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THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

REPORT OF THE
SECOND EXTERNAL PROGRAM REVIEW
OF THE
WEST AFRICA RICE DEVELOPMENT ASSOCIATION
(WARDA)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

OCTOBER 1984

This report comprises:

- (a) Extract from "Main Conclusions Reached and Decisions Taken", CGIAR Meeting, Rome, May 23-25, 1984
- (b) Transmittal Letter from TAC Chairman to CGIAR Chairman
- (c) WARDA Consolidated Commentary on External Program and Management Reviews, 1983
- (d) TAC Commentary on the Second External Program Review of WARDA
- (e) Transmittal Letter from Panel Chairman to TAC Chairman
- (f) The Report of the Second External Program Review of the West Africa Rice Development Association (WARDA)

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

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From: The Secretariat

July 17, 1984

Consultative Group Meeting

May 23-25, 1984

Rome, Italy

WARDA External Program and Management Reviews - Agenda Item 8 ^{1/}

Dr. Blumenschein, Chairman of the External Program Review (EPR) Panel, stressed the importance of rice consumption for people in West Africa. He summarized WARDA's accomplishments in testing cultivars, training, technology assessment and transfer, but repeated that the panel was disappointed with the efficiency with which WARDA used its resources. The report details the panel's understanding of the reasons for this lack of efficiency. The panel believes that if WARDA implements the recommendations of the review and those of the external management review (EMR) it will be strengthened as an organization. He concluded that WARDA represents the initiative of developing countries who should be encouraged by donors to work together in a cooperative fashion.

Dr. Stifel summarized the EMR of WARDA. He prefaced his remarks with the observations that (1) the management problems diagnosed, transcend the executive leadership because they are structural; and (2) as an inter-governmental organization WARDA was fundamentally different from other CGIAR institutions. WARDA was in the midst of a severe financial crisis. Dr. Stifel identified the following factors as contributing to WARDA's problems: poor program management, lack of financial support by members, funding practices of some donors, fundamental organizational deficiencies, absence of an objective policy-making body, a highly politicized staff and ineffective financial management. WARDA's structure contributed to its problems but, Dr. Stifel concluded that the recommendations of the management panel could fundamentally improve WARDA's capacity to carry out its mandate.

^{1/} Extract from "Main Conclusions Reached and Decisions Taken - Consultative Group Meeting, Rome, May 23-25, 1984" CGIAR Secretariat, Washington, D.C., July 1984.

The TAC Chairman stated that TAC was satisfied with the reports, accepts their findings and conclusions and endorses the integrated package of recommendations. He recommended a continuation of CGIAR support to WARDA on condition that the measures proposed are implemented speedily and satisfactory evidence of substantially improved program performance is provided, according to a schedule specified by TAC.

The Executive Secretary of the CGIAR stated that the changes recommended were deliberately made to try and approximate within the context of an intergovernmental association, the program conditions that are found in other CGIAR centers. The management panel's complete set of recommendations may take some time to implement, but some actions have already been taken in anticipation of approval of the recommendations by the Group. He concluded by urging the Group to approve the recommendations of the management review and the election of the seven members of the Scientific and Technical Committee (STC) nominated by the Group (whose names follow).

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Chief, EMBRAPA/CNPAS
National Center for Research on Rice and Beans
Goiânia, Goiás, Brazil

Dr. M. S. Balal
Head, Rice Research Section
Field Crops Research Institution
Ministry of Agriculture
Orman Giza, Egypt

Dr. Robert Cunningham
Agricultural Research Consultant
United Kingdom

Dr. Michel Jacquot
Director, Program for the Improvement of Rice
IRAT/GERDAT
Montpellier, France

Dr. Francis J. Lebeau
Retired Chief Agriculture Division
USAID Bureau for Africa
Washington, D.C.

Dr. Frans Rudolf Moorman
Professor, Soil Science
Institute of Earth Sciences
Utrecht, The Netherlands

Dr. R. Seetharaman
Project Director, All India Coordinated
Rice Improvement Project (AICRIP)
Hyderabad, Andhra Pradesh, India

Dr. Leroux, Executive Secretary of WARDA, explained the changes WARDA had so far made in response to the review, and the reasons why recommendations regarding the deputy executive secretary and enlarging the powers of the STC had not been followed as yet. He also outlined the changes WARDA was making in designing an integrated program and budget, his efforts to secure the support of the Heads of State of WARDA countries, the international search for and designation of a financial controller, and his commitment to improving WARDA's functioning. He thanked the Rockefeller Foundation for providing the services of Dr. James Johnston as a special consultant to assist in developing an integral program and budget for WARDA.

The members of the Group, commenting on the presentations, made the following points: that WARDA's problems are similar to those of many other institutions in developing countries; that the response of the Governing Council has been positive; that TAC has made excellent recommendations on how to deal with WARDA; that the recommendation to concentrate on upland rice is appropriate; that the need for an integrated association-wide program is urgent; that the model of an intergovernmental organization was attractive but that WARDA's poor performance with the model was disappointing; and that the changes recommended by the management review team provide the minimum requirements towards the type of structure which would give the research component of WARDA a chance to succeed. The Group elected the nominees to the WARDA STC and endorsed the procedures set up by the TAC members and the CG Secretariat to monitor WARDA's progress in implementing the recommendations made by the review panels."

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**CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE**

The Chairman

21 March 1984

Dear Mr. Husain,

I take pleasure in submitting to you the report of the second External Program Review of WARDA which was conducted in mid 1983.

The Review Panel was chaired by Dr. A. Blumenschein, who presented the report to TAC at its 32nd meeting in October 1983 in the presence of Dr. H. Leroux, Executive Secretary of WARDA.

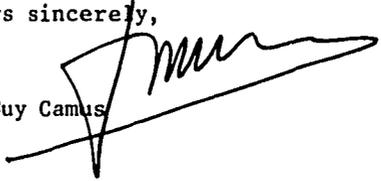
TAC discussed the report in conjunction with the report of the External Management Review of WARDA at its 32nd and 33rd meetings. On the basis of its discussions, TAC prepared a statement which summarizes its conclusions, comments and recommendations, to the Group on the review. This statement, together with WARDA's comment on the review is attached to the report.

In submitting to the Group its observations regarding WARDA's potential, the development of its program and the Association's future role in rice research in West Africa, TAC is fully conscious of the serious problems WARDA is presently facing. The Committee is aware, on the other hand, of the scientific potential that can be realized provided the measures proposed are taken.

TAC noted that WARDA's response to the Panel's recommendations is positive on the whole and that WARDA management is moving ahead with the implementation.

TAC proposes to institute a process of monitoring in close association with the Secretariat of the CGIAR. This will ensure the follow-up required, regular reporting of progress to the Group and a mid-term evaluation after two years.

Yours sincerely,


Guy Camus

Mr. Syed Shahid Husain
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WARDA CONSOLIDATED COMMENTARY ON EXTERNAL PROGRAMME AND
MANAGEMENT REVIEWS, 1983

I. INTRODUCTION

The West Africa Rice Development Association (WARDA) is an intergovernmental organization in the West African sub-region. It was founded in 1970 and today has fifteen members.

As an intergovernmental organization, WARDA is controlled by its Member Countries, who exercise this control at the highest level. Each Member Country is represented on the Governing Council by a Minister. As in other governmental organizations, WARDA is partly funded by its Member Countries and partly by a group of multilateral and bilateral donors.

What distinguishes WARDA from other intergovernmental organizations is first of all that it is the oldest institution of inter-African cooperation in the sub-region. In addition, it is the only institution concerned with rice research, development and training in the sub-region. It is thus an institution which endeavours to find a solution to the problem of food self-sufficiency in West Africa. At the moment about 25-30 percent of WARDA's funding is provided by its Member Countries. A further 25-30 percent is provided by the Consultative Group on International Agricultural Research (CGIAR), while 30-40 percent is provided by the United States Agency for International Development (USAID). The rest of its funds is provided by various bilateral and multilateral donors.

