategy and Programmes.	CCER	Nov-1999

#### **4.8 Bottlenecks**

WARDA faces the dilemma of having the need for scientists from a wide range of disciplines (see the section on sustainability) and resources for only a relatively small size of staff. The Panel commends the institute for implementing creative arrangements of secondments and other assignments to gain access to important expertise through partnerships, and suggests WARDA to review how more of such arrangements can be used to boost its Programmes 3 and 4.

Concerning WARDA's role and quality as a knowledge institute, the Panel has two concerns. The first is based on the lack of long-term continuity in nearly all its research programmes, due to staff members leaving before they have the opportunity to transfer their knowledge to others. The second concern relates to WARDA's partnership approach. While it expands its expertise base, the build-up of knowledge is only partially under its control. Currently, 14 staff members are seconded to WARDA, or 40% of the total scientific staff. The Panel urges WARDA to address the issue of building the institutional knowledge base in a systematic manner.

## CHAPTER 5 – PARTNERSHIPS

### 5.1 Background

To have significant impact WARDA must collaborate with national programmes in technology generation, in technology transfer, and adoption of results in particular rice growing environments. WARDA alone cannot and should not try to meet all the rice science needs in West and Central Africa. WARDA's resources are limited relative to the substantial diversity of the region's rice producing environments, and NARS and other stakeholders must play the key role in agricultural research and rural development. This implies a role for WARDA in building scientific capacity of NARS. In this Chapter, the Panel examines the philosophy and practice employed in building and sustaining partnerships, and how WARDA exploits its unique institutional character as both an intergovernmental association and a CGIAR center.

There are two approaches that WARDA articulates in its institutional strategy. WARDA sees itself as an "Open Centre" and it believes in a "research-development (R&D) continuum". Upon examining the notion of an "Open Centre", however, the Panel believes that this is a philosophy that has been generally adopted by CGIAR Centres, and not uniquely by WARDA. The Open Centre is an attitude that welcomes and values partners and collaborative work, and allows for creativity and synergy to emerge from such partnerships so that, ultimately, the whole has greater capacity and efficacy in addressing a problem, a challenge or an opportunity, than the sum of the individual components. WARDA, however, has exploited its openness to other players in more effective ways than most Centres have been able to. The Panel recognizes that WARDA organized the first CG-workshop on Partnerships in 1999. The Panel observes also that at times partners get no explicit credit for joint work.

The R&D Continuum, as an approach, seeks to have the Centre actively research into and address needs and constraints in technology generation as well as technology adoption. The R&D continuum therefore relies on the whole value-chain that places importance on generating and sharing knowledge and information. The Continuum approach allows WARDA to facilitate interaction between ARIs and NARS of WCA and facilitate the use of cutting edge science and the transfer of technologies.

### 5.2 Management of Partnerships

Although any partnership has, and needs, its own specific goals, partners and mode of operation, it is necessary to recognize general principles and mechanisms. When partnerships are carefully managed and maintained, the best mechanisms can be promoted further, and transaction cost minimized, while the less effective partnerships are weeded out. With an aim of optimal management of partnerships, the Panel reviewed WARDAs partnerships from the points of view of effectiveness and efficiency.

Bilateral, often informal, arrangements between scientists and institutes are very valuable and indeed the core of scientific research. But this is a regular part of science

and therefore not reviewed *per se*. The Panel notes and commends the initiation of a short-term visiting scientist programme to give research opportunities to national scientists in various disciplines, and fill strategic research needs in WARDA's research programmes.

The Panel recognized four types of managed partnerships at WARDA: Task Forces, Consortia led by WARDA, Consortia in which WARDA participates and other research collaboration. Although WARDA views PVS as a partnership, the Panel believes that this is an appropriate breeding method, but does not constitute a partnership in itself.

### 5.2.1 Task Forces

A Task Force (TF) is a network of NARS and WARDA scientists that together identify research priorities and carry out research and share results. Most WARDA member countries participate in each TF which is of relevance to them with at least one scientist, who may have a team of colleagues at home to carry out the assigned tasks. Due to the relative strengths and interests of individual NARS, a subdivision of tasks often occurs. Products of Task Forces are research results, and enhanced capacity of the NARS.

The current Task Forces are: The Rice Breeding Task Force, Natural Resource Management Task Force, Sahel Natural Resources Management Task Force, Integrated Pest Management Task Force, Mangrove Swamps Task Force, Economics Task Force and the Technology Transfer Task Force.

Task Forces are typically managed by a Steering Committee of NARS, and backstopped by or through the WARDA staff member. The Steering Committee managed research is enabled by small grants assigned to NARS scientists, of which more than 400 have been provided since 1993 through the Task Forces. The current Task Forces together include more than 80 national scientists. Annual costs to WARDA for one Task Force have been around US\$30k plus 0.15 person-years of its staff, and the contribution of NARS is estimated at 0.25 person-year in each country, or 1-2 person-year per country for all TF combined that operate in that country. Until recently, the grant-cost of the Task Force mechanism were covered by a special project.

Given the very important role of Task Forces in the promotion of rice production in WCA, the Panel suggests that TF activities be funded from core if external funding is not forthcoming. The Panel suggests also that as WARDA's partners become stronger, the task of scientific backstopping and coordination in Task Forces could be transferred from the WARDA scientist to a NARS scientist. The Panel notes that this has already occurred with the Mangrove Rice TF which was devolved to the Sierra Leone NARS in 1995.

The Rice Breeding Task Force serves as an efficient mechanism for germplasm exchange and evaluation, including materials exchanged through INGER-Africa. Between 1997 and 1999, INGER-Africa provided a total of 9308 seed samples for 128 nurseries in WARDA member states, for upland, rainfed lowland, irrigated and mangrove swamp agro-ecologies. In addition, 3909 samples were distributed to ECSA.

WARDA has recently merged its TFs with the CORAF Rice Research and Development Network. The new network will operate on the TF model, but reducing the number to 7. The coordinating unit of the new network will be hosted at WARDA. A NARS scientist will coordinate each TF. The SC will oversee the new network and is made up of 7 NARS members and 2 WARDA members and chaired by a NARS person. The coordination Unit is a shared responsibility between WARDA and NARS. The Panel believes that this development is further evidence that the NARS in the region value their relationship with WARDA.

### 5.2.2 Leading Consortia

Research consortia can advance a field of science about a particular theme or for the region when the subject requires a multidisciplinary critical mass. This usually involves advanced research institutes and IARCs. NARS partners usually take part in testing and are guided in the work. A characteristic of this type of partnership is that WARDA assumes a scientific leadership role. Yet, there are basically two different tasks: (1) to carry out a research project and (2) to host the coordination of the consortium. The research project is located in a research Programme, while the coordination is located in a support unit.

There are currently two WARDA-led consortia:

- The Human Health Consortium (HHC). The HHC membership comprises two national agricultural and health institutions – Mali and Côte d'Ivoire, IDRC, WHO Panel of Experts on Environmental Management for Vector Control (WHO-PEEM). This formal network of specialist institutes and NARS partners was created to answer the question whether irrigation schemes for rice crops stimulate the incidence of malaria and/or of schistosomiasis. It has a strong emphasis on fundamental and applied science, an effective Scientific Advisory Committee, and is about to produce its conclusions. This is an example of effective involvement of experts on an issue that is not among WARDA's core expertises.
- The Inland Valley Consortium (IVC). Members of the IVC include 10 West & Central African NARS, 4 IARCs (WARDA, IITA, ILRI, IWMI) and 5 international, regional and foreign-national organizations (CIRAD, CORAF, FAO, SC-DLO, WAU). The group became a component of the EPHTA ecoregional programme in April 1994 when the Consortium was first formed, and WARDA was invited to lead it. In April 1999, the Consortium committed itself to a second phase and approved a new five-year strategic plan. More members joined, and it has now 16 operational sites in 10 countries. The IVC has an international Steering Committee. Yet, the Panel judges that the IVC has so far only been effective in characterization, and there is still much to be done to assess the potential of inland valleys at farm, landscape and catchment levels, and to define ways how to realise this. The last External Review of IVC (1997) concluded that the IVC needs more scientific leadership and production, as well as efficiency in administrative tasks. The Panel was unable to examine deeply the institutional issues affecting the effectiveness of the IVC partnership. The Panel, however, believes that implementation is largely at national level, and that a close

examination is required of how the partnership works at local key site level. This Consortium, the Panel believes, will benefit from a good external review.

### **5.2.3 Participating in Consortia**

Complex research tasks that are very important to WARDA, but on which it has insufficient capacity or interest, are increasingly carried out by participating in Consortia led by other centres. WARDA participates in four CGIAR system wide programs: SGRP, SWIM, PRGA and SWIPM. However, the Panel was unable to analyse the workings of these partnerships in order to determine their effectiveness and efficiency.

It would appear that, even though WARDA may be keen on participating in a number of CGIAR initiatives, the Centre has limited its input selectively in consideration of its size and resource base. WARDA, however, has a growing status as a scientific centre of excellence, and the Panel believes that more ARIs will find it more and more attractive to work with WARDA. Other CGIAR Centres responded positively to TAC, in terms of the good working relationship with WARDA.

### **5.2.4 Other Research Collaboration**

The Interspecific Hybridization Project (IHP). The IHP combines the efforts of WARDA-based staff (from WARDA, NRI, JIRCAS, JICA, CIRAD) with those of Cornell University (USA), Tokyo University (Japan), IRRI (the Philippines), CIAT (Colombia) and the Yunnan Academy of Agricultural Sciences (YAAS, China), IRD (France) and JIRCAS (Japan). Since 1996 WARDA is the lead centre among a powerful and global group of rice breeding institutes to derive the full benefits from interspecific hybridization. The organizations pool resources to address common issues, but workplans and specific agreements are only made in small groups. The IHP is one of the most successful partnership at WARDA. WARDA's scientific achievements discussed in Chapter 2 testify to this. Through the IHP, WARDA demonstrated that it did not need to have its own fully-fledged biotechnology capacity in order to do path-breaking research.

## **5.3 Relationship with Host Country NARS and the National Experts Committee**

WARDA's relationship with the host country is excellent. The Panel visited the head of the NARS and the relevant government Ministry and learned that CNRA has been restructured and privatized. The new CNRA has 40% public ownership. Both CNRA and WARDA leadership believe that this development will strengthen the NARS and allow for greater collaboration of the two institutions in rice research. The host country is represented on the WARDA Board.

In chapter 6, the Panel discusses the governance of WARDA and how the COM provides overall guidance. The COM meets every two to three years. During alternate years, when meetings of the WARDA Council of Ministers are not being held, WARDA organizes a National Experts Committee Meeting, composed of heads of the

NARS of WARDA Member Countries. This provides opportunities for NARS' directors to discuss WARDA's ongoing collaborative activities, in particular the Rice Task Forces mechanism and issues of programmatic importance to their research programmes. A second meeting of the National Experts Committee is planned in May 2000. This Committee is a valuable instrument to foster interaction between WARDA and its NARS' directors.

#### 5.4 Assessment

In response to the need for cost effective institutional innovations, especially in the face of declining resources, WARDA has developed partnerships and coalitions that enhance its scientific achievements and facilitate diffusion of technological products. The Panel found that the National scientists and their supervisors appreciate highly the participatory nature of planning and decision making in Task Forces, and cite significant impact on their national programs. There is also a strong feeling of ownership by the NARS. It was also evident to the Panel that although partners may not be of equal size, each partners' contribution was valued as equally important. The Panel noted that in 1999, several meetings for strategic planning and the organization of ROCARIZ took place with representatives from the TF. It also found some confusion at WARDA about the roles of TF-partners, coordination, funding and how they interact with research projects of Programmes 1-4. In principle, TF coordination is a Programme Support activity attached to the DDG-Ps office while TF research activities are attached to the respective research programmes. The Panel suggests that WARDA continues the development of the TF mechanisms and particularly explores how strong NARS partners can play a still larger role.

The Panel also believes that WARDA can build on the improved internet connectivity in the region, following the AfricaLink Project. This is an opportunity to improve the information and knowledge flow with NARS, and WARDA should capitalize on this investment.

Research in consortia is becoming a more common way of doing science. The Panel encourages WARDA to decide clearly whether it wants to lead in such an action or merely participate, and weigh benefits and cost, when new opportunities arise. When WARDA has a leadership role, it should devote sufficient resources to the task, including investment into managing and nurturing partnerships. The Panel attempted to assess the relative benefits of the different partnerships. The results are presented in Table 5.1.

**Table 5.1 – Partnerships of WARDA and their Relative Effectiveness and Efficiency as Estimated by the Panel**

<u>Partnership</u>	<u>Under project</u>	<u>Effectiveness</u>	<u>Efficiency</u>
Task Force	Programmes 1, 2, 3, 4	+++	++
Lead Consortia:			
HHC	Programme 3	+++	+++
IVC	Programme 4	+	+
Other research collaboration:			
IHP	Programme 1	+++	++

In conclusion, the Panel believes that the Task Forces and the IHP is also a valuable partnership. Both have been effective in getting results that lead to scientific breakthrough and impact on the field. The HHC is also at valuable partnership with a more restricted life span. This is good in that research questions can be addressed in this way without making them a permanent part of the programme. Overall, more investment is needed in improving the efficiency or in maintaining partnerships.

As WARDA continues to strengthen, and/or develop new partnerships with NARS, and other partners, the Panel suggests that an approach to follow may be to craft a strategic mix of the following:

- research partnership focused on well-defined research problems aimed at generating new knowledge;
- partnership to enhance technology adoption and impact; and
- partnership to develop research capacity in member countries.

### **Recommendation**

**The Panel recommends that WARDA develops a strategy for managing and periodically reviewing its partnerships for greater effectiveness and efficiency.**

## CHAPTER 6 – GOVERNANCE

WARDA is unique among the international Centres comprising the CGIAR System in that, as a regional Association of West and Central African countries, its governance structure is essentially two-tiered, consisting of a Member State-appointed Council of Ministers and a WARDA-appointed Board of Trustees (BoT).

### 6.1 The Council of Ministers

The Council of Ministers (COM) is charged, with:

- monitoring the strategic direction of the organization in terms of its conformity with the agricultural development policies within the region;
- examining the Annual and other major reports;
- appointing the Director-General nominated and selected by the Board of Trustees;
- approving regular and special contributions by Members States; and
- providing assistance in resolving major political issues.

Meeting once every two years (or in Extraordinary Session as required), the COM has proved to be very successful in its unique role. It has appointed Directors General; it has successfully enabled the relocation of WARDA's headquarters from Liberia to Côte d'Ivoire; and has reviewed the strategic directions proposed by Management and the BoT. In a number of cases, it has also utilized its ability to access the member government policy-makers at the highest levels.

In just one area - that of ensuring that Member States fulfil their financial obligations to WARDA - has the COM's role been less clear over the life of the Centre. While the COM has mobilized additional funds - both for operations and for the construction of Phase I and II of WARDA's physical facilities at M'bé in recent years, nevertheless some US\$ 3.7 million in unpaid budgetary support funding has now accumulated since these arrears were last forgiven 9 years ago. This shortfall places added strains on WARDA and its remaining donors. Table 6.1 below shows, by Member State, the funding levels and shortfalls that have accumulated over the past 9 years.

Member governments are strongly urged to take full advantage of the substantial and positive effects on every Member State's Balance of Payments of increased production and reduced imports that arise directly from WARDA's achievements. The Panel encourages the Council of Ministers to use every opportunity to acquaint their Ministries of Finance of the strong case for funding support to WARDA and suggests that WARDA staff make available suitable impact assessment material and country-specific data that shows WARDA's contribution to agricultural development in each Member State.