As far as part of the normal funding process is concerned, programmes funded by major WARDA donors are reviewed periodically by them. The CGIAR conducts quinquennial reviews, while USAID usually provides a mission for project design and to conduct a mid-term review as well as an end of project evaluation. During the early years of WARDA, these reviews concentrated only on the programmes funded by the specific donors, but now a general review of the overall WARDA programme is being conducted so as to place a particular donor funded project in perspective. Thus, between June and September 1983, a nine-man team was sent out by the CGIAR to review the technical programmes and management of the association. They were: Dr. A. Blumenshein, Chairman of the team; Dr. R.F. Chandler, Jr.; Dr. J.M. Liwenga; Dr. A. Luning; Dr. B.E.J. Wheeler; Dr. Robert Herdt; Mr. A. von der Osten, Secretary; Dr. Laurence Stifel and Professor Dr. Emil M.L. van Lommel.

Thus, the WARDA management participated fully in the review and had an opportunity for full discussions with the visiting team members, both at Headquarters and in the field. In addition, after preparation of the draft report, WARDA had an opportunity to provide written comments.

II. GENERAL POSITION OF THE SECRETARIAT

The Secretariat would like to take this opportunity to comment the deep insights and critical analyses brought to bear on WARDA's problem by the CGIAR. The report is well written and highlights the major problems and issues faced by WARDA. It is very desirable that the activities of any organization be reviewed and even questioned from time to time in order to correct past errors and properly orient future programmes. WARDA has always based its operations on this concept. It organizes, on its own, rice review meetings every year and has always welcomed the periodic reviews by the donors. The review under discussion here was particularly useful in that it coincided with the installation of new management at WARDA.

III. PREPARATION

The Association began preparation for the two reviews 24 months in advance. This early preparation was required to ensure that our scientists in the field had enough time to prepare their reports and make the necessary contacts with Member State governments. The list of documents which were supplied to the two review panels is shown in Annex II.

IV. PROGRAMME OF ACTIVITIES

The programme of the Review Panels was carried out in two phases. The meetings and visits which were held by the Programme Review Panel are shown in Annex IV of the EPR Report. The Management Review Panel had a less formal schedule and met with all members of WARDA management as and when necessary.

V. ASSESSMENT AND RECOMMENDATIONS

The Programme and Management Review Panels in their report on WARDA made the following assessment and recommendations:

WARDA has achieved some of its programme objectives. It has introduced a large number of rice cultivars to the countries of the region, has established productive research activities in the Richard Toll and Rokupr Special Projects, has trained over 900 participants in its training programmes, has established links with national programmes through its Sub-Regional Coordinators and Special Projects, and has developed and implemented its own version of farm-level technology evaluation and constraints identification.

The Panel is impressed with the high quality of most staff members of the Association. Scientists have good qualifications and are capable of carrying out good research, development and training if they are properly guided and motivated. Many support staff are also capable.

However, the Panel is disappointed with the efficiency with which the Association uses its resources. It is an institution that spends nearly half as much annually as the largest of the other IARCs but neither its research output nor its contribution to national rice development capacity is consistent with that level of resources. The Panel believes that this low productivity can be attributed to the lack of clearly stated and appropriate programme objectives geared to the needs of West Africa, to the lack of an operational strategy and performance criteria against which WARDA can evaluate its own performance, to an excessive number of support and administrative staff, and to the lack of firm and dedicated leadership. Despite the considerable financial resources devoted to coordination and administration, the essential contribution of charting the course of the Association as a whole has been largely missing. Another apparent cause of low efficiency is the lack of funds allocated for repairs, maintenance, supplies and equipment replacement, items that are cut when funds are tight. Personnel, on the other hand, are seldom cut.

Part of the responsibility for WARDA's fragmented programme must be attributed to donors. Aside from the Member States' contribution, most of WARDA's resources come from donors who are members of the CGIAR. Yet, only about one-fourth of total donor support comes through the CGIAR. Thus, WARDA responds to the individual interests of a large number of donors which requires considerable time and effort, rather than concentrating on defining and promoting a core programme.

During the recent past, WARDA has experienced recurring financial crisis. The situation in 1983 has been particularly acute. At the time of the Review, it was virtually impossible for programme staff to conduct any activity requiring expenditures. The causes of the crisis are discussed in the Management Review report, but it is clear that actions of both donors and Member States as well as those of WARDA management and staff have contributed to the crisis.

Morale in WARDA is extremely low, especially among staff at Headquarters. This springs from a number of sources including (i) a lack of confidence by many staff members in the Association's leadership, (ii) the apparent encouragement of divisive groupings along Anglophone vs. Francophone lines by institutionalizing the split through the separate selection of Executive Secretary and Deputy Executive Secretary, and (iii) the continuing financial crisis. In many ways, the staff posted to Special Projects and the Sub-Regional Coordinators are scarcely affected by the first two forces, but the financial crisis has affected them along with the rest of the organization.

The Panel senses that one missing ingredient for success is a well developed sense of institutional loyalty. WARDA Headquarters staff tend to work either for their own gain or for other individuals, but one does not sense that the interests of the Association transcend these very often.

The Panel recommended as follows:

1. The Panel recommends that, assuming the implementation of Recommendation 2, WARDA be recognized as having the CGIAR mandate for (i) conducting and (ii) assisting its Member States to develop the joint capacity to conduct a complete rice research programme, from determining

what technologies are required for the region, to developing or introducing and testing those technologies, for the rice ecologies that are important in its Member States. WARDA should continue to maintain close working relations with other rice research institutions to facilitate its work, and in light of their common interest, WARDA and IITA, perhaps together with IRRI, should periodically meet and discuss their respective programmes in order to ensure the most productive use of all resources.

2. The Panel recommends the soonest possible implementation of the key recommendations of the Management Review Panel because it believes without that WARDA may cease to function. The report of the Management Review Panel fully states and justifies their recommendations, but briefly stated they are:

- (a) WARDA's Governing Council (GC) should reconstitute the Scientific and Technical Committee (STC) to include, in addition to the members from WARDA's States chosen by the current system, seven individuals from outside the region selected by the CGIAR to serve in their individual capacities, plus the Executive Secretary (ES) as an ex-officio member, and it should delegate to the STC specific responsibility for reviewing integrated financial and programme plans, for approving the appointments of senior professional staff, and for constituting the search committee to select candidates for the ES to recommend to the GC.
- (b) In order to strengthen WARDA's leadership, the GC should eliminate the position of Deputy Executive Secretary as it is currently defined and it should authorize the ES to recruit a senior staff officer to assist in performing the duties of his office.
- (c) WARDA should establish standards and procedures of recruitment and compensation for senior scientific and professional staff as required to attract and retain personnel of international caliber at this level.
- (d) WARDA should strengthen the financial management system by creating and filling the position of chief financial officer who would report directly to the ES, improving internal and external audit controls, and taking immediate measures to overcome WARDA's present liquidity problem.

3. The Panel recommends that WARDA work toward the development of an integrated and coherent Association-wide programme for both the short and long term. This implies both more active internal planning as well as a serious effort to harmonize this rigorous planning effort with the needs and desires of WARDA's multiple donors. Towards this end, WARDA should establish a mechanism for an integrated cycle of programme planning-budgeting-monitoring-review. This is considered an essential tool of good research management.

- (a) The Panel recommends that WARDA conduct an Annual Association-wide programme review and programme planning

workshop in which accomplishments are measured against goals and goals are translated into operational plans for the coming year. If these imply substantial changes in programme direction the Association's long term plan should be revised to reflect them. This is an important device for ensuring the quality, relevance and coherence of WARDA's programme and is a responsibility of the regular administration structure. No staff should be added for this purpose.

- (b) Through this planning process, WARDA should define an integrated programme that includes those elements it considers to be essential to meeting its mandate. The Panel believes the activities in the Member States like the Special Projects should form a more central role in such an integrated programme.
- (c) WARDA should prepare an integrated Association budget showing all its activities. This budget should be approved by the STC and the Governing Council.
- (d) The integrated programme and its budget should be presented to the CGIAR and an attempt should be made to persuade donors who are members of the CG to direct their contribution to WARDA through the CGIAR to finance WARDA's programmes.

4. The Panel recommends that WARDA make upland rice the top priority in its programme because of the importance of upland rice in the region and the many difficult upland rice problems that need attention. All aspects of upland production systems may be addressed, drawing on the accumulated knowledge and research in addition to WARDA's own activities.

5. The Panel recommends that varietal development work, which heretofore has rested largely on the introduction of varieties and their testing, be expanded to include hybridization and be otherwise modified by adopting the following measures:

- (a) Some resources now used for IET and CVT, such as the Assistant Sub-Regional Coordinators and some technical services scientists at Headquarters should be devoted to identifying constraints and generating new technology for the upland, humid upland, inland swamp and mangrove swamp ecologies.
- (b) The initial screening of introduced varieties intended for IET should be carried out in each of the Special Research Projects to avoid screening out varieties that may perform well in one ecology but not in another. The Special Research Projects should participate fully in the IRTP coordinated by IRRI, according to their capabilities and needs.
- (c) The locations for planting IETs and CVTs should be chosen more carefully in relation to rice ecologies, local interest, supporting facilities and data on climate and soils.

- (d) WARDA should implement the recommendation of the first Quinquennial Review for a "transfer of full responsibilities for implementation of the trials to the Member States". That is, WARDA should make no cash payments to national research units to carry out the trials. At the same time, national programme staff should receive higher training to enhance their capacities for monitoring and selection of varieties suited to chosen countries.
- (e) The on-farm trials should be integrated into the TAT Programme or else discontinued.

6. The Panel recommends that no net additions above WARDA's present level of professional staff be made for at least two years but that recommended programme changes be accomplished through reassignments and termination of staff with less needed skills in favour of recruitment of staff with more needed skills. The present level is defined to mean the number of professional staff holding appointments in September, 1983. Within this limit, the following recommendations are made:

- (a) There should be no increase above the present level in the professional staff assigned to the Special Research Projects in the irrigated ecology at Richard Toll or in the deep water/floating rice ecology at Mopti. If necessary, to meet other programme needs, the staff at these two locations may be required.
- (b) Professional staff and programme in the mangrove swamp ecology of Rokupr should be kept at least at their current level. A small breeding programme should be initiated to develop varieties with improved plant types that are resistant to high soluble iron and salinity levels, tidal effects and crabs.
- (c) The Special Research Project on Upland Rice at Bouake should be strengthened as soon as possible through the transfer from Headquarters of specialists in plant breeding, agronomy, entomology, and plant pathology who are currently assigned to "Technical Services".
- (d) The Technology Assessment and Transfer Programme should be strengthened, perhaps by transferring some of the Assistant Sub-Regional Coordinators to the Special Projects to work on TAT efforts, if their skills are appropriate to that assignment.
- (e) The Technical Assistance Programme should continue at a level which enables it to respond to requests for project design and other services.
- (f) Statistical and data services activities of the Development Department should be maintained at their present level.

7. The Panel recommends strengthening and support of the training programme within the limits of WARDA's resources. Keeping this in mind:

- (a) The Training Department should conduct its Headquarters operations with the Director of the Department plus one other professional.
- (b) The Panel recommends no further expansion be undertaken at the Fendall Training Centre but supports the plan to enlarge the dining room and lounge because the available facilities are inadequate. Further expansion of training should be directed at increasing training opportunities in the Member States.
- (c) The Training Department should make an effort to ensure that a larger proportion of higher degree training opportunities offered to WARDA are made available to Member Country staff than has been true in the past.

8. The Panel recommends that a concerted effort be made to consolidate communication activities and supporting services and improve their efficiency. Among the things that should be considered are:

- (a) Merging the Documentation Division into the Communications Division which should continue the operation of the library at its present level, and eliminate the microfiche operation until adequate resources are available to purchase supplies and its value to users is established.
- (b) All documentation, editorial, printing, translating and interpreting activities should be conducted by the Communications Division. If their facilities are inadequate to handle WARDA's needs, they should arrange for appropriate outside contracting.

9. The Panel believes the number of staff engaged in support, administrative and coordinating activities is excessive. It recommends that ways be found to reduce the number and increase the productivity of staff in the administrative area and that with the exception of adding a Finance Director, the present complement be considered as the absolute upper limit. The position of architect should be eliminated. WARDA should strive to return to the concept of disaggregated programme components located in Member States and served by a small secretariat. WARDA should seriously consider placing all drivers, maintenance men, messengers and janitors at Headquarters into functional pools so that their allocation be consistent with the priorities of the whole Association. This may effect some economies and will make someone responsible for maintenance and cleaning common areas like hallways and stairs.

VI. MANAGEMENT POSITION

The position of the WARDA Management is that all of the recommendations of the CGIAR Programme and Management Review Panels be accepted.

VII. GOVERNING COUNCIL DECISION

During the week of November 28 - December 2, 1983, the Scientific and Technical Committee (STC) of WARDA reviewed the reports of the two Review Panels and made their recommendations to the Governing Council. The Governing Council in its meeting from December 5-9, 1983, adopted all the recommendations of the Panels with amendments to Recommendations 2a and 2b.

VIII. COMMENTARY AND IMPLEMENTATION

Recommendation 1

1. We appreciate the Panel's recommendation giving us the mandate to conduct a complete rice research programme and for determining appropriate technologies for Member States.

As recommended, WARDA will continue to maintain close working relationship with IITA and will meet periodically to discuss our projects. The Chairman of the WARDA Governing Council and the Executive Secretary paid a visit to IITA in February 1984. Meaningful discussions were held with the Director General and other IITA staff. During the visit, the Executive Secretary requested the Director General of IITA to maintain the secondment of the IITA staff in WARDA. The IITA/WARDA Liaison Scientist has been in WARDA since 1978. Contact with IRRI will also continue to be maintained and the position of the IRRI/Africa Liaison will be requested to continue. A conference has been proposed for May 16-18, 1984 among IITA, IRRI and WARDA to further discuss collaboration in our research programmes especially on upland rice.

Recommendation 2a

On the issue of restructuring the STC and the extension of its mandate, the Council agreed that the Committee should be enlarged to include seven members of the CGIAR. While it agreed in principle that the Committee's mandate might be extended, it stressed that the Committee should remain basically an advisory body. It instructed the Executive Secretary to seek the views of all the Member States on the extension of the mandate of the STC and submit their reactions and proposals at the next Governing Council meeting.

The CGIAR has been requested to submit nominations for the expanded STC which will meet from June 4-8, 1984, in Monrovia. Letters have been sent to Member Countries to seek their views on the expansion of the mandate of the STC.

Recommendation 2b

The post of Deputy Executive Secretary was maintained and the election of Deputy Executive Secretary was held as scheduled. The newly elected Deputy Executive Secretary, Mr. Alieu M.B. Jagne, took up his duties as of March 1, 1984.

Recommendation 2c

The Governing Council has agreed to allow WARDA to continue to recruit staff on the present conditions.

The STC, at its meeting in June, will discuss the establishment of standards and procedures for the recruitment and compensation of senior scientific and professional staff.

Recommendation 2d

The position of Financial Comptroller has been internationally advertised by WARDA and CGIAR. A short-listing has been done and interviews are currently being held by CGIAR on behalf of WARDA.

On the present WARDA liquidity problem, the Executive Secretary and the Chairman of the Governing Council have visited all Member Countries and contacted most of the Heads of State informing them among other things of WARDA's financial problems. They have responded very favourably with promises to pay up their arrears and their current contributions. Contacts have also been made to external donors as well as on their contributions.

Recommendation 3a

WARDA will organize next year a programme planning workshop in Bouake, Ivory Coast. This workshop or in-house review will be on an annual basis. In addition, there will be an open Rice Review Conference every other year.

Recommendation 3b

The Research and Development Departments have been combined under one Director who is being assisted by two professional staff at Headquarters.