**Table 6.1**  
**MEMBER STATES CONTRIBUTIONS TO WARDA**  
**1990 through end-1999\***  
**(US\$)**

COUNTRY	REQUIRED ANNUAL CONTRIBUTION	AMOUNT PAID* 1990-1999	TOTAL AMOUNT STILL OUTSTANDING
<b>A. FULLY PAID COUNTRIES</b>			
BENIN	18,283	305,425	Zero
MALI	18,283	305,550	Zero
SENEGAL	<u>18,283</u>	<u>280,425</u>	Zero
	<b>54,849</b>	<b>891,400</b>	
<b>B. COUNTRIES IN ARREARS</b>			
BURKINA FASO	18,283	66,110	214,315
CAMEROUN	27,742	0	259,959
CÔTE D'IVOIRE	37,202	303,314	133,673
GUINEA	18,283	0	280,425
GUINEA BISSAU	18,283	0	280,424
GHANA	37,202	84,612	352,375
LIBERIA	18,283	30,000	250,424
MAURITANIA	18,283	0	280,425
NIGERIA	160,175	1,744,459	320,350
NIGER	18,283	0	280,425
SIERRA LEONE	18,283	24,615	255,810
TCHAD	18,283	0	280,424
TOGO	18,283	40,804	239,623
THE GAMBIA	<u>18,283</u>	<u>13,048</u>	<u>267,377</u>
<b>TOTAL</b>	<b>445,151</b>	<b>2,306,962</b>	<b>3,696,029</b>

\*Includes Capital/Special contributions.

The Panel also suggests that the COM is the most appropriate forum for WARDA to brief the Member States on the region's rice situation - both overall and at the national level - and for establishing a dialog at the highest levels in respect of the specific national agricultural policy issues that arise in the work being done at WARDA.

## 6.2 The Board of Trustees

The Board of Trustees (BoT) fulfils the same role as any other Centre Board in the CGIAR System, including taking responsibility for consideration and approval of:

- the strategic directions for the Centre;
- the annual work programme and budget; and
- policies and guidelines in respect of human resources, finances and administrative matters.

The one major difference is that, given the two-tiered governance structure peculiar to WARDA, the BoT selects and nominates the Director-General of the Association for appointment by the COM.

WARDA's Constitution requires that the BoT comprise between 8 and 14 members, of which half are to be appointed from the Member States. A further stipulation is that, with the exception of the DG, candidates from Member States are to be nominated by their respective Member State. The current Board composition is in compliance with WARDA's Rules of Procedure that require the BoT to consist of 11 Trustees, of whom 6, (including the DG in his/her ex-officio capacity), are nominated and appointed from Member States as required by Article VII of the Constitution, and the remainder are appointed from nominations made by Cooperating States and Organizations, three of whom are suggested by the CGIAR System. The Panel notes, parenthetically, that while the Board has adopted Rules of Procedure that call for 11 Trustees, the formal Constitution implies an even number of Trustees as noted above. Table 6.2 overleaf summarizes, for the period 1993 through 1999, the composition of WARDA's Board by nationality, gender, and Committee membership.

The Board carries out its work through four permanent committees: the Executive and Finance; Audit; Programme; and Nominating committees. Each Trustee is a member of at least one committee and, in practice, most are members of multiple committees. The Board, and its committees typically meet twice a year.

Two members of the Panel attended the June '99 meetings of the Board and its four Committees. Panel members also attended some of the November '99 meetings and Board members were interviewed during the Panel's visits. Panel members were invited to attend both open and closed sessions, and were given every opportunity to interact with individual Trustees.

The Panel noted, and some Trustees observed, that staff presentations tend to be long on facts but short on a clear and concise analysis and presentation of the underlying issues resulting from the facts. According to a number of Trustees, this lack of issues-orientation means that one of the key elements of good governance - getting a Board perspective on major strategic issues - can be missed in the meetings. The Panel concurs with this assessment.

**Table 6.2 - WARDA Board of Trustees: Terms of Office and Committee Assignments (1993-1999)**

Name	Sex <sup>1</sup>	Nationality	Year <sup>2</sup>							Position Held <sup>3</sup>
			93	94	95	96	97	98	99	
H. Carsalade	m	France	C							C-BoT, C-EFC
S.Z. Morris	m	Liberia	M							M-PC
B. Traoré	m	Mali	M							C-NC, M-EFC
R. Audet	m	Canada	M							M-PC
T. Takeda	m	Japan	M	M						M-PC
M. Sedogo	m	Burkina Faso	M	M	M					M-PC, C-NC, M-EFC
H.E. Kauffman	m	USA	M	M	M	M	M			C-PC, M-EFC
J. Faaland	m	Norway	M	C	C	C	C	C	C	C-BoT, C-EFC, M-AC, M-PC, M-NC
A. Sawadogo	m	Côte d'Ivoire	M	M	M					M-PC
R.N. Keita	f	Mali	M	M	M	V	V	V		V-BoT, M-EFC, M-PC, M-NC
E.R. Terry	m	Siera Leone	DG	DG	DG	DG				M-PC, M-EFC
M. A. Amakiri	f	Nigeria		M	M	M	M	M	V	C-NC, M-EFC, M-PC, V-BoT
A. Basler	m	Germany		M	M	M	M	M	M	C-AC, M-EFC, M-NC, M-PC
D. Mclean	f	Canada			M	M	M	M	M	M-PC, M-NC
M. Diomandé	m	Côte d'Ivoire				M	M	M	M	C-PC, M-EFC, M-NC
L. Innes	m	U.K						M	M	C-NC, M-PC, M-EFC
J. A. Takem	m	Cameroon					M	M	M	M-PC, M-NC, M-AC
R. Musangi	m	Kenya						M	V	M-PC, M-AC, C-NC, V-BoT, M-EFC
A. Sawyerr	m	Ghana						M		M-PC, M-AC
D. Ba-Diallo	f	Mali							M	M-PC, V-NC
R. Ishii	m	Japan			M	M	M	M	M	V-PC
D. Spencer	m	Sierra Leone							M	M-PC, C-AC, M-EFC
K. F. Nwanze	m	Nigeria				DG	DG	DG	DG	M-PC, M-EFC
<b>Total Number of Board Members</b>			11	9	10	9	10	12	12	

<sup>1</sup>m = male and f = female

<sup>2</sup>C = Chairperson; V = Vice Chairperson; M = Member; DG = Director General, ex-officio member of the Board of Trustees

<sup>3</sup>C = Chairperson; V = Vice Chairperson; M = Member; DG = Director General, ex-officio member of the Board of Trustees; BoT = Board of Trustees; EFC = Executive and Finance Committee; PC = Program Committee; NC = Nominating Committee; AC = Audit Committee.

While the contributions of individual Trustees during the meetings observed were of significantly differing intensities, nevertheless there was an excellent spirit of cooperation among Board members and there was no evidence of 'camps' of opinions or political positions within the board membership - an issue raised in the last EPMP Review. Comments and suggestions on governance made in the context of the Third EPMP Review have all been taken into account and the WARDA Board structure and governance processes are stronger as a result.

The Board conducts a regular self-evaluation process and the results are shared and discussed at a subsequent Board meeting. Feedback from the recent surveys suggest that Board members believe that their governance processes are working better than at the time of the 1997 Survey. That said, however, many felt that a more timely distribution of Board materials was necessary, and some felt that more frequent reporting on financial matters throughout the year would materially enhance their ability to understand the issues and contribute to the governance processes more effectively. The Panel comments below on these matters, and has made a number of content and format suggestions to sharpen the focus of the Board Survey instrument - thereby providing more actionable feedback.

The current Board Chairman's term ends in May 2000 and the Chair-Elect has been chosen by the BoT. As has been done so successfully in the past, the new Chair's ability to work closely with the Director-General as a mentor, advisor, and close confidant will contribute substantially to the continued steady progress of the Association in the years ahead. The Panel welcomes the Chair-Elect's strong desire to increase the spirit of teamwork among all the Trustees as, together, they address the key strategic issues in the years ahead.

### **6.3 The Board Committees**

**6.3.1 The Nominating Committee (NC)** has a rather more complex and difficult task than its counterparts in other CGIAR Centres because of the two-tiered sourcing requirements dictated by the WARDA Constitution. With respect to non-Member State nominations and appointments, the NC has been very successful in identifying and presenting excellent candidates with the appropriate scientific qualifications. As the Centre grows in size and complexity of funding, the requirements for managerial, administrative, legal, and financial expertise at the board level will increase substantially. The current Chair of the Audit Committee with experience in these areas is also reaching the end of his second term in May 2000 and it is important to continue and indeed strengthen the Board's competencies in these vital areas by seeking candidates - possibly from the private sector in the region - with specific skills and experience in these other areas.

On at least two occasions in the recent past, however, the mandated approach in respect of the Member State nominations of local candidates for the Board's consideration has failed to produce candidates with the requisite skills, experience, gender mix, and seniority for the position of Trustee in an internationally recognized and funded research institution<sup>1</sup>. This has been, and continues to be, a source of great concern to the Board and a number of initiatives are being taken to address the problem, including:

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<sup>1</sup> Indeed one recent Call for Nominations produced no new candidates.

- urging the Member States and current Member State Trustees to be much more proactive in identifying suitable candidates;
- more clearly specifying the personal qualities, professional knowledge, and breadth of the experience required of trustees so that every trustee, once appointed, is clearly adding value to the governance process; and
- looking to the private sector within the region for high-potential candidates for one or even 2 of the vacancies.

But clearly more is required to ensure that the very best candidates continue to be put forward for election.

The Panel encourages the BoT to explore, with the COM, ways to improve the identification and recruitment of quality candidates.

Further, the Board has typically re-nominated eligible Trustees whose first term is expiring to a second, three-year term. Since it is highly unlikely that every Trustee appointment will work out as originally intended, the Panel is concerned that re-appointments are not given the same degree of scrutiny as new appointment decisions. Often reflective of a lack of political will to make tough choices, such a stance nevertheless could lead to a sub-optimal slate of candidates for the governance task at hand. The Panel also examined the rationale of the re-nomination procedures pertaining to Board Membership as well as a formal annual evaluation process for each Trustee, including the Board Chair.

Such an evaluation process will provide a clear and transparent procedure for basing re-appointment decisions that is both apolitical and fair. The Panel suggests that the NC Chairperson consult the available material on Board evaluations – including materials published by the CGIAR – in developing the Evaluation process.

**6.3.2 The Audit Committee (AC)** – which was established in 1995 - works closely with Management and the External Auditors (EA) throughout the year to ensure the integrity of WARDA's finances and management control systems. WARDA suffered from a continuing turnover of A&F leadership during the period 1996-1998, but with the improved staffing levels within the Administration and Finance department, Management and the Board has rightly focussed its attention on WARDA's finances and has received a clean audit report for 1998. The Auditor's Management Letter contained no substantive issues that still had to be addressed. This is a major improvement and all involved – Management and Board alike – deserve credit. With the major staffing bottlenecks now resolved, the AC needs to assure itself that, for integrity purposes, the normal policies with respect to mandatory vacation periods for Finance staff are more closely adhered to, and that the responsibilities for handling funds and controlling funds flows are appropriately partitioned within the A&F Department. Two AC members with the most experience and familiarity with audit matters are both scheduled to leave in May 2000, leaving a potential gap in competencies in this vital area of WARDA's activities. Replacing these individuals with nominees with appropriate qualifications and experience is a key issue for the NC. One suitably-qualified candidate has already been identified.

**6.3.3 The Programme Committee (PC)** meets twice a year during the regular Board meetings and, in practice, comprises all of the members of the Board, i.e. it operates

as a “committee of the whole”. It deals with the key strategic scientific and programmatic issues, and is responsible for monitoring the implementation and quality of research.

A review of the PC Minutes confirms the Panel’s observations that, while Trustees often ask the right questions in respect of strategic linkages, priorities and work plans, the PC rarely debates staff’s responses in order to improve the research work or challenge the resource-allocation process. The Panel also noted that many Trustees had not yet visited WARDA’s research programmes in Senegal (or other stations), even though considerable resources are expended in these programmes.

The PC’s responsibilities are heightened in those situations where there is a significant turnover in scientific staff, funding difficulties, and a number of scientific position vacancies potentially leading to shifts in priorities and work plans.

To aid this priority-setting process, Board members should be encouraged to systematically visit key field sites - possibly linked to regularly-scheduled Board events so as to save on costs and time. It may also prove necessary to form sub-committees of the PC - possibly along programme-specific lines - to orchestrate a systematic review process, to commission and review CCER’s and to ensure adequate, in-depth coverage of each programme.

**6.3.4 The Executive and Finance Committee (EFC)** currently meets twice a year just prior to, or during, regular Board meetings. Since the full Board typically revisits the findings and decisions of the EFC, there is, naturally, some duplication of effort. The formal adoption of, and strict adherence to the principle that the full Board may rely on the conclusions of its committees in respect of routine matters - could reduce the perceived ‘time-wasting’ and redundancy noted by a number of Trustees. The EFC may want to consider meeting between Board meetings - a common practice in other organizations - to enhance its coverage and provide added assistance to the D-G between regular Board meetings. The upcoming availability of improved satellite-based communications could enable such EFC meetings to be conducted by conference call - thus saving costs.

## **6.4 Gender**

The Panel notes the increase in the number of women Board members since 1993 and took note of the discussions in both the NC and the full Board of the continuing need to seek additional qualified women candidates for all positions - Board and staff alike - consistent with the agreed position that candidate quality should not be ‘satisfied’ by arbitrarily-set gender targets<sup>2</sup>. Gender issues in respect of staffing within WARDA are discussed in Chapter 7.

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<sup>2</sup> The Panel observed that of the 9 candidates submitted for nomination by Member States in a recent Call for Nominations, none were female, thus adding to the NC’s difficulties in achieving a higher gender ratio.

## 6.5 Information Flows

Board Members, almost without exception, commented on the need to get a full set of Board documents<sup>3</sup> much sooner than at present (typically the complete Board package is made available to Trustees on their arrival in Abidjan, en route to the Board meeting).

While there are always cogent reasons why such documents are not available earlier - particularly in some of the Member countries where mail delivery problems are endemic, nevertheless, Board documents should be furnished well ahead of the scheduled meeting date.

One argument made to the Panel was that, with information changing so rapidly, it only makes sense to provide the very latest data once Board members arrive. The Panel disagrees: 'Board room' information updates are often necessary in a rapidly-changing environment, but Trustees need advance time in their busy schedules to (a) read the documentation; (b) assimilate the underlying issues being addressed; and (c) most importantly, to consult/dialog with their colleagues and with the Board Chair, before arriving in M'bé. The fundamental issues underlying a Board paper rarely, if ever, change substantively with more recent data, but the improved quality and focus of the Board's collective wisdom resulting from the added review time, always pays dividends. Further, WARDA has an excellent Web site that, with suitable security safeguards, could serve as the distribution medium for these reports. It is axiomatic that Trustees will use the added time to read the documentation - since lack of preparedness by a Trustee will be a major factor in the Trustee Evaluation process recommended earlier.

Accordingly, in order that the Board can effectively carry out its fiduciary responsibilities, the Panel further strongly suggests that (*de minimus*) the members of the Audit, and the EFC receive monthly updates on:

- budget-vs-actual incomes and expenditures;
- a rolling 12-month cash-flow forecast; and
- an accompanying commentary that addresses the issues raised by the data and outlines what Management is doing about the issues raised.

This monthly document need not be long, or onerous to prepare: many companies with budgets and operations that are orders of magnitude larger and more complex than WARDA's typically report monthly to their Boards on their operations in a simple, two-page format that includes Management's discussion of the results.