A committee has been set up (Programme Integration Committee -PIC) to prepare the outline of an integrated and coherent programme for WARDA. The PIC has met on several occasions. WARDA has through CGIAR with Rockefeller funding secured the services of a consultant who will assist in finalizing the integrated programme which will be submitted to the STC meeting in June. The activities in the Member States will form a more central role in the integrated programme.

Recommendation 3c

Actions have started on this. The integrated budget for 1985-1989 will be ready in May 1984.

Recommendation 3d

The budget will be presented to CGIAR in June 1984. Donors will be requested to direct their contribution to WARDA through CGIAR to finance WARDA's programmes.

Recommendation 4

We endorse this recommendation and we are taking necessary action to make upland rice the top priority. We shall look at all aspects of upland production systems.

Recommendation 5

In all our research stations, we have plans for hybridization in varietal development.

Recommendation 5a

Some of the staff and funds for IETs and CVTs will have been diverted towards this.

Recommendation 5b

Screening of introductions will be done in appropriate WARDA Special Research Projects. The research projects will participate fully in the IRTP coordinated by IRRI, according to their capabilities and needs.

Recommendation 5c

Special Research Projects, Sub-Regional Coordinators and National Scientists will work together to identify appropriate locations for IETs and CVTs.

Recommendation 5d

As from 1985, there will be no cash payment to national research units to carry out WARDA trials. This year, half of the usual amount will be paid because of commitments already made. WARDA will, in collaboration with IITA, IRRI and other international and national centres train nationals to enhance their capabilities in relevant areas of research including varietal development.

Recommendation 5e

The on-farm trials will be integrated into the TAT Programme from 1984.

Recommendation 6 - General

This is being implemented. Some staff are being terminated and various staff deployments will be made in 1984.

Recommendation 6a

This is acceptable but some of our staff presently at headquarters will be deployed to Mopti and Richard Toll.

Recommendation 6b

This is being implemented.

Recommendation 6c

Effective March 1, 1984, three professional staff members have been relocated to the Bouake Upland Rice Project in the Ivory Coast. The transferred staff include a breeder, a pathologist and an entomologist. The senior agronomist will also be transferred at the end of June. One or two others from the former Development Department will be transferred by the end of the year.

Recommendation 6d

The TAT Programme will be strengthened by the transfer of some of the staff in the former Development Department to appropriate sites. One of the Assistant Sub-Regional Coordinators will be transferred to the TAT Programme and might be based at Guinea Bissau.

Recommendation 6e

Technical Assistance Programme (TAP) will be continued with a core of professional staff at Headquarters and those in the field. The Director of Research and Development will coordinate this.

Recommendation 6f

The statistical and data services activities will be maintained as recommended.

Recommendation 7a

The activities of Training Department at Headquarters are carried out by the Director of Training Department plus one expert from Switzerland under Swiss cooperation as Special Assistant. The expert's contract is ending on June 30, 1984. Meanwhile, a chief of pedagogical support is being appointed and will take up full duties in July 1984.

Recommendation 7b

So far, no further expansion is undertaken at the Fendall Training Centre apart from the dining room, lounge and garage to hold agricultural equipment and for maintenance of cars. These works will be terminated by the end of 1984 under USAID Monrovia aid and supervision.

Recommendation 7c

This recommendation will guide our policy in future, depending on the availability of scholarships. It may be noted that since 1978 scholarships offered by France, Belgium, USA, Canada, FAO, IRRI, WARDA, Great Britain and Switzerland have been given to Member Countries staff for short, medium and long term training in the fields of research, water management, agriculture/economics and teaching while special scholarships are available for special projects.

Recommendation 8a

The Documentation and Communications Divisions have been fused under one Chief. The microfiche operation has been suspended pending improvement in the financial situation.

Recommendation 8b

Communications Division now takes care of all relevant activities. Contacts are being made to look for a consultant to assist on our publications. As the financial situation improves, outside contracts will be done for translating, interpreting and printing, etc.

Recommendation 9

Internal arrangements are being made to reduce administrative costs. The post of the architect will be eliminated end of June 1984. Pooling system has been implemented for drivers, maintenance men at headquarters.

TAC COMMENTARY ON THE SECOND EXTERNAL PROGRAM REVIEW OF WARDA

TAC expresses its appreciation to Drs. A. Blumenschein and L. Stifel and their colleagues on the Review Panels for their thorough analysis and their clear reports. TAC discussed the report of the Second External Program Review in conjunction with the Management Review report of WARDA at its 32nd and its 33rd Meetings. Both Panel Chairmen and the Executive Secretary of WARDA were available for the discussions at TAC 32; Dr. H. Leroux was also available at TAC 33.

The EPR and EMR Reports

The Committee commended both Review Reports and noted that they are complementary and interdependent. They provide a useful instrument for focussing TAC's and CGIAR's attention on the CGIAR-supported elements of WARDA's research and training program within the broader context of the Association's overall program.

Findings and Recommendations of the Review Reports

TAC endorses the Review findings and accepts the Reports' recommendations with the comments set out below. It considers the recommendations of both Reports to be one coherent package.

WARDA's Mandate

WARDA is a regional inter-governmental research and development association which operates on a network basis involving the national systems of its member countries. TAC recognizes that WARDA is a creation of its member states with the objective of helping them to achieve self-sufficiency in rice.

TAC noted that in the context of the CGIAR System WARDA was viewed essentially as an organization for adaptive research in its 15 member states. This implied the testing of improved rice varieties developed elsewhere for their adaptability to West African conditions.

TAC agrees with the Panel's recommendation that the CGIAR's support for WARDA should be shifted toward technology generation. WARDA should conduct a coherent rice research program for the more important rice ecologies of its region, in close cooperation with the other institutions responsible for rice research.

WARDA's Potential

TAC is aware of the pressing research needs in WARDA's member countries and the important role that WARDA could play in filling these needs. It recognizes the Association's basic potential for conducting and promoting research and development activities in cooperation with its member countries and with other international institutions.

TAC notes that this potential has not been fully realized and the impact of WARDA's work is modest. WARDA is in fact facing a serious crisis due to a series of management, financial and programmatic problems which have reduced the Association's performance to a critically low level.

TAC considers that in order to overcome these problems and to mobilize WARDA's full potential, a number of important changes are required. The measures considered essential concern both organization and management and the area of program development. They are interdependent and constitute one coherent package.

Organization and Management

TAC endorses the Panel's view that in the area of organization and management the following four measures are required to realize the Association's performance potential.

- (i) Delegation of specific managerial responsibilities to an expanded STC through the addition of CGIAR nominees (Recommendation 1 of the EMR Report). This is expected to create an effective mechanism for exercising control on behalf of member states and provide the management with a central source of guidance and support for program formulation and execution.
- (ii) Strengthening of WARDA's executive leadership by eliminating the position of Deputy Executive Secretary as currently defined in the WARDA Constitution (Recommendation 2 of the EMR Report). This is expected to provide the Association with the much needed unified leadership. TAC understands that WARDA constitutional processes require an orderly change in order to comply with this recommendation and in view of this accepts a delay in implementation.
- (iii) Establishing standards for international recruitment and compensation as required to attract and retain high-quality staff (Recommendation 3 of the EMR Report). The involvement of the reconstituted STC in setting standards and procedures for international recruitment is recognized as an important part of this recommendation.
- (iv) Strengthening of the financial management system by appointing a Chief Financial Officer reporting directly to the Executive

Secretary, improving internal and external audit controls, and taking immediate measures to solve WARDA's present liquidity problems (Recommendation 4 of the EMR Report). This is expected to provide WARDA with an adequate financial and control system and to enable the top management to exercise its function of financial management.

Program Development

In the area of program development TAC considers that three measures are essential to increase the relevance and effectiveness of WARDA's research effort.