## 6.6 Conclusions

WARDA, as an Association of Member States, is unique among the CGIAR Centres. In its uniqueness, there are some very powerful advantages including access to, and support from the Member States, and WARDA is encouraged to take greater advantage of this unique opportunity.

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<sup>3</sup> Board documents here refers specifically to those papers that lay out the issues, possible actions, and management's evaluation and recommendations. It does not refer to minutes of past meetings.

The Governance function is improving, and WARDA will benefit from an increased involvement by, and levels of competencies of, Board members. There is much new work for the Board to undertake in the coming years, including monitoring the changes resulting from the recent staff attitude survey; holding management accountable for achieving goals in respect of improving financial reporting; and in upgrading its own efficiency and effectiveness.

### **Recommendation**

**The Panel recommends that the Board of Trustees:**

- i) assists the COM in the search process for positions on the WARDA Board;**
- ii) institutes a formal annual evaluation process for each Trustee, including the Board Chair;**
- iii) ensures that the Programme Committee plays a more active role in providing guidance and oversight to the Centre in programme strategies and priority setting;**
- iv) pursues avenues to allow Trustees to be better prepared for meetings. Each Trustee should receive the essential meeting documents at least 7 days before the scheduled meetings.**

## CHAPTER 7 – MANAGEMENT

### 7.1 Introduction

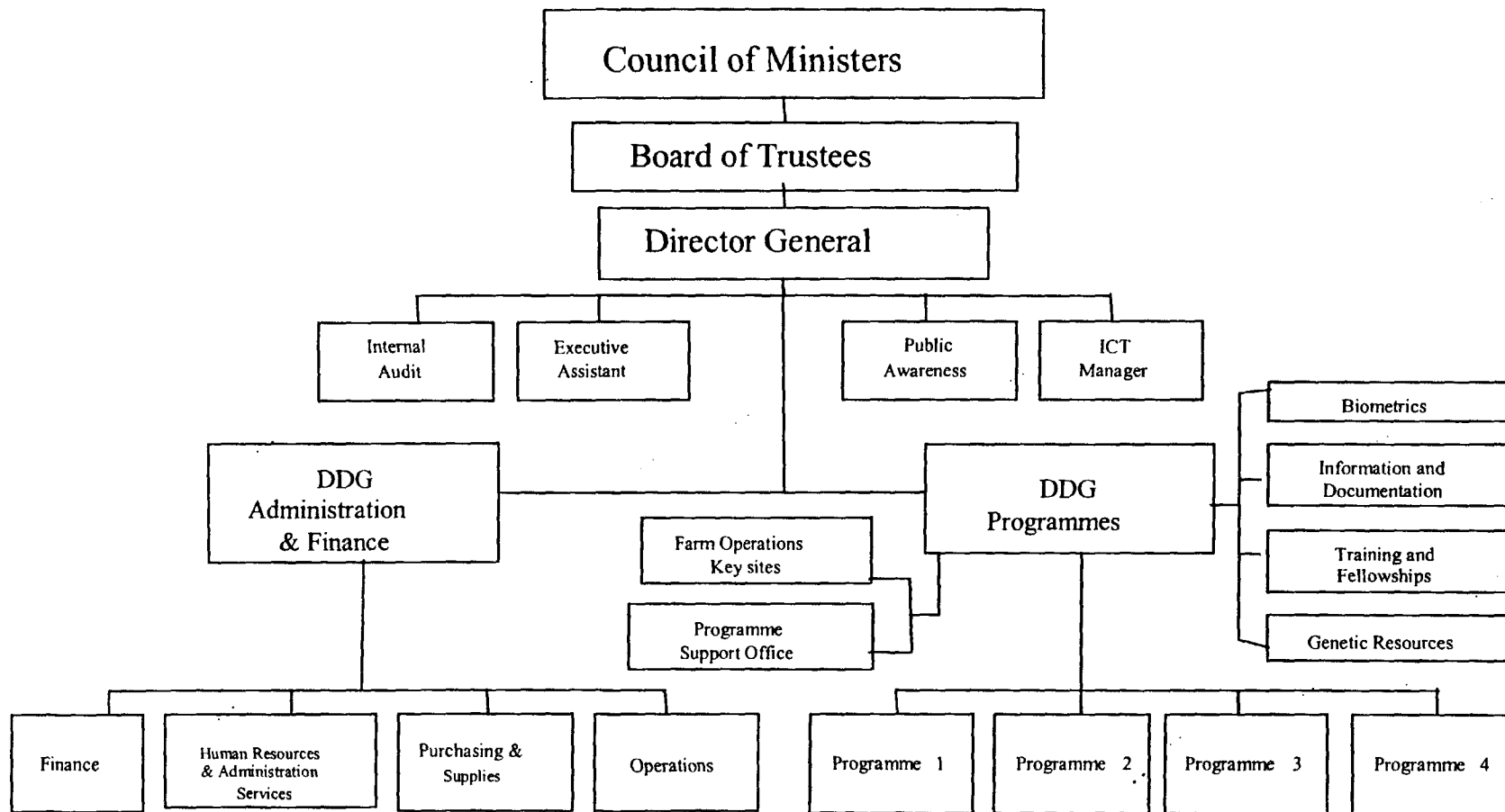
As WARDA's scientific activities have expanded and changed over the past 5 years, so too has the organization's structure and leadership. Since the Third EPMR, the Centre has changed its senior management team completely - with a new Director-General (December, 1996), and more recently, new leadership of both the Programmes (October, 1998) and Finance and Administration (F&A) (January, 1998) functions at the Deputy Director-General level. As a result WARDA today is becoming a more financially sound, and scientifically respected research institute.

### 7.2 Organizational Structure

WARDA divides its total range of activities into two major functional groupings; Research and Finance & Administration, the heads of which report directly to the DG. Figure 7.1 depicts the current organizational structure.

### 7.3 The Executive Function

In March of 1997, in order to improve the effectiveness of decision making and make it more participatory, the DG formed three management committees. The first, the Executive Management Committee (EMC), comprises the DG (as Committee Chair) and the two Deputy Directors-General and is primarily responsible for centre-wide policy formulation and strategic decision-making. The Executive Secretary to the DG serves as Secretary to the EMC. The second, the Programme Management Committee (PMC), is chaired by the DDG-Programmes and comprises the Programme Leaders who report to him, and the DDG-AF. It carries primary responsibility for articulating the research agenda and concomitant work programmes and budgets, and for implementing the same, and for overseeing the quality and relevance of the Centre's scientific activities. The third, the Administration & Finance Committee (AFC), is chaired by the DDG-AF and comprises the heads of the functional departments under the F&A structure, together with the DDG-Programmes. Its purpose is to develop and implement the financial, organizational, human resource, and administrative affairs of the Centre within the approved policies and strategic imperatives approved by the Board and/or by the EMC.



**Figure 7.1 – Organizational Chart of WARDA**

#### 7.4 Leadership and Staff Morale

Changing the strategic direction of the Centre's activities and, simultaneously instituting new policies, procedures, and financial controls to correct past funding and expenditure deficiencies, has had some predictable results: some senior scientists found these changes unacceptable and left WARDA. To understand the situation more clearly, the Panel carried out an extensive survey of staff attitudes during the Review and the findings give cause for both optimism and some concern.

First, staff are keen to see WARDA succeed and like what they do - key essentials for achieving success in the years ahead. They are proud of their association with the Centre, and are willing to work hard to ensure its success. In this staff give credit to their immediate supervisors for the leadership they provide, and comment favorably on the working relationships within their workgroups.

The Survey also indicates some concerns among the staff, including some discomfort with the Centre Management Team's leadership style, with employment conditions, and particularly with the perceived lack - at the centre-wide level - of recognition for personal achievements, and also with career prospects.

It will now be crucial for the DG and his senior management team to transition from a 'hands-on' leadership style to one that empowers staff to make decisions within the broad parameters set by the planning exercises that have consumed so much time over the past year. Such changes will also put the planning and control systems now being implemented to the test and place new demands on the BoT as it monitors progress. These changes will result in higher levels of organizational effectiveness and performance.

Staff remain the critical 'asset' at WARDA and for reasons of continuity, institutional memory, critical mass, and WARDA's overall image among the international and national communities, it will be important to monitor staff attitudes over time. To this end:

#### **Recommendation**

**The Panel recommends that Management takes such actions as necessary to capitalize on the strengths and address the weaknesses identified in the Staff Survey, and that the Board replicate the Survey every 18 months to monitor progress and to provide feedback to the Staff, and Management.**

In this, the Panel commends management for retaining a Human Resources Management specialist to assist it in analysing the results of the Survey and developing appropriate implementation plans.

## 7.5 The Research Function

### (i) Structure

The Centre's research management structure has shifted over time from a discipline-focussed structure to a multi-disciplinary programme/project-focussed structure. Cognizant of the need for quality control at the discipline level, however, WARDA has also instituted disciplinary "Groups" (discussed elsewhere) that cut across the formal programme/project structure outlined above.

The four research programmes discussed in Chapter 3 are each managed by a Programme Leader - a Senior Scientist - and within each programme there are a number of projects - each of which is headed by a Project Coordinator who is also typically a senior scientist. Projects, in turn, are comprised of clearly identified Activities each of which has budgetary resources allocated to it, and concomitant milestones and clearly identified outcomes.

### (ii) Management

The issue of priority setting as between competing claims on the limited budget in WARDA is discussed briefly in Chapter 6 in the context of the Board's role. Within the Programmes function itself, the Panel commends the efforts being made to strengthen the priority-setting processes and document the results thereof. One good example of this initiative relates to a study of the yield constraints within each major rice-growing environment. With estimates of the potential impact of those constraints on rice production in West Africa, WARDA then seeks to link its research priorities, and funding, to the results of that impact-ranking process.

The planning, budgeting, and control of these set of programmes, projects and activities is undertaken by the project scientist who prepares a bi-monthly report for the Project Coordinator<sup>1</sup> that summarizes progress against an agreed plan, and compares budgetary resource utilization against actual expenditures. The many projects and activities carry with them an overhead administrative burden, since each activity has to be documented, budgeted and reported on as noted above. Elsewhere in this report the Panel is recommending that the number of projects (and therefore, activities) be reduced substantially to generate fewer groupings, and from a management perspective, the same conclusion is reached: combining activities into larger groupings would provide project scientists with greater flexibility to move funds within a work programme and also reduce the administrative overhead burden on the manager's time.

The management processes being introduced are conceptually sound, and essential to the development of a well balanced, and appropriately prioritized research programme within WARDA. The Panel notes that it will take some time and experimentation to achieve the right balance in terms of the need for, and the cost effectiveness of, these

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<sup>1</sup> ...and from the Project Coordinator to the Programme Leader, then to the Programme Management Committee (Programme Planning, Monitoring Process at WARDA, draft document, Nov. '99).

research management tools. It nevertheless commends management for taking this initiative.

As the Panel reviewed the Centre's work, it utilized the various Centre-Commissioned External Reviews (CCERs) and other review papers prepared at the Centre's initiative. The Panel found the programme-related CCERs to be very valuable descriptive pieces, but noted that they did not adequately address quality and relevance of science, and the resource implications of the recommendations being made by the authors. The CCER on Financial Management and Control is discussed below.

The senior scientific and non-scientific core staff complement has ranged from 17 in 1996 to as high as 23 in '97 and '98. Currently at 21, the annual turnover rate among this staff group during the past 4 years has ranged from a high of 25% (in 1996) to a normal 16% in 1999. The Panel, however, noted that a substantial number of vacancies at scientific staff level remain vacant, with some for a year or longer. Given the limited number of scientists in some programmes/projects, the Panel is concerned about adverse impact on research programmes. This would also adversely impact WARDA's institutional memory and its 'critical mass' to carry out research efficiently. WARDA is vulnerable to the loss of even one senior staff member because of its broad, but shallow coverage of scientific disciplines. A concomitant problem is that it becomes more difficult to match scientific competencies with required expertise when the depth, by science discipline, is not there. The Panel has commented on this issue in a number of places earlier in the report.

The inherent vagaries of CGIAR funding mechanisms (e.g., the two-year lag in EU funding), coupled with WARDA's generally difficult financial position in past years, make some measure of 'vacancy management' at the Centre inevitable. Nevertheless, in WARDA's case the lack of depth in scientific staff - particularly in those projects where the expertise in some disciplines is only one person deep - the effect of a vacancy can mean the loss of leadership, a scaling-down, the delay, or even the elimination of that project from the Centre's work programme. The Panel fully recognizes that WARDA's science is also highly leveraged through the use of Associate Principal Staff<sup>2</sup>, and the scientists located in Task Forces, and other regional research units. The leadership of the research effort, however, remains at WARDA and is therefore vulnerable to the lack of depth. Training is one example where the position of Training Coordinator has been vacant now for over two years, although recruitment is now taking place.

### **Recommendation**

**The Panel recommends that WARDA fills vacant positions within the shortest time possible in order to ensure efficiency of programme implementation.**

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<sup>2</sup> In 1997, WARDA established this international staff category to utilize available qualified scientists from the region.

## 7.6 The Administration and Finance Function

### (i) Administration

In the past two years, a major initiative to clarify and document current administrative policies and procedures for the benefit of staff and to ensure consistency of application has been undertaken. Many procedures and policies have been developed and approved by the EMC (and where appropriate, by the BoT) and published. Through the Staff Survey, however, the Panel found, that although staff are aware of WARDA policies and procedures and work rules, communication between Senior Management and staff is still inadequate. The survey shows that staff feel that they are not adequately involved or consulted in the process of policy formulation and change. The Panel believes that by adopting a more open and consultative approach to the formulation of policies, procedures and work rules, Management will reap higher levels of trust from staff. This will boost morale and contribute to a healthier work environment, especially since staff are already highly committed to their work.

WARDA's field station operations are also managed by A & F and scientific staff had few complaints relating to the management thereof, except in respect of the availability of accurate, and timely information on actual-vs-budgeted expenditures—a problem discussed elsewhere in this report.

### (ii) Human Resources Management

The human resource management function, which did not exist until mid-1997, when a HRO was recruited at the IRS level, is being strengthened with the addition of a locally-recruited senior GSS specialist so as to handle all scientific and non-scientific staff in WARDA. Nevertheless as clearly demonstrated by the results of the Staff Survey, not all staff are happy with the performance of the HR function at WARDA at this time. The Panel believes that the initiatives to be taken in respect of the Survey results should address the perceived problems – and progress in this respect will be measured in subsequent surveys.

### *Gender*

A review of WARDA's successes on gender related activities has produced mixed results. On the one hand, a review of the training course participants, by gender, appears to suggest a retrograde move in respect of training women—the acknowledged primary field worker in West Africa. On the other hand, its success in attracting female doctoral, post-doctoral, and other students appears to be good. Table 7.2 overleaf refers.

In the recruitment of female senior scientific staff, WARDA has had limited success. The Panel notes, however, that WARDA has taken many initiatives to encourage female candidates to apply for jobs at WARDA over the past three years. Several have been interviewed and offered positions, but the candidates have subsequently declined the offer made. The Panel nevertheless concludes that WARDA is making every effort to

recruit eligible female staff at all levels within the organization within the bounds of the geographic and spouse employment constraints typically faced by CGIAR Centres. WARDA itself has extended employment opportunities to two spouses recently.

**Table 7.2 – Percent Female Participants/Candidates in WARDA Activities, by Year**

Year	Training Courses at WARDA	Of which % Female Attendees	Students/ PhD/ etc. assigned to WARDA	Of which % Female Appointees
1993	5	11.8	97	20.0
1994	8	11.4	140	10.0
1995	4	2.8	69	7.7
1996	2	4.0	24	25.0
1997	8	18.4	71	50.0
1998	4	5.6	67	23.1
1999	2	7.6	73	30.0

**(iii) Finance**

WARDA's research activities since its inception have been noteworthy, yet restricted by the lack of funding - particularly from its member countries. As noted in Chapter 6 above, the cumulative deficit in funding from its members since 1990 (when such indebtedness was last forgiven) now approaches US\$3.7 million and this funding deficit has impacted WARDA's ability to carry out its mandate and build even a minimum financial reserve of at least 30 days' working capital. (The CGIAR-suggested minimum is 90 days' working capital). Further, as shown in Table 7.3, WARDA has also had difficulty in matching its operating expenses to its operating revenues - particularly in 1995, 1996, and 1997 the result of which was an increasing shortfall in operating reserves by the end of 1998 that had to be corrected by substantial cost-cutting actions in 1999 and that also required access to a commercial bridging facility, and some temporary funding support from the CGIAR System.

The funding shortfall impacted directly on the level of research expenditures, and indirectly on staff morale. The 1999 total core operations expenditures were some 20% below that of 1997. Savings were achieved by leaving vacant scientific posts unfilled, often for considerable periods of time as noted above.

As a result, however, WARDA now has a funding strategy to build its reserves, and retire its credit line. It has implemented new financial controls, updated personnel policies and procedures, and formally documented many operational procedures (although the

Accounting Manual - a key document - is still not completed). The Panel commends this initiative and is cognizant of the magnitude of the task involved.

The Centre's computerized accounting system (a SUN System) is a powerful system designed for complex organizations. The problem for WARDA, as for some other Centres using SUN Systems, is that the SUN System requires a substantial investment in higher level systems and programming skills in order to avail of its complex, but extensive flexibility and built-in capabilities. WARDA does not have these skills and relies instead on personnel from other Centres with similar SUN installations. Some in-house capability, at the appropriate level of expertise, will be necessary for about two years to bring this system up to its capabilities and to provide staff with timely, accurate information.

The recently-appointed Internal Auditor (who reports directly to the DG) has reviewed a number of the Centre's activities and made various recommendations for improvements: some pertain to the hiring and payment of local field labour (a perennial problem for CGIAR Centres) and some recommendations impact on the control over fixed assets. The Internal Audit function appears to be working as intended and is of appropriate caliber.

With respect to the external audit function, the Panel was also pleased to note that there were no substantive outstanding issues raised in the most recent (1998) Management Letter to the Board. A Panel member met separately with the External Auditor and obtained assurances that, in his view as the External Auditor, WARDA was appropriately managed and in compliance with all relevant standards. The Board Chair has confirmed that WARDA expects to review its External Auditors within the next year - the current firm having served WARDA now for 7 years. The Panel commends management's efforts to eliminate a long list of audit recommendations made over a number of years.

In respect of timely, accurate, and meaningful financial information a succession of studies, beginning with the Gormbley report in 1996 and now including a recently-completed CCER of the A & F complex have all concluded that the improvements being implemented by WARDA should "in the near future" provide an adequate flow of management information at the Centre. Although some progress has been made, full implementation is still some ways off. The Panel notes that scientists still must rely on their own informal records to control expenditures - particularly close to the end of the year - as they do not yet have a set of reliable and timely reports from A&F that enables them to see at a glance how they are doing in relation to the approved budget.

Management's response to the latest A & F CCER recommendations give little comfort that a time-bound programme of actions will bring closure to the on-going difficulties. The Panel strongly suggests that the BoT ask for a definitive Programme of Action, with completion dates, and closely monitor progress against this agreed timetable. The Panel is also concerned that, in trying to save administrative costs, WARDA may have under-resourced its administrative and financial competencies to such an extent that there will continue to be difficulties in bringing closure to the planned improvements and therefore to provide an acceptable level of service.

**Table 7.3 - WARDA Funding Levels and Balances (\$000)**

	ACTUALS									ESTIMATED
	90	91	92	93	94	95	96	97	98	1999
<b>A. OPERATING FUND</b>										
Balance b/f	662	405	989	1,170	1,346	1,314	551	78	(718)	(859)
Total Income	6,607	6,732	7,532	7,967	7,067	8,737	9,951	9,898	9,437	9,514
Total Expenditures	6,864	6,148	7,351	7,791	7,099	9,500	10,424	10,694	9,578	8,532
Closing Balance	405	989	1,170	1,346	1,314	551	78	(718)	(859)	123
<b>B. CAPITAL FUNDS</b>										
Balance b/f	10	1,474	(2,548)	(3,949)	(2,795)	(1,635)	(66)	(180)	786	284
Total Income	3,455	4,128	2,447	1,760	2,304	2,831	1,009	1,856	583	1,088
Total Expenditure	1,991	8,150	3,848	606	1,144	1,262	1,123	890	1,085	1,462
Closing Balance	1,474	(2,548)	(3,949)	(2,795)	(1,635)	(66)	(180)	786	284	(90)
<b>MEMO ITEM</b>										
Unrestricted Funding of Total Operating Income	75%	77%	66%	59%	51%	52%	54%	54%	67%	75%

## 7.7 Conclusions

Much has been accomplished over the past few years. Difficult decisions had to be made - and were made - to ensure that WARDA continued to be a scientific force in the region. There were some adverse consequences for the staff of those decisions and yet staff have remained loyal and committed to the institution's success. There are now clear opportunities for WARDA to move ahead and the Panel commends management for moving quickly to implement the necessary changes in human resource management, in financial planning and controls, and in setting priorities for the research programme over the coming months and years.

## CHAPTER 8 - THE FUTURE OF WARDA

The demand for rice continues to grow in WCA and increasing productivity and reducing the cost of producing and accessing rice will have tremendous positive impact on poverty and food security. WARDA should continue to give top priority to achieving such impact. Since the last EPMR WARDA's standing among rice oriented Centres has improved considerably. And today WARDA does have the capacity to play a significant role in WCA rice sector. In order to position itself better for this role, WARDA has to continually assess and monitor the rice policy environment in WCA as this impacts on rice production and consumption. WARDA should use its COM more effectively for policy intervention.

The Panel deliberated on the future of WARDA and agreed that the Centre's core competences should form the basis on which to review any future scenarios and/or options. These are mainly in two areas. Genetic enhancement and crop management of rainfed and irrigated rice in particular is WARDA's core competence. In addition, WARDA's effective partnership with NARS of WCA is also core. The Panel believes that WARDA, as a priority, should consolidate its successes within the WCA region, utilizing these strengths. WARDA (including the Board) has also been examining the desirability and feasibility of expanding its geographical area of mandate, building on INGER-Africa and the Task Force approach to work in ECSA regions. WARDA and IRRI continue to consult on this issue.

The Panel commends WARDA for giving priority to preparing their ten-year (2001-2010) strategy. In this Chapter, the Panel offers a number of potential new directions or options that WARDA can explore as it prepares its strategy, and looks into its future. Most of these options are compatible so that any combination of these can be explored.

### 8.1 Consolidating Successes

WARDA's operational budget has doubled since the Third EPMR. WARDA's core contributions have increased substantially. This reflects donor confidence in WARDA's work and management. Also Member State contributions are steadily increasing. It is doubtful, however, that its budget will continue to grow at the same pace. Given this scenario, the most logical way forward for WARDA is to consolidate its hard won successes with rainfed and irrigated rice development. This would imply giving continued top priority to the rainfed and irrigated rice programmes and in this regard boosting research on crop and natural resources management, and investing more into the Task Force type research and diffusion of technologies and knowledge.

In order to consolidate its achievements, WARDA needs to invest more in rounding out its knowledge gaps and building more complete competence on rice research and development. This process could start by seeking greater understanding on key sectoral issues around rice development. Sector analyses at national and regional levels expose leverage points for development in a wider range of areas: technology, markets, trade policies, R&D institutions as well as private sector seed and fertilizer,

and other aspects of the input delivery system. Even long term issues of human resources development and capacity building should be assessed through sector studies, so as to position nations and the region for long term development.

## **8.2 Expanding Activities to ECSA**

This is a scenario that the Centre and its Board are considering in consultation with IRRI and Sub-Regional Offices. This, of course, assumes availability of resources for such expansion. The Panel suggests that WARDA and IRRI develop a joint strategy for ECSA; and by exploiting their strengths and comparative advantages in a coalition, should be more effective in promoting rice development in the region. WARDA is already succeeding with INGER-Africa, in availing NARS in ECSA with genetic material, and would bring this strength into the partnership. It would still be necessary, however, to identify a cost-effective approach to carrying out Task-Force type research in ECSA. Whilst the regional research associations (ASARECA and SACCAR in eastern and southern Africa respectively) do not have effective operational research structures, it is feasible to craft mechanisms under or with these regional associations. This would mean that WARDA/IRRI would not have to be directly responsible for investing into building the structures, or coordinating them. The regional bodies would also be directly responsible for building the political capital and would have to act as necessary for the arrangement to work as successfully as it has in WCA. Building partnerships in ECSA will not necessarily be the same as WARDA's experience in WCA. In summary, expanding activities to ECSA will require caution and informed judgement into building partnerships.

## **8.3 Placing Greater Priority on Sustainability and Ecosystems Development**

Natural Resources Management requires greater attention at WARDA because gains in rice production will be of short duration if the environment and natural resources are not taken into account. This is mainly so because the physical, biological, economic and social environment change slowly but significantly, partly due to rice production itself and partly due to other causes. Sustainable development of rice production requires explicit attention to a range of aspects of the crops, cultivation practices, the people and the environment. Of particular interest are situations where rice production induces changes in the environment.

It is generally agreed that to achieve sustainable crop production, this requires high but stable yields, high income, a resource fit with household capabilities and needs, and conservation of natural resources. WARDA's mission, the promotion of rice production in WCA invites, therefore, attention to all of these aspects at household, community, and national levels. WARDA has given attention in its programmes to some of these aspects, and clearly has not in others. Of each of the five aspects of sustainability of production systems (Table 8.1), the Panel distinguishes 'depth' (degree of scientific depth to which issues are being explored) and 'scope' (coverage of crucial issues). The line 'entire picture' indicates the low degree to which the five components are integrated at household or policy level.

**Table 8.1 Coverage in WARDA's Programmes of Aspects of Sustainable Production Systems**

Aspect	Irrigated		Rainfed	
	Depth scope		Depth scope	
Crop yields	xx	xx	xxx	xx
Yield stability	x	x	xx	x
Natural resource conservation	xx	x	x	x
Household income	x	-	x	x
Social acceptability	x	x	x	x
Entire picture	-	-	-	-

Legend: -: hardly any; x: some; xx: quite a bit; xxx: to a large extent.

The Panel suggests that WARDA explores to what extent households, communities and governments in the Sahel and the region could improve the conditions for sustainable rice production. Conclusions should be presented to the stakeholders, including the Council of Ministers. The issue of natural resource conservation merits particular attention, as it is of interest to both private and public sectors. Without effective land tenure security, exploitation of natural resources leads to more 'tragedies of the commons', particularly when the population pressure increases. It is the role of governments to develop appropriate land tenure policies that promote natural resources conservation, particularly under common property management regimes such as inland valleys.

In order to guide development of research at WARDA and among its partners towards sustainable development of rice production in West Africa, WARDA should develop and publish an overall picture, and analyses of bottlenecks to sustainable development.

More explicit attention to NRM issues in WARDA's mainstream programmes also offers the research opportunity to address diversification issues, particularly on inland valleys, where NRM issues are important, at the same time households and communities utilize these inland valleys for an array of cropping and livestock activities. The Panel believes that mainstreaming issues of intensification and diversification on inland valley development offers greater scope for research and implementation.

#### **8.4 Strengthening Capacity in Biotechnology**

WARDA is already using many of the tools of modern biotechnology: tissue culture, immunological diagnostic tools, gene marker assisted breeding against biotic and abiotic stresses, characterization of fungal and viral strains using molecular markers. These tools are cost-effective means to improve the efficiency of breeding and assess progress in crop improvement. Any leading crop improvement institute values

access to the use of these modern technologies. Although WARDA has been instrumental in the setting of biosafety guidelines in Côte d'Ivoire, and has provided leadership in this area in West Africa, genetic engineering is presently not being undertaken at WARDA. If it were, it would divert scarce core resources away from its approved research programme and would probably not be able to reach critical mass. WARDA does, however, need to track scientific progress in this promising area and develop partnership with ARIs including the private sector, where it sees opportunities, always respecting its mandate and mission. WARDA recognizes this and is already collaborating with Cornell University, the Institut de recherche pour le développement (IRD), and John Innes Institute. WARDA should continue its collaboration with these institutions including IIRI. WARDA needs to continue assessing the potentials for its regional mandate and reviewing the resource costs and scientific trade-offs which are involved.

### **8.5 Capitalizing on the Regions's Improving Policy Environment for Quick Impact**

In WCA, market reforms have generally provided a policy environment that offers greater scope for both local production and trade. Although this varies from country to country, the Panel believes that current developments in Mali, Senegal, Guinea, Ghana and Côte d'Ivoire demonstrate the various opportunities available. Nigeria is also an interesting case due to recent developments in that country.

Nigeria already produces half of the rice in West and Central Africa and one-third of the rice in Sub-Saharan Africa. Nigeria's rapidly improving policy and institutional environment offers opportunities for vast rice production potential in that country where there is rapidly growing effective demand for rice. There are seven large irrigated basins in northern Nigeria established after the oil boom in the seventies and producing mainly wheat and rice. The comparative advantage of these irrigation schemes is now definitely shifting towards rice. In the new political climate, agriculture is centre-stage in Nigeria's economic recovery and development programme.

The Panel therefore suggests that WARDA, in collaboration with its partners, positions itself to provide more strategic support to the growing rice sector of the region. This can be achieved by first commissioning rice sector studies for a number of major producing countries, as a basis on which to determine critical points of intervention.

### **8.6 Utilization of Scientific Resources Available in WCA**

A closer examination of WARDA's partnership with NARS shows that this is largely with NARIs. Although this is the key partner and logical start point, the Panel believes that Universities and other research institutions are a vast intellectual and skill reservoir that is being under-utilized, particularly in the Task Forces and research consortia. WARDA currently utilizes university visiting scientists, and supports thesis work for students working on rice. WARDA has had this issue on their agenda and are planning a WARDA/Agricultural University platform. The challenge, however, is going beyond these initial steps and deliberately surveying the universities for scientific

competence. It is feasible, through contracts to teams or individuals, or competitive grants aimed at strategic type research, to harness local scientific expertise to a greater degree. Experience with Task Forces demonstrates that these scientists can be hired or contracted at much lower cost than scientists from more developed regions. Such expertise exists in faculties of agriculture, science, economics, engineering and so on.

### **8.7 Accommodating Transient Research Issues**

Given the array of researchable problems on rice, and given the normal tendency of new issues to emerge, WARDA needs to utilize its limited time and resources carefully in dealing with such new issues. It may be wise to resist the tendency to expand existing programmes just to accommodate new issues. Quite often, it suffices to allocate a limited amount of time and funds on a project basis to examine an issue, and once sufficient knowledge has been gathered to understand implications, close the project, utilize research results in the existing programme, and identify a new issue that warrants similar attention. This principle may be applied for instance at serially examining impact-related issues (health, nutrition/food security, and say land tenure for NARS and so on).

The Panel suggests that WARDA develops an exit strategy for any project-based research on a transient issue, and any issue which is not core to its research programme.