- (i) Development of an integrated and coherent Association-wide program (Recommendation 3 of the EPR Report). This implies the establishment of an institutional mechanism for an integrated cycle of program planning - budgeting - monitoring - review. It is considered an essential tool for successful research management and is particularly necessary in the case of WARDA in view of the Association's need to harmonize the demands of member countries with the desires of its large number of external donors.
- (ii) A shift in emphasis from research efforts directed at testing imported technology to efforts at generating appropriate technology for the different rice ecologies in the region, especially upland rice (Recommendations 4 and 5 of the EPR Report).
- (iii) Decentralization of research activities and research staff (Recommendation 9 of the EPR Report). This implies strengthening those activities that will more directly assist member states to achieve the Association's goals. It means placing primary emphasis on program activities at research sites in member states and reducing the size of headquarters-based staff. This is expected to increase considerably the effectiveness and relevance of the research program.

TAC supports the Panel's suggestion that an integrated WARDA budget showing all activities should be approved annually by the Governing Council with the advice of the STC, and presented to the CGIAR and other donors, who on their part should be encouraged to direct their funds in a way that will maintain the support for an integrated WARDA program.

WARDA Strategy

TAC endorses the Panel's recommendation that in view of the importance of upland rice in the region work on this ecology be given top priority, to be followed by mangrove swamp rice cultivation and irrigated rice.

Cooperation with Other Organizations

TAC stresses the importance of the Panel's recommendations that in the further development of its research program along the lines suggested, WARDA seek the collaboration of other rice research institutions active in the region to reach an optimum sharing of responsibilities.

Implementation of Review Recommendations

TAC notes that most of the problems facing WARDA, as outlined in the review reports, are of a long-standing nature. They are more structural in character than situational and require early attention. TAC considers that implementation of all recommendations of both review panels is essential if continued support for WARDA's programs from CGIAR donors is to be expected.

TAC assumes that WARDA will move ahead vigorously with the establishment of a coherent plan of action for the implementation of those recommendations. It stresses the need for realism in target setting in such an exercise and expects to be kept fully informed of the development of a time-phased plan of action. TAC notes in this connection that WARDA management and the Governing Council have reacted favourably to most of the Panel's recommendations. It stresses the need for early implementation.

Monitoring of Progress

TAC feels that the recommendations made by the two Panels constitute an essential framework for the solution of many of WARDA's present problems and for the development of a coherent program. This framework allows the necessary flexibility that is required for successful implementation and yet provides a useful tool for monitoring.

The monitoring process to be instituted shall be guided by TAC and the Secretariat of the CGIAR. It will consist of:

- (i) Regular progress reports by WARDA management and STC;
- (ii) Regular visits to WARDA on behalf of CGIAR and TAC.

All throughout this monitoring process TAC shall be concerned with actual results and WARDA's performance rather than the fulfillment of formalistic requirements. At any time in this process, TAC may carefully examine the progress WARDA has made to date and make further recommendations to the CGIAR.

With regard to timing, the following steps are planned:

- (i) June 1984: first progress report together with the submission of the integrated program and budget for 1985;
- (ii) December 1984: second progress report;
- (iii) June 1985: third progress report and submission of the program and budget for 1986;
- (iv) June 1986: mid-term evaluation by a TAC mission to WARDA.

Recommendation to the CGIAR

TAC recommends continuation of CGIAR support to WARDA on the condition that the measures proposed are taken by WARDA and satisfactory evidence of substantially improved program performance is provided according to the schedule set out above.



CENTRO NACIONAL DE PESQUISA - ARROZ, FEIJÃO

Goiânia, December 27, 1983

Dear Prof. Camus,

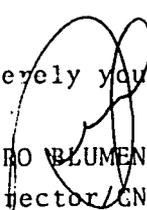
Please find enclosed the report of the Second External Program Review of WARDA. The Terms of Reference and the specific questions referred to the Panel by TAC were used as guidelines. The findings and recommendations were unanimously agreed upon. We hope the report will be useful to your Committee, WARDA, the Associated Nations, and the CGIAR System as a whole.

As is written in the report, "WARDA is a creation of its member States; and represents the embodiment of the ideal of regional inter-governmental cooperation". I think it also represents the recognition of the importance of agriculture research by developing countries and is an important step towards a broad system where International Institutions and National Programs participate in a truly cooperative effort. For these reasons, WARDA must be looked upon as a special and important example.

On behalf of the Panel, I would like to give special thanks to Dr. R. Herdt, who participated in our work not only as an observer of the CGIAR Secretariat, but also as a true and a very efficient member of the group.

We thank Mr. A. von der Osten, Executive Secretary, for his active participation in the discussions and writing of the report. Also we thank Ms. M. Lantini from TAC Secretariat for her patience and excellent work in the typing and organization of the draft and for logistic support.

Sincerely yours,


ALMIRÓ BLUMENSCHWEIN
Director/CNPAF

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AGR/TAC:IAR/83/26 Rev. 1

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE

REPORT OF THE
SECOND EXTERNAL PROGRAM REVIEW
OF THE
WEST AFRICA RICE DEVELOPMENT ASSOCIATION
(WARDA)

Review Panel: Dr. A. Blumenschein (Chairman)
Dr. R.F. Chandler, Jr.
Dr. J.M. Liwenga
Dr. H.A. Luning
Dr. B.E.J. Wheeler
Dr. R.W. Herdt (CGIAR Secretariat)
Mr. A. von der Osten (TAC Secretariat)

TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
MARCH 1984

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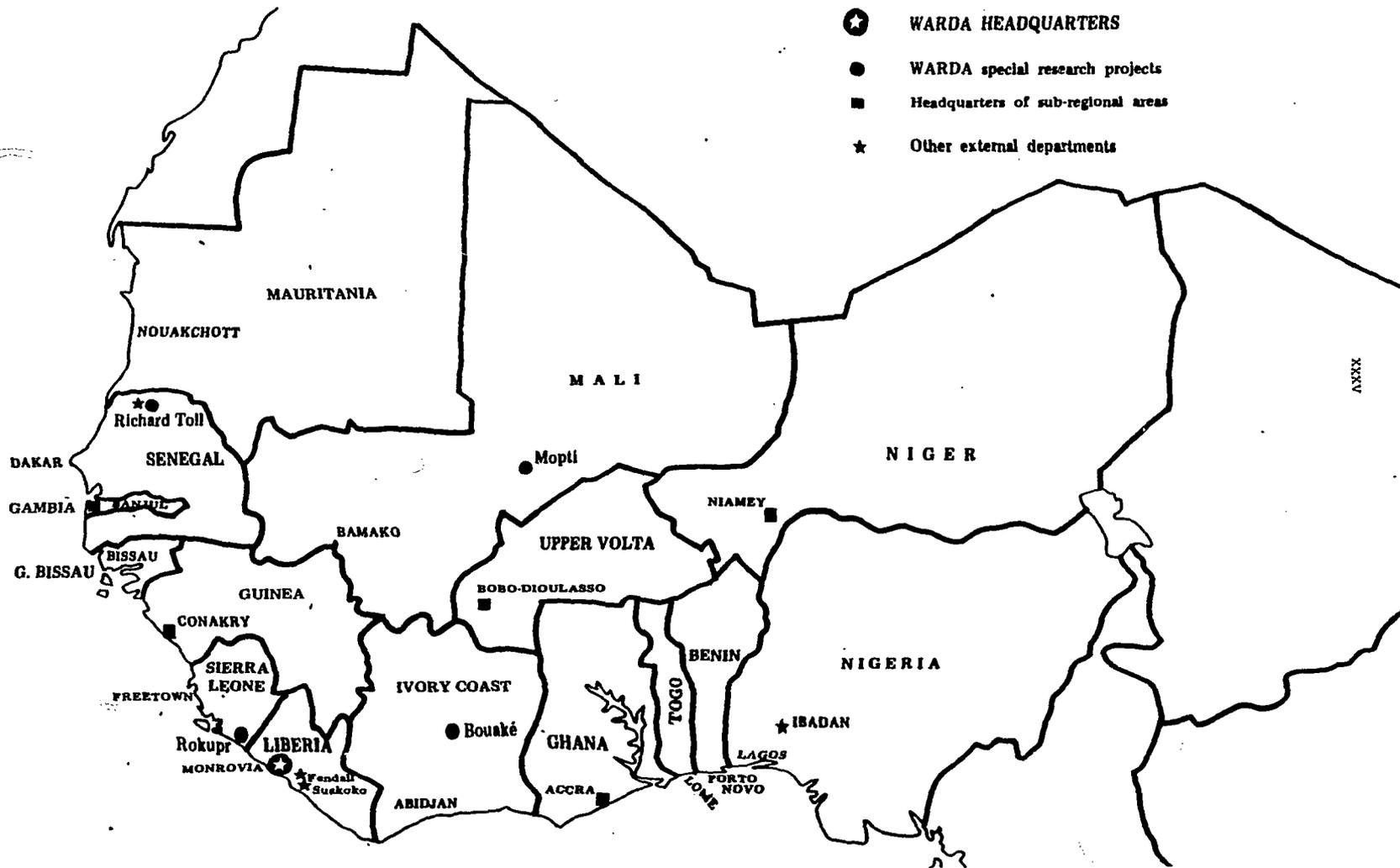
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WARDA'S AREAS OF OPERATIONS