### **8.8 Conclusions**

WARDA has contributed immensely to recent achievements in rice production in WCA. At the threshold of an unfolding rice production revolution, WARDA needs to build on and rely on its strengths. Resources will continue to be limited, and WARDA needs to do more work for the same or smaller budget. This can be achieved by continued effective partnerships, particularly in the region. If indeed the rice production revolution unfolds in the foreseeable future, WARDA needs to anticipate the sustainability issues that such production revolutions bring. And if WARDA is to do more in the rest of Africa, this should not be at the expense of WCA nor by diluting current strengths. Moreover, if WARDA takes its scientific leadership to ECSA, this should be on the principle that governments, national and regional research systems in those regions make requisite investments in institutional structures and modalities that would save on WARDA's resources and energies. Rice research in ECSA is not as established as in WCA and NARS in ECSA would have to demonstrate a convincing demand for WARDA's services before a proactive move by WARDA. Meanwhile, more can be achieved by strengthening INGER-Africa. WARDA is best positioned to push hard for a rice-based green revolution in WCA. The Panel urges WARDA to maintain focus on the impact of its work on people's lives – by putting more rice on the tables of poor and hungry people, and by putting more money into their pockets.

## ACKNOWLEDGEMENTS

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The Centre made good preparation for the review, culminating in a smooth operation during the production of the report. We commend the arrangements made for the Panel to conduct field visits to some of the WARDA Member States, particularly Nigeria, Ghana, Senegal, Guinea and Côte d'Ivoire. These visits enabled the Panel to listen to farmers, extension workers and policy makers. The WARDA staff who accompanied the Panel Members to these visits deserve our acknowledgement.

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## APPENDIX I

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Studies on breeding procedures (rapid generation advance, etc.); identification of Wide-Compatibility Gene for hybrid sterility in rice; Administration on genetic resources at a central institute in Japan; FAO Short-term Consultant, 1990-1993, for Asia and Latin America; FAO-UNDP Review Panel for Hybrid Rice Project in India, 1995 and 1997.

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**Education:** Agricultural Engineer, K.U.Leuven (1967), M.A. Economics, Michigan State University (1971), Ph.D. Agricultural Economics, Michigan State University (1975)

**Expertise:** Agricultural Economics, Agricultural Marketing, African Agricultural Research

**Experience:** 1971-1977: Professor of Agricultural Economics, Université Lovanium and Université Nationale du Zaïre (1971-1973: Kinshasa; 1973-1977: Yangambi); 1977-1979: Professor of Agricultural Economics, K.U.Leuven; 1979-1983: Administrator, Commission of the European Communities, Luxemburg; Since 1983: Professor of Agricultural Economics and Head of the Department, K.U.Leuven; Since 1985: Vice-president of the NGO ACT, Brussels; 1988-1991: Consultant CGIAR Task Force on Sub-Saharan Africa (maize and cassava); 1989-1990: Member IITA External Program Review; Since 1990: Associated Member of the Royal Academy of Overseas Sciences, Brussels; 1990-1995: Member European Scientific Advisory Committee, IFPRI; 1995-1999: CGIAR-EU liaison; 1995-1997: Vice-president and Treasurer, NATURA; Since 1997: Member IFAD External Research and Development Panel; Since 1997: Member of the Advisory Committee of CTA, Wageningen; 1998: Member of the External Evaluation Team of PSI-CORAF, Dakar; Since 1998: Member of the Jury, King Baudouin Prize for Development Cooperation, Brussels; Since 1998: Member of the IITA Board of Trustees; Since 1999: Member of the Scientific Committee of PRASAC, N'Djamena.

**Name:** TANNER, Marcel (Switzerland)

**Born:** 1952

**Position:** 1997-present: Director, Swiss Tropical Institute; 1997 onwards: Professor of Epidemiology and Medical Parasitology, University of Basel, Faculty of Science; 1996-present: Honorary Professor, University of Queensland Medical School.

**Expertise:** Zoology; human health – agriculture linkages.

**Education:** 1972-1976: University of Basel: Studies in Zoology, Botany, Chemistry, Medical Microbiology. 1977-1979: PhD thesis (*summa cum laude*) in Medical Zoology at Swiss Tropical Institute (STI).

**Experience:** Currently: Director, Swiss Tropical Institute; 1993 to present: Professor of Epidemiology and Medical Parasitology, University of Basel; Since 1996: Honorary Professor, University of Queensland Medical School; Since 1997: Founder Member, Board of Trustees, Ifakara Health Research and Development Centre; 1992 to present: Principal Co-Investigator Malaria Vaccine Programme in Tanzania; In addition he is Member of: The Editorial Board "European Journal of Tropical Medicine & International Health"; The Advisory Editorial Board "Parasitology Today"; The Editorial Board "Parasitology International"; The Joint Research Co-ordination Board, PR-Chinese Government and WHO/TDR; Since 1994: Chairman Scientific Advisory Board for the Research Focus on Tropical Medicine, University of Heidelberg, Germany; Since 1998: Chairman Commission of Swiss Academy of Natural Sciences "Centre Suisse de Recherches Scientifique" Adiopodoumé, Ivory Coast, (Board member of same commission since 1996); 1998 to present: Member, Board of Directors INCLLEN (International Clinical Epidemiological Network).

**TERMS OF REFERENCE**  
**FOR EXTERNAL PROGRAMME AND MANAGEMENT REVIEWS**  
**OF CGIAR CENTRES**

**BACKGROUND**

**Context**

1. The Consultative Group on International Agricultural Research (CGIAR) is an informal association of over 50 members that supports a network of 16 international research centres in agriculture, forestry and fisheries. The CGIAR aims, through its support to the Centres, to contribute to promoting sustainable agriculture for food security in developing countries. Because the Centres constitute the core of the CGIAR, the effectiveness of each Centre is crucial to the continued success of the CGIAR (as a System).

2. Each Centre is an autonomous institution operating within the mandate assigned to it by the CGIAR, and is governed by a legally constituted Board that has full fiduciary responsibility for managing the Centre. To ensure accountability in an essentially decentralized system, each Centre is expected to be responsive to the CGIAR, which provides financial support for its work.

3. The CGIAR has established a tradition of External Programme and Management Reviews (EPMRs) to provide a mechanism of transparency and accountability to the Members and other stakeholders of the CGIAR System. EPMRs are the joint responsibility of TAC and the CGIAR Secretariat, and are conducted for each Centre approximately every five years. As each Centre is autonomous, EPMRs provide a measure of central oversight and serve as an essential component of the CGIAR's accountability system.

**Integrated System of Reviews of Each Centre**

4. Besides the EPMRs, Centre Commissioned External Reviews (CCERs) are undertaken at each Centre. These CCERs are commissioned by the Centre Boards to periodically assess the quality and effectiveness of particular aspects of a Centre's work. The terms of reference (TORs) for each CCER are determined by the Centre, based on broad principles endorsed by the CGIAR at ICW95 (ref. document entitled *Improving the Quality and Consistency of CGIAR's External Centre Reviews*, dated October 24, 1995).

5. EPMRs complement the CCERs by providing a CGIAR-commissioned and comprehensive external assessment of the Centre's programme and management, especially its future directions and the quality and relevance of its research. The TORs for the EPMRs (which update the "standard TORs" endorsed by the CGIAR at MTM95) are provided below. Guidelines for undertaking the reviews are issued separately.

## TERMS OF REFERENCE

### Objectives and Scope

6. EPMRs seek to inform CGIAR members that their investment is sound, or recommend measures to make it so. Members of the CGIAR and other stakeholders can be informed whether the Centre is doing its work effectively and efficiently. EPMRs are both retrospective and prospective; and help ensure the Centres' excellence, relevance and continued viability, and the CGIAR System's coherence. Each review is expected to be strategic in orientation and as comprehensive as the situation warrants.

7. The broad objectives of EPMRs are to: a) provide CGIAR members with an independent and rigorous assessment of the institutional health and contribution of a Centre they are supporting; and b) to provide the Centre and its collaborators with assessment information that complements or validates their own evaluation efforts, including the CCERs.

8. The EPMR panel is specifically charged to assess the following:

- a. The Centre 's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;
- b. The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Centre's completed and ongoing research;
- c. The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and
- d. The accomplishments and impact of the Centre's research and related activities.

9. The topics expected to be covered by the EPMRs are listed below.

## TOPICS TO BE COVERED

### A. Mission, Strategy and Priorities

- The continuing appropriateness of the Centre's mission in light of important changes in the Centre and its external environment since the previous external review.
- The policies, strategies, and priorities of the Centre, their coherence with the CGIAR's goals (of poverty alleviation, natural resources management, and sustainable food security), and relevance to beneficiaries, especially rural women.
- The appropriateness of the roles of relevant partners in the formulation and implementation of the Centre's strategy and priorities, considering alternative sources of supply and the benefits of partnerships with others.

### B. Quality and Relevance

- The quality and relevance of the science practised at the Centre.
- The effectiveness of the Centre's processes for planning, priority setting, quality management (e.g., CCERs, peer reviews and other quality and relevance assurance mechanisms), and impact assessment.

### C. Effectiveness and Efficiency of Management

- The performance of the Centre's Board in governing the Centre, the effectiveness of leadership throughout the Centre, and the suitability of the organization's culture to its mission.
- The adequacy of the Centre's organizational structure and the mechanisms in place to manage, coordinate and ensure the excellence of the research programmes and related activities.
- The adequacy of resources (financial, human, physical and information) available and the effectiveness and efficiency of their management.
- The effectiveness of the Centre's relationships with relevant research partners and other stakeholders of the CGIAR System.

### D. Accomplishments and Impact

- Recent achievements of the Centre in research and other areas.
- The effectiveness of the Centre's programmes in terms of their impact and contribution to the achievement of the mission and goals of the CGIAR.

## WARDA's RESPONSES TO THE THIRD EPMR

## Evaluation of WARDA's Progress in Implementing the Recommendations of the 1993 External Programmes and Management Review (EPMR)

Recommendations	Implementation	WARDA's Comments	Panel's Comments
<p><i>Recommendation 2.1</i> - The panel recommends that WARDA take further steps to obtain the cooperation of other institutions such as IFPRI in undertaking research on the effects of markets, infrastructure, and government policies on the adoption of improved technology by rice farmers.</p>	<p>Partial</p>	<p>The AfDB provided WARDA the opportunity to initiate its own policy work through a study of the economic competitiveness of rice production systems in West Africa, initiated in 1994. Since that work was undertaken by a contractor, no collaboration with IFPRI was initiated at that time. When WARDA internalized the policy research in 1996, WARDA and IFPRI agreed that the position of policy economist would be a shared appointment in the sense that the WARDA researcher would spend 2 months per year at IFPRI in Washington. This was never implemented, however. Effective collaboration never successfully evolved with IFPRI (we note, in particular, that WARDA was approached as a non-participating partner in IFPRI-led projects on rice marketing reform in West Africa only well after the research was initiated). However, in 1998 some promising new dialogue was initiated again between WARDA and IFPRI about joint appointment of a post-doc and future collaboration: WARDA has joined IFPRI's 2020 Network and a possibility of a joint IFPRI-WARDA appointment at WARDA headquarters has been discussed. In 1999 dialogue with IFPRI has been reactivated through intensive exchange of view and ideas with the regional co-ordinator for the 2020 Vision based in Accra. Potential areas of collaboration have been exhaustively reviewed; it has been agreed upon to develop a joint research on the emergence of a regional market for cereals, where WARDA will take the lead for the rice component. Concurrently WARDA has also been identified as one potential source of expertise to backstop the activities of the 2020 Vision Regional Network for West and Central Africa. Further strengthening of the inter-centre collaboration such as out-posting of IFPRI researcher at WARDA would be considered once the joint activities have been initiated.</p> <p>WARDA's policy research programme has become closely associated with the Economic Development Institute of the World Bank and USAID, using their policy analysis capacity-building activities as a platform for active collaboration with national policy analysis units. This work has been highly successful and policy training has been conducted in Mauritania, Senegal, Côte d'Ivoire and Mali.</p>	<p><i>2.1</i> Although the Panel recognizes that there have been collaborative efforts with IFPRI, WARDA is encouraged to further pursue collaboration with IFPRI on a more formal basis, particularly in the framework of the 2020 Vision activities in West and Central Africa. More pro-active collaboration should be sought with Southern and Northern Universities partners, particularly through the Task Forces mechanism. Sufficient critical mass in the social sciences programme at WARDA remains an issue. The Panel commends WARDA for its leadership role in PAM training and networking in West Africa.</p>

\* Full/Partial/No

Recommendations	Implementation	WARDA's Comments	Panel's Comments
<p><b>Recommendation 2.2</b> – The panel recommends that donors enable WARDA to maintain at least a second core scientist position in the Sahel Programme.</p>	<p>Full</p>	<p>The recommendation of the panel in 1993 to maintain at least two core scientists positions in the Sahel Programme was adopted by WARDA. From 1991 to 1994, a breeder and a physiologist were based in Senegal and they worked on varietal improvement and understanding of varietal responses to climate and salinity. Since 1995, the physiologist was replaced by an agronomist because of the need to identify agronomic and socio-economic constraints and opportunities to irrigated rice cropping at the field level. Moreover, as sustainability of the irrigated systems in the Sahel was in doubt, more insight into soil degradation processes under irrigation in the Sahel was needed (i.e. salinity, alkalinity and soil fertility issues). Three postdoctoral fellows in agricultural economics worked in succession at the station since 1993 providing much needed support as far as socio-economic aspects of irrigated rice cropping are concerned. In 1997, the mandate area of the Sahel station was broadened to irrigated rice-based systems in West Africa as a whole. This new development reinforces the need to have at least two core scientists based in Senegal. We feel, however, that the ideal scenario would be to have three core scientists based in Senegal: one breeder, one agronomist and one economist.</p> <p>The first core scientist will remain a breeder, as varietal improvement remains of extreme importance. Major advances are expected from both <i>O. sativa</i> x <i>O. sativa</i> and <i>O. sativa</i> x <i>O. glaberrima</i> crosses as far as resistance to RYMV and salinity tolerance is concerned. WARDA intends to maintain an agronomist on the second core position. Further strategic research is needed on site-specific soil fertility management, plant-soil interactions governing nutrient efficiencies, integrated weed management strategies that minimize herbicide use in irrigated rice-based systems in West Africa, and prevention of soil degradation (alkalinization, sodication) in the Sahel. To have a larger impact, we will need to move up from field to scheme level. Technologies that have been developed need evaluation on a larger scale as part of WARDA's project 4.1 (Irrigated systems development and technology transfer). This requires a thorough understanding of the socio-economic context in which rice is grown. To provide continuity to socio-economic research at the station, WARDA would like to place an economist on a third core position in Ndiaye.</p> <p>Improving water productivity in a sustainable way at field, scheme and basin level is another important issue. We hope to work in this area through a post-doctoral fellow, with backstopping from IWMI/WARDA's water management expert in Mbé. An associate scientist to assist the breeder would be highly desirable as well.</p>	<p><i>2.2 The Panel concurs with WARDA's comments and agrees that the ideal scenario is to have three core scientists based in Senegal. Moreover, WARDA is encouraged to address sustainability issues in the irrigated Sahel programme.</i></p>

Recommendations	Implementation	WARDA's Comments	Panel's Comments
<p><b>Recommendation 2.3</b> – The panel recommends that WARDA explore with IWMI the possibility of a joint ecoregional initiative in the irrigated areas of the Sahel.</p>	Full	<p>WARDA and IWMI have explored possibilities to work together in West Africa as a whole, and not only in the Sahel. WARDA has signed a memorandum of understanding with IWMI to work jointly on improving water productivity in a sustainable way in rice-based systems in West Africa. This has resulted in the joint appointment of a water management scientist at WARDA's headquarters in Mbé (1998). This scientist will work on water management issues related to rice cropping in both rainfed and irrigated (areas) systems in West Africa. It is hoped that eventually a postdoctoral fellow on water management will be based in Senegal to address constraints and opportunities related to irrigated rice cropping in the Sahel, with backstopping from the Mbé IWMI/WARDA scientist.</p> <p>A more inclusive regional initiative involving WARDA, IWMI, WECARD/CORAF, NARS, CIRAD, CEMAGREF, IRD (ex ORSTOM) and PSI (Pole des Systèmes Irrigués) has been initiated. Discussion for creating a regional programme on water and the formulation of this programme are fairly advanced.</p> <p>IWMI has become a member of the Inland Valley Consortium (WARDA's project 4.3), and both institutions are actively involved in the Systemwide Initiative on water management (SWIM).</p>	<p><i>2.3 The Panel concurs with WARDA's comments.</i></p>
<p><b>Recommendation 2.4</b> – The Panel recommends that WARDA intensify its effort to mobilize complementary funding to maintain most of the present Mangrove Swamp Rice Network activities.</p>	Full	<p>WARDA is not a broker but helps to solicit complementary funds from donors to support its regional Task Force activities. WARDA, therefore, currently supports technology generation for the mangrove ecology in collaboration with the national programme of Sierra Leone (Rice Research Station, Rokupr) through the Special Mangrove Project (SMP). WARDA funds the SMP with Task Force (TF) funds to the tune of US 40,000 dollars per annum since 1994 to 1998; funding for 1999 was US 20,000 dollars due to reduced activities as a result of the civil war. But the situation is now returning to normal in that country and the funding level may increase to US\$60,000 per year for three years starting in 2000 if the EU grant to the Task Force mechanism is approved.</p> <p>The research themes in the SMP are varietal improvement, characterization of the mangrove environment and pest management. Small scale seed multiplication of promising/advanced breeding lines for distribution to farmers and development agents, is also carried out. Similar themes are covered by five other mangrove TF countries for which small research grants in the tune of US\$ 20,000 to 30,000 per annum. WARDA also supports monitoring tours to mangrove areas of countries participating in the mangrove TF every year to</p>	<p><i>2.4 The Panel concurs with WARDA's comments.</i></p>

Recommendations	Implementation	WARDA's Comments	Panel's Comments
		<p>assess progress and impact. WARDA also provides core funds to support few scientists in group training and visiting scientists fellowships to WARDA or NARS.</p> <p>WARDA, in collaboration with CORAF has already submitted a proposal to USAID, EU and other donors for funding of the new Regional Rice Network for West and Central Africa. The new network will operate on the model of TF, which includes the former mangrove TF, and will become operational in the year 2000.</p>	
<p><b>Recommendation 2.5</b> - Donors should enable WARDA to a. restore the position of trainer, and b. assist NARS to assume responsibility for conducting rice production related courses.</p>	<p>Partial</p>	<p>a.) Inadequate funding has not allowed the position of Trainer to be restored as a full-time staff. An IRS spent 50% of his time as Trainer until October 1997. Recruitment is now planned for the year 2000. In the meantime a consultant is filling this post in 1999. b.) WARDA has encouraged NARS to undertake courses related to rice production and has provided varying levels of support. Recent examples include experimental design and data analysis course and a rice production course in Guinea, and training at the St Louis station for courses to national staff from Senegal and Mauritania. For these courses, all related costs were paid by the NARES with only the technical aspects of the course provided by WARDA. For specialist courses such as for Participatory Varietal Selection, WARDA has invited participating NARES scientists to workshops dedicated to the subject.</p>	<p><i>2.5 The Panel suggests that WARDA consolidates and strengthens training programme, performs a training needs assessment in its mandate region, develops and implements a strategic training plan.</i></p>
<p><b>Recommendation 2.6</b> - INGER-Africa should be maintained as a unitary Network for the whole of Sub-Saharan Africa, sponsored and managed jointly by WARDA and IRRI. The new INGER should be so organized as to meet the specific requirements of WARDA and West African NARS; special arrangements should also be made for the ESCA countries if they so request. The ultimate location of INGER should be in WARDA; the timing of the move should be worked out as part of an overall package that will guarantee the Network's future stability and effectiveness.</p>	<p>Full</p>	<p>The present organisational structure of INGER-Africa is the result of the implementation of these recommendations. The INGER-Africa programme has been transferred from IITA to WARDA since April 1997. There is now one single unified INGER network for Africa since the transfer of INGER-Africa to WARDA. Before the transfer, two rice networks were operating in parallel: the Task Force germplasm exchange network covering 17 WARDA member countries and the INGER-Africa network covering the East, Central, southern (ECSA) and Western Africa. The unified INGER-Africa is operating using the West Africa Task Force germplasm exchange mechanism, which is more flexible and tailored to individual NARS needs. We, therefore, have departed from sending systematically uniform nurseries across countries. Also nurseries are dispatched only on request. But we have maintained a set of uniform nurseries for GxE analysis. This model was introduced by the Task Force members from the WARDA member countries.</p> <p>The transfer of INGER Africa to WARDA did not affect the flow of germplasm from INGER to ECSA. Since 1997, we have continuously sent nurseries on request to the Central African Republic, Congo Brazzaville, Congo RDC, Rwanda, Burundi, Uganda, Ethiopia, Kenya, Tanzania, Mozambique,</p>	<p><i>2.6 The Panel concurs with WARDA's comments.</i></p>

Recommendations	Implementation *	WARDA's Comments	Panel's Comments
		<p>Madagascar and Malawi. We use the same mechanism of germplasm exchange as in West Africa and the result is very encouraging. There is more interaction between scientists and NGOs from ECSA and WARDA. Some have visited WARDA on invitation to participate to our Task force meetings. WARDA has received and honoured requests for training/attachment for scientists from ECSA. The New INGER-Africa-DFID project will cover the region with Tanzania, Uganda and Mozambique being the target countries.</p> <p>One area where much improvement has not been achieved is the issue of joint management of INGER between IRRI and WARDA. Effort was made in 1995-96 to develop a joint INGER project. This project was submitted to several donors but no funding came through. Under this project the INGER coordinator, who should be an IRRI liaison scientist will be based and operate from WARDA Headquarters in Bouake, Cote d'Ivoire. However, WARDA has so far supported INGER Africa activities in Africa as a whole, from its core budget with no contribution from IRRI. The present INGER Africa coordinator is a WARDA scientist. The INGER-Africa coordinator should continue to be a WARDA scientist, even if financial support is received from donors for a regional network under the joint management of WARDA and IRRI.</p>	
<p><b>Recommendation 3.1</b> - The panel recommends that WARDA distribute its internal training effort more evenly between its international and local staff and that managers at all levels be made responsible for providing appropriate training opportunities to the staff reporting to them.</p>	<p>Partial</p>	<p>In recognition of the importance of General Support Staff (Staff) to the performance of the organisation, training efforts at WARDA has been increasingly placed on this group. Responsibility for identifying needs is devolved from the Deputy Directors General, Programme Leaders, heads of units and to research assistants. Identification of training needs is on-going, but these are also identified at the annual staff performance review. Training is monitored by the head of the Training Unit and the Personnel Officer. Recent examples of formal training include: Research Assistant from GIS laboratory being posted to France for training, Research Analyst being given leave to take a post graduate diploma in Senegal and Field Observers been given a short course in field research methods. In addition there is on-going informal training for junior GSS staff on topics such as computer use, data entry and pest identification. At programme level, scientists and senior GSS staff attended a short course on "Systems Analysis and Simulation" to support the shift to a "systems approach" to research for varietal development and crop and resource management.</p>	<p><i>3.1 The Panel concurs with WARDA's comments.</i></p>
<p><b>Recommendation 3.2</b> -The Panel recommends that WARDA make systematic efforts to recruit qualified women, especially for senior positions.</p>	<p>Partial</p>	<p>In its recruitment process, WARDA has made a concerted effort to attract female candidates. For the 13 internationally recruited positions filled during the period 1996-1999, thirteen women were short listed and invited for interview. Eight were actually interviewed, and 4 were offered positions, but 3 declined the offer, and one was recruited. However, the female IRS left in</p>	<p><i>3.2 The Panel concurs with WARDA's comments</i></p>

Recommendations	Implementation*	WARDA's Comments	Panel's Comments																																								
		<p>1997 due to health reasons.</p> <p>A female PDF, initially offered part-time spouse employment was eventually offered a joint IRS appointment with her husband. She declined and has joined another sister center in 1999, which had offered her a full IRS position. This year, a female Junior Professional Officer from the UK has joined WARDA for 1 year. A female post doctoral fellow will be joining in October. This year WARDA recruited two female senior GSS staff at the managerial level, one as the Internal Auditor and the other as Personnel Officer for GSS staff. In our recruitment drive, concerted efforts were made to identify and shortlist qualified candidates for senior positions.</p> <p>WARDA Management recognizes the advantages in recruiting qualified women especially for senior positions. WARDA also recognizes the need to include diversity in its recruitment programme. It recognizes the need to create an enabling environment, which will be conducive to women applications. Towards this end, WARDA has incorporated into its personnel policies, specific guidelines in support of women and gender diversity issues. Additionally, a Gender Task Force has been set up to address specific gender issues, to make the workplace not only conducive to women colleagues but will be attractive to qualified women. It is worth noting that WARDA's Board of Trustees, compared to other Centers, has one of the highest numbers of women represented on its Board. The Board of Trustees in concert with WARDA Management has taken affirmative steps to attract qualified women in its senior positions. This is an ongoing process.</p>																																									
<p><b>Recommendation 4.1</b> - TAC, the CGIAR and the donor community in general should reaffirm their support for WARDA, and their determination to keep it going as a viable international center. Sympathetic consideration should be given to the specific recommendations in this report which would lead to strengthened support for WARDA programs.</p>	Full	<p>The following table summarizes the CGIAR contributions to WARDA since 1994. From the table it can be seen that the donor community has reaffirmed their support to WARDA. The increase in funding in 1999 and the projected funding support in year 2000 reflects an increase in donor confidence in WARDA's work and Management. This reaffirmation of support is substantially in recognition of WARDA's significant contribution to rice research and the impact of its work in West and Central Africa. The increasing trend of donor support will enable WARDA to implement its MTP 2000 to 2002 in full.</p> <table data-bbox="718 1250 1493 1421"> <thead> <tr> <th></th> <th colspan="7">Projected (in US\$000s)</th> </tr> <tr> <th></th> <th>1994</th> <th>1995</th> <th>1996</th> <th>1997</th> <th>1998</th> <th>1999</th> <th>2000</th> </tr> </thead> <tbody> <tr> <td>Core</td> <td>3.597</td> <td>4.528</td> <td>5.420</td> <td>5.386</td> <td>6.624</td> <td>6.200</td> <td>6.100</td> </tr> <tr> <td>Restricted core</td> <td>3.267</td> <td>4.027</td> <td>4.189</td> <td>4.153</td> <td>2.699</td> <td>4.700</td> <td>5.700</td> </tr> <tr> <td>Total</td> <td>6.864</td> <td>8.555</td> <td>9.609</td> <td>9.539</td> <td>9.031</td> <td>10.900</td> <td>11.800</td> </tr> </tbody> </table>		Projected (in US\$000s)								1994	1995	1996	1997	1998	1999	2000	Core	3.597	4.528	5.420	5.386	6.624	6.200	6.100	Restricted core	3.267	4.027	4.189	4.153	2.699	4.700	5.700	Total	6.864	8.555	9.609	9.539	9.031	10.900	11.800	<p><i>4.1 The Panel concurs with WARDA's comments</i></p>
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<p><b>Recommendation 4.2</b> - The Panel invites the WARDA Member States, through the Council of Ministers, to take urgent steps to bring the contributions to the WARDA budget up to the target level of 5% of operating funds.</p>	Full	<p>Since the last EPMPR, Member States contributions are steadily increasing. Except for 1995, where no contributions were received, the years following have shown a marked increase in support from Member States.</p> <table border="1" data-bbox="732 412 1455 634"> <thead> <tr> <th>Year</th> <th>Budget</th> <th>Member States Contributions (US\$)</th> <th>Operations Capital</th> <th>Total</th> <th>% of Budget</th> </tr> </thead> <tbody> <tr> <td>1994</td> <td>7,732,000</td> <td>64,046</td> <td>00</td> <td>64,046</td> <td>0.8</td> </tr> <tr> <td>1995</td> <td>9,028,000</td> <td>00</td> <td>30,418</td> <td>30,418</td> <td>0.3</td> </tr> <tr> <td>1996</td> <td>10,396,000</td> <td>379,675</td> <td>71,743</td> <td>451,418</td> <td>4.3</td> </tr> <tr> <td>1997</td> <td>10,660,000</td> <td>382,739</td> <td>91,865</td> <td>474,604</td> <td>4.5</td> </tr> <tr> <td>1998</td> <td>9,573,000</td> <td>762,797</td> <td>283,542</td> <td>1,046,339</td> <td>10.7</td> </tr> <tr> <td>1999</td> <td>9,778,000</td> <td>294,209</td> <td>162,670</td> <td>456,879</td> <td>4.7</td> </tr> </tbody> </table> <p>Concerted efforts have been made by the Director General personally and through the Council of Ministers at the recent Council meeting in Monrovia, for Member States to pay their contributions, and arrears.</p>	Year	Budget	Member States Contributions (US\$)	Operations Capital	Total	% of Budget	1994	7,732,000	64,046	00	64,046	0.8	1995	9,028,000	00	30,418	30,418	0.3	1996	10,396,000	379,675	71,743	451,418	4.3	1997	10,660,000	382,739	91,865	474,604	4.5	1998	9,573,000	762,797	283,542	1,046,339	10.7	1999	9,778,000	294,209	162,670	456,879	4.7	<p><i>4.2 The Panel concurs with WARDA's comments</i></p>
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1998	9,573,000	762,797	283,542	1,046,339	10.7																																								
1999	9,778,000	294,209	162,670	456,879	4.7																																								
<p><b>Recommendation 4.3</b> – WARDA should systematically promote the concept of an open centre, with a view to associating a broader range of institutions with its work.</p>	Full	<p>WARDA endorsed the recommendation of that it should promote the concept of an open centre, with a view to associating a broader range of institutions with its work.</p> <p>Since the early 1990s WARDA continues to build on its open centre character by providing a permanent institutional framework within which to attract, focus and facilitate the efforts of a range of collaborators working together in partnership. The unifying principle is that all participants will contribute to solving key problems identified through a rigorous regional priority setting exercise. While WARDA generally serves as catalyst to identify the priority themes and most appropriate partners for collaborative research, research leadership in any given area is jointly determined on the basis of institutional comparative advantage. The complementary skills and resources contributed by WARDA's partners will provide a synergistic addition to WARDA's core programme. Specific examples partnership activities are as indicated below:</p> <p>*In the past eight years, WARDA has drawn on the support of a wide range of advanced research institutions and other CGIAR centers to conduct specific tasks for which WARDA did not have a core capacity, but that were included within our priority research agenda. Often, such activities are supported through special project funding. For some, research support is provided through the outposting of staff from ARIs to WARDA and through the provision of complementary backstopping. Through arrangements of this type, eight collaborating scientists have contributed significantly to WARDA's research agenda during the last eight years. These comprised three scientists</p>	<p><i>4.3 The Panel supports the concept of an open centre and encourages WARDA to pursue more pro-active research collaboration with regional, other Southern and Northern Universities partners, particularly through the Task Forces mechanism. This is particularly important in its social sciences programme.</i></p>																																										