- ★ WARD A HEADQUARTERS
- WARD special research projects
- Headquarters of sub-regional areas
- ★ Other external departments



- 1 -

CHAPTER 1. EXECUTIVE SUMMARY

1.1. The Review

The Technical Advisory Committee (TAC) of the CGIAR commissioned this review of WARDA's program by a panel of external agricultural researchers. The Panel was guided by TAC's terms of reference (Annex I), the first Quinquennial Review and the combined knowledge of its members. The CGIAR also commissioned a review of the management of WARDA, which was conducted simultaneously.

The Review was conducted in two stages during which members of the Panel, either collectively or in sub-groups, visited the four Special Research Projects, the stations of most Sub-Regional Coordinators, the Training Centre and research facilities at Fendall and WARDA Headquarters in Monrovia. Two members of the Panel also visited IITA. The members of the Panel were thus able to interact with a range of WARDA staff, national program staff and administrators.

1.2. The Report

The purpose of the report is both to help WARDA carry out its mandate more effectively and to provide CGIAR with information that will help it to assess the WARDA program. The report examines the relevance, scope and objectives of both present programs and forward plans of WARDA in relation to its mandate, assesses the content and quality of its programs and appraises the impact of its activities.

The report is structured to reflect the view of the Panel on the potential of WARDA to respond to existing needs for rice in West Africa (Chapter 3), its research activities (Chapters 4, 5, 6), other components of its program (Chapter 7) and its links with other organizations (Chapter 8).

The report concludes with an overview of WARDA and a list of the Panel's main recommendations.

Administrative and financial management issues are reviewed in the report of the Management Review Team.

1.3. WARDA's Mandate

WARDA is charged with rice research and development in West Africa. The frequently stated view of its objectives can be almost equated with

achieving regional rice self-sufficiency, a view which also prevailed in the first Quinquennial Review. Yet, although the production of rice in West Africa has increased, because of more rapid increases in demand and other political, economic and social factors beyond the control of WARDA, regional self-sufficiency has decreased from 70% in 1970/74 to 48% in 1980/82. Thus a more realistic statement of WARDA's objectives, as in fact stated in the Constitution, is to assist member states to increase rice production through research and development activities (Annex IV).

In the context of the CGIAR system, WARDA was viewed as an organization with a mandate for adaptive research in the 15 member states. This involves essentially the testing of improved rice varieties, production technologies and "packages of practices" for their adaptability to the principal ecologies of West Africa.

Donors, themselves members of the CGIAR, have extended this mandate through agreements outside the CGIAR to include technology generation, research activities, constraints identification and pilot extension schemes.

The Panel considers that WARDA has, and should have, the mandate to conduct a complete rice research program for the important rice ecologies of its 15 member states and to assist its member states to conduct similar research and development programs. WARDA's program should include: determining the technologies required, developing and testing those technologies and assisting member states to put those technologies and related development policies into effect.

1.4. WARDA's Strategy

The Panel found it difficult to perceive a coherent overall strategy in WARDA to achieve its objectives. This lack of operational strategy geared to the needs of West Africa has contributed in large measure to the present fragmented program. The Panel accepts that funding problems have also contributed to this but believes that WARDA should concentrate more on defining an integral program and finding support for it than on responding to the individual interests of its many donors. Despite this, the Panel considers that WARDA had made considerable progress towards achieving some objectives. It needs now to focus its efforts on the most relevant parts of its own program and assist more positively in building the national programs. This requires strong leadership.

1.5. WARDA's Program

WARDA's program is centered around the principal areas of research, development and training. Some individual aspects are commendable but the

program is fragmented. There is not the unity between the various components -- coordinated trials, special research projects, technology assessment and transfer, training -- that should exist. There are mechanisms for interchange of results and ideas for appraising these critically -- annual reviews, sub-regional coordinators and visits of HQ staff to outstations. However, too little effort has been made to use these mechanisms for producing a unified program and hence the organization remains fragmented.

1.6. WARDA's Impact

WARDA's impact on the production of rice is small but there are other criteria against which its performance can be judged. It has:

- (i) identified some of the constraints limiting rice production increases in West Africa;
- (ii) introduced many rice cultivars into the region, some of which are used by farmers;
- (iii) established productive research activities in the Richard-Toll and Rokupr Special Research Projects;
- (iv) generated a modest amount of new scientific knowledge;
- (v) developed and implemented a Technology Assessment and Transfer (TAT) program to appraise the value of its technologies;
- (vi) contributed substantially to studies of rice policies and economics in West Africa;
- (vii) helped to improve the research capacity of its member states through its training programs and Sub-Regional Coordinators.

1.7. Suggested Changes

The Panel considers that there should be two major changes in WARDA's program:

- (i) the Association should strengthen those activities that will more directly assist its member states to achieve increased production by placing primary emphasis on program activities in the member states and reducing the size of the Monrovia-based staff;

- (ii) there should be less emphasis on introducing technology and more on generating appropriate technology for the different rice ecologies in the region, especially upland rice.

The recommendations of the Panel indicate the specific ways in which these changes should be made. These are detailed in Section 9.3. but their essential features are as follows:

- (i) The key recommendations of the Management Review Panel vis-à-vis the reconstitution of the Scientific and Technical Committee (STC) and the strengthening of WARDA's leadership should be implemented immediately. Subject to this, WARDA should be recognized as having the CGIAR mandate as indicated by the final paragraph Section 1.3. of this Executive Summary. WARDA should maintain close working relations with other rice research institutions to facilitate its work and to this end could meet periodically with IITA, IRAT and IRRI to discuss programs and ensure maximum productivity of all resources (Rec. 1,2).
- (ii) WARDA should plan an integrated, coherent, Association-wide program suited to both short and long-term objectives and appraising realistically the needs and desires of its multiple donors. Activities in member states like the Special Project should be central to this program. The importance of upland rice in the region demands that work on upland rice be a top priority. All aspects of upland production systems should be addressed using all knowledge accumulated from research at WARDA and other institutions. A mechanism should be established for an integrated cycle of program planning-budgeting-monitoring-review to allow an annual dynamic reappraisal of this coherent program and to make any necessary changes. An integrated WARDA budget showing all activities should be approved by the STC and Governing Council, and presented to CGIAR and other donors, who on their part should be encouraged to direct their funds through the CGIAR or otherwise so as to maintain the integrity of the WARDA program (Rec. 3, 4, 5).
- (iii) Overall, professional staff levels should be maintained at those obtained in September 1983 and priorities defined in the WARDA integrated program should be strengthened by deploying staff. Specifically:

(a) In Research and Development, the Special Project at Bouake should be strengthened by the transfer from Headquarters of specialists in plant breeding, agronomy, entomology and plant pathology; Technology Assessment and Transfer (TAT) should be similarly strengthened by transferring assistant Sub-Regional Coordinators who have appropriate skills to the Special Projects for TAT efforts.

(b) In Training further expansion should only be directed at increasing training opportunities in the member states.

(c) The communication activities should be consolidated by merging the Documentation Division into the Communication Division.