Recommendations	Implementation*	WARDA's Comments	Panel's Comments
		<p>from UK institutions who have conducted research on weed control, African rice gall midge and nematodes; two scientists from French institutions who have focused on the physiology of drought resistance, and inland valleys; one scientist from the Netherlands who has contributed to WARDA's work on inland valleys; three scientist from Japan who operate WARDA's grain quality laboratory and conduct research on deep water, drought and acidity tolerance; and one researcher from a US NGO working on constraints to technology transfer.</p> <p>*Through the <b>Task Force</b> mechanism, WARDA ensures that NARS scientists continue to participate directly in setting regional research priorities. The Task Forces also provide for a forum in which complementary regional research programme are designed, research results exchanged, and the capacity of national rice researchers enhanced.</p> <p>*As member and convening host center of the <b>Inland Valley Consortium (IVC)</b>, WARDA plans to strengthen its contribution to the Ecoregional Programme for the Humid Tropics of Africa (EPHTA). Through the IVC we will continue to promote cooperation among 10 national programmes in technology development and evaluation in inland valleys. Activities of the IVC will complement, and be coordinated with EPHTA activities for the Moist Savanna and Humid Forest that are convened and led by IITA.</p> <p>*WARDA will also continues to host the <b>Human Health Consortium</b>, through which we are promoting cooperation between national health research institutions in Côte d'Ivoire and Mali to better understand the risks to human health associated with lowland rice cultivation and to develop prototype practices to reduce those risks. Through an expanded set of bilateral partnerships with advanced research institutes and universities, WARDA will increasingly tap into global research advances, ensuring that they are applied to African problems and made available to national programmes.</p> <p>We recognize that it is often more efficient to outsource specialized research services from <b>advanced research institutes (ARIs)</b> rather than to attempt to develop a permanent in-house capacity to conduct them ourselves. For this reason, WARDA has sought collaboration with and drawn on the support of a wide range of ARIs and other CGIAR Centers. Such partnership will be expanded during the 2000-2002 Medium Term Plan period, and so will the partnership with universities in the region.</p> <p>WARDA will make particular efforts to identify partners in the <b>private sector</b>, taking care that broad access to the products of such collaborative research will</p>	

Recommendations	Implementation	WARDA's Comments	Panel's Comments
		<p>be assured. Research on rice post-harvest problems offers some of the most promising opportunities to identify complementarity and mutual advantage with private sector entities. While it is probably not WARDA's comparative advantage to conduct research to develop or adapt technologies for rice storage and processing, WARDA can play an important catalytic role, through its grain quality laboratory, by helping to identify the major post-harvest constraints, focusing both public and private sector attention on post-harvest problems, and informing private sector partners about solutions developed elsewhere.</p> <p>*WARDA will continue to strengthen its current work with NGOs and farmer groups. WARDA will collaborate with NGOs and farm organizations in Côte d'Ivoire, the Gambia, Nigeria, Senegal and other countries where they are active. The work aims to diagnose the constraints to the transfer of new technologies and use research approaches to develop and test innovative participative methods to overcome those constraints.</p> <p>Finally, WARDA recognizes the enormous value of local knowledge in identifying production constraints and in designing and evaluating new technologies, which are relevant to farmers. In the past, WARDA has used a combination of farmer surveys and on-farm experiments to tap local knowledge. Beginning in 1996, WARDA sought to establish more valid <b>partnerships with farmers</b> by initiating participatory varietal selection methods at several key sites in West Africa. During the 2000-2002 period, WARDA will intensify its current farmer participatory varietal selection activities and farmer managed tests, and will strengthen participatory breeding work. Working through the Task Forces, we will expand the application of participatory selection activities into all the countries of West Africa.</p>	

Recommendations	Implementation	WARDA's Comments	Panel's Comments
<p><b>Recommendation 4.4</b> - WARDA should take the initiative for developing a joint research project with IITA for the inland valley ecosystems in West Africa.</p>	<p>Full</p>	<p>In a common effort between WARDA, IITA and other partners, the Inland Valley Consortium (IVC) was launched in April 1994. Through the IVC, the co-operation of eight national programmes is promoted to allow the development and testing of technologies for the inland valleys. As a member and host centre of the IVC, WARDA has contributed to the Eco-regional Programme for the Humid Tropics of Africa (EPHTA). The activities of the Moist Savanna and Humid Forest Consortia, led by IITA have been co-ordinated with those of the IVC. In some member countries (e.g. Cameroon), IITA has played an important role in the activities of the National Co-ordinating Unit (NCU).</p> <p>A Collaboration Agreement (MoU) for Phase II of the IVC was signed by Heads of 10 WCA NARS and 8 international institutions including IITA, ILRI, IWMI and WARDA in April, 1999.</p> <p>WARDA and IITA management and scientists met over three days in April 1999 to discuss future collaboration in the area of crop and resources management for inland valley ecosystems in West Africa. A draft MOU is now under preparation to facilitate joint work in the future.</p>	<p><i>4.4 IVC-research should go beyond characterization of the environment and address the technology generation and adoption challenges for this particular agro-ecosystem. The Panel urges WARDA to continue serving as a coordinator and catalyst in the Consortium, demonstrating scientific leadership for this rice-based ecosystem. The Panel also suggests that IVC should be maintained as a network activity.</i></p>

### ITINERARY OF THE EPMR PANEL

The Panel Chair attended the WARDA Board meeting at M'bé headquarters in June 1999, accompanied by the Panel member for Governance and Management. The Chair participated in a one and half days briefing and discussion meeting in Rome on 18 November, 1999 with the TAC Chair, TAC Chair designate, and the TAC Secretariat. The purpose of the meeting was to brief the Panel Chair on the review process and initiate discussion on key issues to be considered by the Panel.

The whole Panel visited WARDA Headquarters, Bouaké from 21 to 26 November, 1999 for the initial phase of the review to familiarize itself with the Centre. The Panel members interacted with the Board, Senior Management, staff, and representatives of the Staff Association. One member of the Panel met with the Internal and External Auditors. Between 27 and 28 of November 1999, the whole Panel visited three of WARDA's sites in Cote d'Ivoire namely, Korhogo, Boundiali and Gagnoa. From 29 November to 3 December, 1999, the Panel split into two sub-panels that visited Ghana, Nigeria, Guinea, and Senegal and met NARS, directors and farmers. In Ghana a sub-panel met with the Minister of Agriculture. In Senegal, the sub-panel visited WARDA's Sahel Station at Ndiaye, Saint Louis and held discussion with staff, farmers and representatives of NARS. A Panel Member participated in a synthesis seminar of PSI-CORAF held in Dakar, 29 November – 3 December, 1999 attended by NARS researchers from the Sahel and their counterparts from CIRAD and IRD and interacted intensively with NARS. On 19-20 January 2000, two Panel Members visited Guinea. A Consultant on the Human Health Consortium visited WARDA Headquarters, (25-29 January, 2000) and interacted with Consortium Members from Côte d'Ivoire, Mali, Panel Members, the Director General of WARDA and staff in the course of preparing his report to the Panel. In the course of the main phase, a sub-panel met with the Minister of Higher Education, Scientific Research and Technological Innovation in Côte d'Ivoire.

The whole Panel returned to WARDA Headquarters from 21 January to 11 February, 2000 for the main phase of the review. The Panel Members interacted with the management and scientific staff, individually and in small groups and met with the relevant head of the host country NARS and Minister.

Draft chapters of the report were shared with the Director General. On 10 February, 2000 the report of the Panel was presented by the Panel Chair to the Board Chair and Members of the Executive Committee at M'bé and subsequently to the staff.

## APPENDIX V

### LIST OF DOCUMENTS PROVIDED TO THE PANEL

#### A. Documents Provided by the TAC and CGIAR Secretariats

##### *To all Panel Members:*

1. Review Processes in the CGIAR, 1988
2. CGIAR Priorities and Strategies for Resource Allocation During 1998-2000
3. Report of the Third External Programme and Management Review of the West Africa Rice Development Association
4. Report of the First External Programme and Management Review of the International Livestock Research Institute (one of the most recent EPMR reports)
5. Documents regarding the most recent TAC strategic studies involving the Centre:
  - (a) Priorities and Strategies for Soil and Water Aspects of Natural Resources Management Research in the CGIAR
  - (b) Policy and Management and Institution Strengthening Research and Service in the CGIAR
6. The TAC Commentaries on WARDA's 1999-2001 and 2000-2002 MTPs
7. A list of centre-specific issues drafted by the Centre for incorporation into the standard TOR of the review
8. 'Update on the use of CCERs' (memo from TAC Chair)
9. Guidelines and TOR for EPMRs
10. The updated panel composition list
11. Medium-Term Resource Allocation 1998-2000: Centre Proposals and TAC Recommendations
12. First Review of Systemwide Programmes with an Ecoregional Approach
13. Report of the Fifth External Programme and Management Review of the International Rice Research Institute (IRRI)
14. Lucerne Declaration and Action Programme (pp. 7-12)
15. Most recent CGIAR Annual Report
16. Most recent CGIAR Brochure and Directory
17. Financial Requirements of the 1999 CGIAR Research Agenda (latest MTM99 doc)
18. Terms of Reference for External Programme and Management Reviews of CGIAR Centres
19. Organization and Management of the CGIAR System: A Review, 1993. (S. Özgediz, Public Administration and Development, Vol. 13, 217-231 (1993); copyright 1993 by John Wiley & sons, Ltd.)
20. Reference Guides for CGIAR International Agricultural Research Centres and their Boards of Trustees, August 1997
21. CGIAR ICW99 End of Meeting Report and MTM99 Summary of Proceedings
22. Evaluating Research Institutions: Lessons from the CGIAR (S. Özgediz, *Knowledge, Technology, and Policy*, Winter 1999, Vol. 11, No. 4, pp. 97-113.)

***Supplementary documents, to relevant Panel Members (including the Chair):***

23. Governance and Management of the CGIAR Centres, 1991 (S. Ozgediz, Study Paper No. 27, copyright 1991, first printing October 1991)
24. Most recent volume of the CGIAR Board of Trustees Directory (October 1999)
25. CGIAR 1997 Financial Report (August 1998)
26. Committees and Units of the CGIAR: Roles, Responsibilities, and Procedures
27. Most recent CGIAR financial guidelines and manuals relating to:
  - a) Financial Management Guidelines, Series No. 1 (January 1988)
  - b) Accounting Policies and Reporting Practices Manual (October 1993)
  - c) Financial Guidelines - Audit Manual (July 7, 1995)

**B. WARDA documents to EPMPR Team (First batch)*****To all Panel Members and/or available at the Centre for reference:***

28. Guide to Living in Bouake
29. WARDA: Vision Statement (by Director General)
30. Program 1: Rainfed Rice Program - List of Scientists Publications
31. Selected Publications by Staff
32. List of Staff Publications: INGER
33. DRAFT Program Report 1998
34. Program Report 1996-1997
35. WARDA: Looking back into the future
36. The WARDA Model: Open Centre and Task Force Approach to Collaboration
37. Le modèle ADRAO: Le Caractère de Centre ouvert de l'ADRAO et son approche de la collaboration par le biais de Groupes d'action
38. 1996 Annual Report
39. 1997 Annual Report
40. 1990-2000 Strategic Plan
41. List of Senior Staff with brief biodata
42. 2000 Financing Plan
43. Report of the WARDA Mission by Board member
44. Integrated Pest Management Review
45. Cropping Systems Review
46. Breeding Review
47. Gormbley report on consultation with Management and staff

***Second batch WARDA documents to EPMPR team***

48. Summary of main achievements (Main document distributed to Panel upon their arrival)
49. WARDA's Governance and Management - Organization chart
50. CCER Reports on Financial Management and Control
51. Reports of major planning conferences, internal reviews, expert meetings, etc.
52. Senior Management Retreat report (as a self assessment initiative)
53. Response to the last EPMPR
54. Agreements for cooperative activities with other Centres & institutions
55. Table Summarizing Turnover of Staff (1994-1999)

56. Salary Ranges, Benefits and Allowances of Staff Category
57. Evolution of WARDA's mandate
58. Consultant Report on the Extension of WARDA's mandate in East, Central & Southern Africa
59. Major issues confronting WARDA
60. Vision Statement
61. Minutes of the first meeting of the WARDA Mandate Working Group
62. Letter of transmission of: WARDA's 2000 - 2002 Medium Term Plan
63. Assessment of the Prospects of the WARDA Interspecific Rice Varieties in West Africa (Consultancy Report by Dunstan S. C. Spencer and James Edwin, Dec. 1999)
64. WARDA Medium Term Plan 2000-2002 (English and French editions)
65. WARDA Medium Term Plan 1998-2000 (English and French editions)
66. WARDA Medium Term Plan 1994-1998 (English and French editions)
67. Research Activities of WARDA Rice Task Forces: 1991-1997
68. WARDA Staff Publications
69. Draft paper: "Potentials and Threats of the Genetic Engineering Technology: Quest for an African Strategy at the Dawn of a New Millennium" - Hans R. Herren
70. Draft paper: "Evoking Underutilized Genetic Potentials in Rice by Modifying the Growing Environment to Change Plant Structure and Increase Yields" – William Holiarison *et alia*
71. WARDA Annual Reports: 1998, 1997, 1996, 1995, 1994, 1993
72. Participatory varietal selection. "The spark that lit a flame"
73. Rice Interspecific Hybridization Project: Research Highlights - 1999
74. Selected papers from the region about possible impact of the Interspecifics
75. Centre Commissioned External Review on Programme Strategy and Management
76. WARDA in Brief: "Partners in development - responding to the challenges for food security and poverty eradication in Africa"
77. Varieties released for cultivation in West Africa in the last five years
78. List of Rice Varieties Adopted and Used by Farmers in West African Countries
79. Rice Trends in Sub-Saharan Africa: "A Synthesis of Statistics on Rice Production, Trade and Consumption (1973-92)"
80. IVC/CBF: "A Framework for Regional Cooperation for the Sustainable Development of Inland Valley Agro-ecosystems in sub-Saharan Africa"
81. IVC News Letters # 1, 2 and 3: 1996-97
82. Proceedings of 4th Annual Workshop of IVC - 1996
83. Proceedings of 1st Workshop of IVC - 1995 (English/French eds., 2 copies)
84. Proceedings of 3rd Annual Workshop of IVC - 1995
85. Proceedings of 2nd Annual Workshop of IVC – 1994
86. Proceedings of 1st Annual Workshop of IVC – 1993
87. IVC Annual Report 1994
88. IVC Annual Report 1995
89. IVC Proposal (1993)
90. Minutes of the 1999 Heads meeting
91. Minutes of the 1997 Heads meeting
92. Collaborating agreement phase II 1999
93. Memorandum of understanding 1997
94. [IVC] Strategic Plan (1999-2003)
95. [IVC] External Review (1996)
96. External Review: IVC Responses
97. Minutes 1st IVC Management Committee Meeting

98. Minutes 14th Steering Committee Meeting
99. Minutes 15th Steering Committee Meeting
100. Minutes 16th Steering Committee Meeting
101. List of IVC Publications
102. Steering Committee Meetings since 1993
103. List of IVC members addresses
104. Projet de programme consortium
105. Compte rendu de réunion de directeurs 1999
106. Compte rendu de réunion de directeurs 1997
107. [IVC] Plan stratégique (1999-2003)
108. [IVC] Revue externe (1996)
109. Revue externe: les réponses du CBF
110. [IVC] Compte rendu de la 1ère réunion du Comité de gestion
111. [IVC] Minutes de la 14ème Réunion du Comité directeur
112. [IVC] Minutes de la 15ème Réunion du Comité directeur
113. [IVC] Minutes de la 16ème Réunion du Comité directeur
114. Programme Planning and Monitoring Process at WARDA
115. Research Process at WARDA, 1999
116. Programme Priorities and Strategies 1999-2005 (Preliminary draft)
117. Programmes and Projects Logframes