(d) Ways should be found to reduce staff and increase productivity of staff engaged in support, administrative and coordinating activities (Rec. 6, 7, 8, 9).

The implementation of the Panel's recommendations is considered essential for the future operation of the Association.

CHAPTER 2. INTRODUCTION

2.1. The Consultative Group on International Agricultural Research (CGIAR)

The CGIAR, founded in 1971, is an international consortium sponsored by the Food and Agriculture Organization of the United Nations (FAO), the United Nations Development Programme (UNDP) and the World Bank. It seeks to increase food production in the developing world through research programs and training scientists and production specialists in these countries.

The Consultative Group is comprised of 35 donors, including 19 governments, 11 international organizations and development banks and 5 foundations, and 10 non-donor developing nations as representatives of the five major developing regions of the world: Africa, the Near East, Asia, Latin America, and Southeastern Europe, nominated by the FAO Regional Conferences on a two-year term basis.

The 13 institutions which the CGIAR supports are autonomous international research and training institutions with an international staff of scientists, supported by locally recruited technicians. Each is governed by its own international Board of Trustees.

The CGIAR has an independent Technical Advisory Committee (TAC) entrusted with the periodical assessment of the achievements, the appropriateness and the effectiveness of the programs of the International Agricultural Centers. These reviews of individual centers are conducted by TAC at approximately five-year intervals.

2.2. West Africa Rice Development Association (WARDA)

WARDA is a regional intergovernmental organization with the primary objective of making the region self-sufficient in rice by promoting rice production in the region and increasing the quantity and quality of rice produced in West Africa. To this end WARDA conducts research, development and training programs.

Rice is a staple food of growing importance in West Africa. An estimated 700,000 farmers grow rice in the region, but yields are generally low. Despite the region's considerable potential for growing larger quantities of rice, West African countries spend increasing amounts of their scarce foreign exchange resources on rice imports to supplement local production.

In response to this need WARDA was founded in 1971. Its members are: Benin, Gambia, Guinea, Guinea Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo and Upper Volta.

WARDA is governed by its Governing Council. Its programs are regularly reviewed by a Scientific and Technical Committee as well as donor agencies. WARDA is financed by member countries as well as numerous donor agencies.

2.3. The Second External Program Review (EPR) of WARDA

The first Quinquennial Review of WARDA was held in 1978. An independent Panel reviewed the activities of the Association and submitted its report to both TAC and CGIAR. The Panel's recommendations were generally endorsed by TAC, the CGIAR and WARDA. The review report served as a reference document for the second review.

In consultation with WARDA, TAC decided that the second review of WARDA should take place in mid-1983. The program review would be held simultaneously with a management review of the Association, the latter being conducted by the CGIAR Secretariat.

2.4. Terms of Reference

The Review Panel was charged with the conduct of the review under the Standard Terms of Reference for TAC External Program Reviews of the CGIAR Centers. The Panel was requested to assess content, quality and impact of the overall program of WARDA and to examine whether the research program is conducted in line with declared policies and to acceptable standards of excellence.

The Panel was expected to give particular attention to the mandate of the Association, to the relevance, scope and objectives of both its present program and its forward plans and to the impact of its activities. The detailed Terms of Reference including a list of specific questions to be addressed by the Panel are appended as Annex I.

2.5. Preparations for the Review

In consultation with WARDA management TAC established a time-phased program for the review, selected a panel to conduct the review and prepared a list of issues and specific questions to be addressed in the exercise.

Both WARDA and the TAC Secretariat provided the Review Panel with a comprehensive set of relevant briefing documents. The list of documents is appended as Annex II.

In preparing for the review one of the Panel members (Dr. Robert F. Chandler) attended on the Panel's behalf the 1983 Annual Rice Review Meeting organized by WARDA.

2.6. The Review Panel

The Panel was chaired by:

Dr. A. Blumenschein, Director, National Center for Research on Rice and Beans, Brazil.

Its members were:

Dr. R.F. Chandler, Jr., former Director of IRRI

Dr. J.M. Liwenga, Director
Uyole Agricultural Centre, Tanzania

Dr. H.A. Luning, Agricultural Economist,
International Institute for Aerial Survey and Earth Sciences
(ITC), Netherlands

Dr. B.E. Wheeler, Reader in Plant Pathology,
Imperial College, UK.

Observer:

Dr. R.W. Herdt, Scientific Adviser, CGIAR Secretariat,
World Bank, USA

Secretary to the Panel was:

Mr. A. von der Osten, Executive Secretary, TAC
FAO, Italy.

The full addresses of the panel members are provided in Annex III.

2.7. Review Activities

The Review was conducted in two phases. The second phase coincided with the Management Review of WARDA. All throughout that phase, the Panel

cooperated closely with the Management Review Team. It found this close cooperation between the two Panels useful and mutually beneficial.

During Phase I which took place from June 12 to 20, 1983, the Panel visited:

- WARDA Headquarters at Monrovia;
- WARDA's Liberia-based activities including the Fendall Training Centre and the Suakoko research sites;
- the Special Research Project on Irrigated Rice at Richard-Toll in Senegal;
- the regional coordination office for Zone I in the Gambia;
- cooperating national programs in Gambia, Liberia and Senegal.

Phase II was conducted between September 15 and October 7, 1983. During the initial parts of this phase, the Panel split up into 3 teams in order to cope with the extensive program of visits and travel that had been drawn up. The programs and institutions visited include:

- the three Special Research Projects on Mangrove Swamp Rice at Rokupr (Sierra Leone) on Deep-Water and Floating Rice at Mopti (Mali) and on Upland Rice at Bouake (Ivory Coast);
- the sub-regional coordination office for Zone III at Bobo-Dioulasso, Upper Volta;
- the cooperating national programs in Ivory Coast, Nigeria, Sierra Leone and Upper Volta;
- the rice research program at IITA, Ibadan, including a meeting with the Panel conducting the External Program Review of IITA;
- WARDA Headquarters at Monrovia where the complete Panel spent the period 25 September to 7 October 1983. During that time the Panel met with the team conducting the USAID Mid-Point Project Evaluation of WARDA.

The Panel appreciates the cooperation of WARDA management and staff all throughout the review. It regrets, however, that the intended meeting with the Scientific and Technical Committee (STC) was not arranged.

Details of the review program, the Panel's itinerary and the persons and institutions consulted are provided in Annex IV.

2.8. The Report

On October 7, 1983, the Panel presented its collective findings and recommendations to the WARDA management and provided them with the draft report for their comments.

The Review Panel accepts sole responsibility for this report, which does not commit in any way the sponsoring agency, i.e. the CGIAR/TAC.

The report is structured in such a manner as to reflect the Panel's findings with respect to the following key areas:

- the importance of rice in West Africa, WARDA's mandate in this regard and the Association's potential (in terms of structure, mode of operation and resource endowment) to respond to existing needs (Chapter 3);
- an assessment of the relevance, quality and impact of WARDA's research programs (Chapters 4, 5, 6);
- a review of the other components of WARDA's program and linkages among them (Chapter 7);
- an analysis of WARDA's scientific linkages with the outside world, i.e. cooperative arrangements with national systems on the one side and with International Research Centers on the other (Chapter 8);
- an overall assessment of the Association's achievements, and impact with due consideration given to major constraints and possibilities for their removal (Chapter 9).

2.9. Follow-up

The Panel's draft report was subsequently presented by its Chairman to TAC at its 32nd meeting in October 1983 and to the Governing Council of WARDA at its 13th meeting in December, 1983. Both entities formulated their response and comments.

In the light of these comments an editing team of the Panel reviewed the report in early-December 1983. The final report was then submitted to TAC for consideration at its 33rd meeting in March 1984 and for transmittal to the CGIAR.

CHAPTER 3. THE MANDATE AND ITS IMPLEMENTATION

WARDA is charged with rice research and development work by its member states and the CGIAR. This chapter of the report describes the reasons why rice is important to the WARDA countries, analyzes the mandate given to WARDA by the member countries and the CGIAR, describes how WARDA is organized to pursue its mandate, and analyzes the allocation of WARDA resources among its various activities and functions.