*Additional documents provided to Mr. J. Griffith*

118. Results of the 1998 Board Self-Evaluation
119. WARDA Board Profile
120. WARDA's Governance and Management
121. Constitution of WARDA – Revised Text
122. WARDA Board of Trustees – Ruler of Procedure
123. 18<sup>th</sup> Meeting of the BOT – Draft Minutes
124. 22<sup>nd</sup> Ordinary Session of COM-Provisional Report
125. 23<sup>rd</sup> Meeting of the WARDA AFC-Draft Minutes
126. 18<sup>th</sup> Meeting of the BOT – Draft Minutes – Nomination Committee
127. 18<sup>th</sup> Meeting of the BOT – Draft Minutes – Programme Committee
128. Update on Status of Implementation – Gormbley Report
129. Minutes of IRS Staff Meeting to discuss Staff Morale and Recruitment
130. Program Planning and Monitoring Process at WARDA
131. Procedures and Guidelines: NARS Visiting Scientist Programme
132. Procedures and Guidelines: Post Doctoral Fellows
133. Policies and Procedures Manual – Purchasing & Supplies
134. Procedures Manual for Administrative and Support Services
135. Manual of Procedures: Operations Service
136. Draft WARDA Transport Guidelines
137. Personnel Policies and Procedures – Associate Professional Staff
138. Personnel Policies and Procedures – Principal Staff
139. Human Resources Procedures Manual
140. Performance Evaluation System
141. General Services Staff – Policies Manual (1995)
142. Report on Gender Staffing Consultancy at WARDA, Joshi, 1996
143. Reprint on the Audit of Farm Laborers and Contract Staff, 1999
144. 19<sup>th</sup> Meeting of the BoT – Report of the DDG-Programme

145. Consultancy Report on the Extension of WARDA's Mandate in East, Central and Southern Africa, 1997
146. IRS Recruitment and Staff Review Procedures, 1999

*Additional documents provided to Mr. Hiroshi Ikehashi*

147. "Impact Assessment and Evaluation Group Study: Ecological Diversity and Rice Varietal Improvement in West Africa" - Draft: 29 October, 1999. Timothy J. Dalton, Robert G. Guei
148. CGIAR-TAC: Report of the Fifth External Programme and Management Review of the International Rice Research Institute (IRRI).
149. West Africa Rice Development Association (WARDA): Summary of Achievements: 1993-1999
150. Internal Review of Rice Breeding Activities at WARDA - 24 September - 3 October, 1994. Minutes of WARDA Breeders' Meeting, 7-9 February, 1995
151. Genetic Resources Unit. Status of WARDA's Germplasm Conservation and Utilization. 1992-1999

**GLOSSARY OF ACRONYMS**

<b>ADRAO</b>	Association pour le développement de la riziculture en Afrique de l'Ouest (French name of WARDA)
<b>AfDB</b>	African Development Bank
<b>AFC</b>	Administration and Finance Committee
<b>AFR</b>	African Bureau/USAID
<b>AIRGM</b>	African Rice Gall Midge
<b>AMSRON</b>	African Mangrove Swamp Rice Observation Nursery
<b>ANADER</b>	Agence nationale d'appui au développement rural
<b>AP</b>	Application Points
<b>API</b>	Assessment Programme Impact
<b>ASI</b>	ADRAO/SAED/SISMAR/ISRA Thresher/Cleaner
<b>AVRDC</b>	Asian Vegetable Research and Development Centre
<b>BMTRM</b>	Bi-monthly Technical Review Meeting
<b>BRA</b>	Bureau de la recherche agronomique
<b>CABI</b>	CAB International
<b>CABO</b>	Centre for Agrobiological Research
<b>CARI</b>	Central Agricultural Research Institute (Suakoko, Liberia)
<b>CBSS</b>	Community-Based Seed Production System
<b>CEMAGREF</b>	Centre d'Étude Du Machinisme Agricole Du Génie Rural des Eaux et Forêts
<b>CFA</b>	Communauté financière africaine (African Financial Community)
<b>CFC</b>	Common Fund for Commodities
<b>CGIAR</b>	Consultative Group on International Agricultural Research
<b>CIAT</b>	Centro Internacional de Agricultura Tropical
<b>CIDT</b>	Centre ivoirien pour le développement des textiles
<b>CIFOR</b>	Centre for International Forestry Research
<b>CILSS</b>	Comité permanent inter-états de lutte contre la sécheresse dans le Sahel (Permanent Inter-State Committee for Drought Control in the Sahel)
<b>CIMMYT</b>	Centro Internacional de Mejoramiento de Maiz y Trigo
<b>CIP</b>	Centro Internacional de la Papa (International Potato Centre)
<b>CIRAD</b>	Centre de coopération internationale en recherche agronomique pour le développement (France)
<b>CIRES</b>	Centre ivoirien de recherches économiques et sociales
<b>CIRT</b>	Centre ivoirien de recherches technologiques
<b>CNRA</b>	Centre national de recherche agronomique
<b>CNRST</b>	Centre national de la recherche scientifique et technologique
<b>CORAF</b>	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles
<b>CRI</b>	Crops Research Institute
<b>CRIG</b>	Cocoa Research Institute of Ghana
<b>CRSP</b>	Cooperative Research Support Project
<b>CSIR</b>	Council for Scientific and Industrial Research

<b>CTA</b>	Technical Centre for Agricultural and Rural Cooperation
<b>DAES</b>	Department of Agricultural Extension Services
<b>DAF</b>	Director Administration and Finance
<b>DDG</b>	Deputy Director General
<b>DDG-A&amp;F</b>	Deputy Director General for Administration and Finance
<b>DDG-P</b>	Deputy Director General for Programmes
<b>DG</b>	Director General
<b>DGIS</b>	Directoraat Generaal Internationale Samenwerking (The Hague, The Netherlands)
<b>DIARPA</b>	Diagnostique rapide de pré-aménagement
<b>DNA</b>	Deoxyribonucleic acid
<b>DTC</b>	Director Training and Communication
<b>EARSM</b>	East African Regional Sorghum and Millet Network
<b>ECOWAS</b>	Economic Community of West African States
<b>ECSA</b>	Eastern, Central and Southern Africa
<b>EMC</b>	Executive Management Committee
<b>EPMR</b>	External Programme and Management Review
<b>EU</b>	European Union
<b>F3</b>	3rd Filial Generation
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FCFA</b>	Franc communauté financière africaine (French African Financial Community)
<b>FDFP</b>	Fonds de développement de la formation professionnelle
<b>FLS</b>	Front Line Staff
<b>FMHD</b>	Farm Management Household Database
<b>FPR</b>	Farmer Participatory Research
<b>FSR</b>	Farming Systems Research
<b>G/EG/AFS</b>	Global/Economic Growth/Agricultural Food Security
<b>GENSTAT</b>	General Statistical Software
<b>GIS</b>	Geographic Information System
<b>GTZ</b>	Deutsche Gesellschaft für Technische Zusammenarbeit
<b>HHC</b>	Human Health Consortium
<b>IARCs</b>	International Agricultural Research Centres
<b>IBPGR</b>	International Board for Plant Genetic Resources
<b>IBSRAM</b>	International Board for Soil Research and Land Management
<b>ICARDA</b>	International Centre for Agricultural Research in the Dry Areas
<b>ICIPE</b>	International Centre of Insect Physiology and Ecology
<b>ICLARM</b>	International Centre for Living Aquatic Resources Management
<b>ICRAF</b>	International Centre for Research in Agroforestry
<b>ICRISAT</b>	International Crops Research Institute for the Semi-Arid Tropics
<b>ICSH</b>	ICRISAT Sorghum Hybrid
<b>ICTG</b>	Inter-Centre Training Group
<b>IDC</b>	Information and Documentation Centre
<b>IDEFOR</b>	Institut des Forêts
<b>IDESSA</b>	Institut des Savanes (Savana Institute)
<b>IDRC</b>	International Development Research Centre
<b>IER</b>	Institut d'économie rurale
<b>IFPRI</b>	International Food Policy Research Institute

<b>IIMI (IWMI)</b>	International Irrigation Management Institute – International Water Management Institute
<b>IITA</b>	International Institute of Tropical Agriculture
<b>IHP</b>	Interspecific Hybridization Project
<b>ILCA</b>	International Livestock Centre for Africa
<b>ILRAD</b>	International Laboratory for Research on Animal Diseases
<b>ILRI</b>	International Livestock Research Institute
<b>INERA</b>	Institut de l'environnement et de recherches agricoles
<b>INGER</b>	International Network for the Genetic Evaluation of Rice
<b>INPA</b>	Instituto Nacional de Pesquisa Agraria
<b>INRAB</b>	Institut national de recherches agricoles du Benin (National Agricultural Research Institute of Benin)
<b>INSAH</b>	Institut du Sahel (Sahel-Institute)
<b>IPGRI</b>	International Plant Genetic Resources Institute
<b>IPM</b>	Integrated Pest Management
<b>IRAG</b>	Institut de recherche agricole de Guinée
<b>IRAT</b>	Institut de recherches agronomiques tropicales et des cultures vivrières
<b>IRBET</b>	Institut de recherche en biologie et écologie tropicale
<b>IRD (former ORSTOM)</b>	Institut de recherche pour le développement
<b>IRRI</b>	International Rice Research Institute
<b>IRSN</b>	Institut de recherche sur les substances naturelles
<b>IRSSH</b>	Institut de recherches en sciences sociales et humaines
<b>IRTP</b>	International Rice Testing Programme
<b>ISNAR</b>	International Service for National Agricultural Research
<b>ISRA</b>	Institut sénégalais de recherches agricoles
<b>ITRA</b>	Institut togolais de recherche agricole
<b>IVC</b>	Inland Valley Consortium
<b>JICA</b>	Japan International Cooperation Agency
<b>JIRCAS</b>	Japan International Research Centre for Agricultural Sciences
<b>LEACHM</b>	Leaching Estimation and Chemistry Model
<b>LTBA</b>	Laboratoire de biochimie et technologie alimentaire
<b>MESRIT</b>	Ministère de l'enseignement supérieur, de la recherche et de l'innovation technologique (Côte d'Ivoire)
<b>MOFA</b>	Ministry of Food and Agriculture (Ghana)
<b>MOU</b>	Memorandum of Understanding
<b>MTP</b>	Medium-Term Plan
<b>MTRM</b>	Monthly Technical Review Meeting
<b>NAEP</b>	National Agricultural Extension Project
<b>NARC</b>	National Agricultural Research Centre
<b>NARCC</b>	National Agricultural Research Co-ordination Council
<b>NARES</b>	National Agricultural Research and Extension Systems
<b>NARI</b>	National Agricultural Research Institute
<b>NARP</b>	National Agricultural Research Project
<b>NARS</b>	National Agricultural Research System
<b>NCRI</b>	National Cereals Research Institute
<b>NERICA</b>	New Rice for Africa
<b>NGO</b>	Non-Governmental Organization
<b>NRI</b>	Natural Resources Institute (United Kingdom)
<b>NRM</b>	Natural Resources Management

<b>OAU/STR</b>	Organization of African Unity/Scientific, Technical and Research Commission
<b>OFAT</b>	On-farm Adaptive Trial
<b>OP</b>	Observational Points
<b>ORYZAS</b>	Modèle de simulation pour le développement du riz/milieu sahélien
<b>OSIRIZ</b>	Observatoire de statistiques internationales sur le riz
<b>PALMINDUSTRIE</b>	Gestion des plantations industrielles de palmier et cocotier et industrialisation des oléagineux et des corps gras (Côte d'Ivoire)
<b>PMC</b>	Programme Management Committee
<b>PWTR</b>	Periodical Workshops for Technologies Review
<b>RADORT</b>	Research on Accelerated Diffusion of Rice Technology (project)
<b>RELC</b>	Research-Extension Linkage Committee
<b>RFLP</b>	Restriction in Fragment Length Polymorphism
<b>RI</b>	Resistance Index
<b>RIDEV</b>	Rice Development (model)
<b>ROCAFREMI</b>	Réseau Ouest et Centre africain de recherche sur le mil (West and Central African Millet Research Network)
<b>ROCARIZ</b>	Réseau Ouest et Centre africain du riz (West and Central Africa Rice Network)
<b>RRPMC</b>	Regional Research Project for Maize and Cassava
<b>RSSS</b>	Research-System Support Sites
<b>RTC</b>	Regional Technical Committee
<b>RUVTs</b>	Regional Uniform Variety Trials
<b>RYMV</b>	Rice Yellow Mottle Virus
<b>S5</b>	5th Generation of Selfing
<b>SACCAR</b>	Southern Africa Coordinating Centre for Agricultural Research
<b>SAED</b>	Société d'aménagement et d'exploitation des terres du delta du fleuve Sénégal et des vallées du fleuve Sénégal et de la Falémé
<b>SAFGRAD</b>	Semi-Arid Food Grain Research and Development Network
<b>SAPH</b>	Société africaine de plantations d'hévéas (Côte d'Ivoire)
<b>SARI</b>	Savanna Agricultural Research Institute
<b>SATMACI</b>	Société d'assistance technique pour la modernisation de l'agriculture en Côte d'Ivoire
<b>SCO</b>	SAFGRAD Coordinating Office
<b>SD</b>	Sustainable Development
<b>SDI</b>	Selective Dissemination of Information
<b>SEMRY</b>	Société d'exploitation mécanisée rizicole de Yagoua
<b>SHAZAM</b>	Software for Economic Analysis
<b>SISMAR</b>	Société industrielle sahélienne de machinisme agricole, de mécanique et de représentation (Sénégal)
<b>SMS</b>	Subject Matter Specialist
<b>SMT</b>	Senior Management Team
<b>SODEFOR</b>	Société de développement des forêts (Côte d'Ivoire)
<b>SRO</b>	Subregional Agricultural Research Organizations
<b>SPAAR</b>	Special Programme for African Agricultural Research
<b>SSP</b>	Systems Study Points
<b>SWIM</b>	System Wide Review on Water Management
<b>TAC</b>	Technical Advisory Committee of the Consultative Group on International Agricultural Research

<b>TAFU</b>	Training and Fellowship Unit
<b>TF</b>	Task Force
<b>TOR</b>	Terms of Reference
<b>TT</b>	Technology Transfer
<b>TTP</b>	Technology Transfer Programme
<b>UAES</b>	United Agricultural Extension System
<b>UK</b>	United Kingdom
<b>UNDP</b>	United Nations Development Programme
<b>USAID</b>	United States Agency for International Development
<b>USAID/AFR/OSD/PSGE</b>	USAID Africa Bureau/Office of Sustainable Development / Productive Sector Growth and the Environment
<b>WANA</b>	West Asia and North Africa
<b>WARDA</b>	West Africa Rice Development Association
<b>WARRI</b>	West Africa Rice Research Institute
<b>WCA</b>	West and Central Africa
<b>WECAMAN</b>	West and Central African Maize Network
<b>WECARD</b>	West and Central African Council for Research and Development (Suakoko, Liberia)
<b>WECASRN</b>	West and Central African Sorghum Collaborative Research Network
<b>WHO-PEEM</b>	World Health Organization of the United Nations (WHO) Panel of Experts on Environmental Management (for Vector Control)
<b>WID</b>	Women in Development
<b>YAAS</b>	Yunnan Academy of Agricultural Sciences (China)