3.1. Rice in West Africa

Approximately 340 million tons of rice are produced world-wide on 145 million hectares. Developed countries (Japan, USA, etc.) account for about 2% of the total area, Latin America for nearly 5%, developing Asian countries for about 90%. Africa contributes about 3% of the world's rice area and somewhat less than 3% of the world production, because yields in Africa are far below the world average. WARDA countries account for about half of Africa's production, the other half is largely grown in two countries, Egypt and Malagasy Republic.

The importance of rice production, consumption and imports has been steadily increasing in most of the WARDA countries for some time. In 1960/64, 1.5 million ha. were planted to rice in the 15 member states. By 1980/82 this area had increased to 2.5 million ha. Production increased at the same pace as there was little change in yields per ha. Imports were 0.3 million tons in 1960/64, 0.9 million tons in 1975/79 and 1.7 million tons in 1982 (Table 1).

Upland rice accounts for about 65% of the area. It is mainly grown by smallholders either under shifting (bush-fallow) cultivation or under hydromorphic conditions which fluctuate between flooded, saturated and upland conditions within a season. Most other rice in the region is grown under either mangrove or inland valley swamps with no control over water, conditions described as "lowland" or "wetland" in Asia. About 2% of the region's rice land is irrigated, where farmers have the ability to add water to the fields. The table in Annex V shows WARDA's estimate of the proportion of area planted to the various types of rice culture.

The average yield has remained in the range of 1.1 to 1.3 tons paddy per ha. Average annual paddy production of 2.75 million tons in the period 1975/79 increased to 2.9 million tons in the period 1980/82, an average rate of production increase of 1.5% per year. There were substantial production increases during this period in Nigeria, Upper Volta and Togo and sizeable decreases in Sierra Leone, Mali, Guinea Bissau and

Senegal whereas the other rice producing countries show rather wide fluctuations from year to year. For the 15 WARDA countries as a whole estimated per capita paddy production has not changed significantly since the 1960s. However, for individual countries the picture is different: a large increase occurred in Nigeria and Mauritania, and substantial decreases over this 20-year period in Guinea Bissau, Mali and Senegal.

In recent years rice imports to the WARDA region accounted for about 13% of world rice imports up from about 5% in the 1960s. Regional self-sufficiency in rice which stood at over 70% in 1970/74 has dropped to 48% in 1980/82. None of the countries in the sub-region is presently self-sufficient in rice.

Nigeria, Senegal, Ivory Coast, Liberia and Guinea together account for 82% of the total rice imports in the WARDA countries in 1982. Since 1980 there has been no significant amount of stocks carried over from year to year in the WARDA countries, with the exception of Senegal and Gambia. Per capita annual rice consumption is at Asian levels (90-120 kg) in Liberia, Sierra Leone and recently also in Gambia. Ivory Coast, Guinea, Guinea Bissau, Mauritania and Senegal form a middle group consuming 50-70 kg/capita/annum. In the remaining countries, consumption levels are 10 kg/capita or less.

Population has grown over the last five years by approximately 14%, total paddy production has increased by about 8% and per capita rice consumption has increased by about 20%, with the ultimate result that the gap between consumption and production substantially widened over the period.

The rapid increase in rice consumption was noted in the first Quinquennial Review (paras 125-127). The role of population and income growth, urbanization and substitution of other cereals by rice were considered to be the main factors. To this should be added the heavy subsidizing of retail prices, which has made rice one of the cheapest foods consumed in the area. This is illustrated with the case of Ivory Coast where rice prices increased 130% between 1960/66 and 1976/77 while other starchy staple prices increased by 180 to 360% (see table, Annex VI). However, the decreasing ability of governments to maintain subsidies must lead to a gradual increase in consumer prices, unless substantial food aid or production increases can offset this price trend. So far the extent of consumer price increases has not had much effect in slowing down demand for rice. The Governments of Mali, Sierra Leone and the Gambia have announced that subsidies on rice consumption will gradually be phased out.

Table 1. Key Statistics on Rice Production, Consumption and Imports for the WARDA Member States, 1980/82 and Compound Annual Growth Rates 1975/79 to 1980/82; Self-Sufficiency Rates 1980/82

	Rice Area		Paddy Yields		Paddy Production ^{a/}		Net Rice Imports		Per Capita Consumption (kg./yr.)		Self-Sufficiency Rates
	'000 ha.	Annual Growth Rate	kg/ha.	Annual Growth Rate	'000 t.	Annual Growth Rate	'000 t.	Annual Growth Rate	1960/64	1980/82	1980/82
Benin	9	- 2.3	1702	- 3.5	17	- 4.8	20	7.6	2	8	38.5
Ivory Coast	457	2.5	1028	- 3.6	470	- 1.2	283	29.0	34	68	50.4
Gambia	26	2.6	1583	4.4	40	6.5	34	6.3	68	91	36.3
Ghana	67	0	1052	1.3	70	1.5	38	- 1.7	9	7	52.8
Guinea	539	5.3	776	- 3.7	419	1.4	76	14.3	49	42	71.5
Guinea-Bissau	41	- 2.3	920	- 8.8	37	-11.0	29	15.8	127	64	46.3
Liberia	209	1.3	1262	11.4	265	4.2	90	14.9	86	122	49.4
Mali	161	- 1.4	1270	0.1	132	- 9.2	87	51.5	22	24	61.3
Mauritania	3	20.7	822	-37.9	12	1.4	59	13.2	7	42	49.0
Niger	21	0	3458	- 5.6	34	6.8	67	60.2	2	8	9.6
Nigeria	464	16.8	1591	6.7	835	17.8	529	16.7	2	11	44.9
Senegal	71	- 4.0	1782	0.1	88	- 6.7	304	9.2	48	59	42.2
Sierra Leone	384	- 2.5	1231	- 2.8	434	- 7.9	52	16.9	82	95	14.1
Togo	23	- 2.3	1129	- 5.5	27	5.7	14	11.0	7	10	82.3
Upper Volta	39	- 1.7	1205	8.3	49	7.8	23	3.1	4	8	50.1
Total/Average	2514	3.2	1164	- 0.1	2928	1.5	1660	16.0	12	21	48.3

Source: Calculated from data in Rice Statistics Yearbook (WARDA, June 1983).

^{a/} Expressed as unhusked rice (Paddy).

All member countries operate guaranteed producer price schemes aimed at providing economic incentives but these vary from country to country. Guaranteed prices increased in most countries since 1975/79, they remained constant in Nigeria, Niger and Senegal and were reduced in Ivory Coast. A change in producer prices would, "all other things being equal," affect land cultivated, yields and therefore output. However, in many sub-regions farmers produce rice primarily to meet their subsistence needs and many constraints on rice production by the farm family often lead to situations where farmers have to accept low ex-farm gate prices. These factors militate against the benefits to be obtained by a change in producer prices. Some other factors which may also negatively affect rice production are overvalued exchange rates, lack of foreign exchange to provide equipment for mechanized rice cultivation and irrigation and cash limits for farm credit.

Whatever the economics of rice production in the various member states, from a social or private economic viewpoint, the reality is that governments are going ahead in designing programs for increased food production including rice. All the countries have ongoing special programs and projects to increase paddy production, but to date it is difficult to argue that these projects have made much contribution to production, with the possible exception of Nigeria.

3.2. The Mandate and Its Interpretation

WARDA is unique among institutions supported by the CGIAR in being a regional intergovernmental association controlled by its member states. Thus WARDA is ultimately responsible to its Governing Council, composed of the Ministers of Agriculture of member states, and their view of the purposes of the Association must be considered as well as that of the CGIAR donors.

3.2.1. Member States' View

The member states expressed their view in the constitution of WARDA that "The Association shall assist the Governments of Member States to achieve operational cooperation in the pursuit of": increased rice production, improved rice quality, use of appropriate varieties, use of adapted production methods, effective phytosanitary controls related to rice, and promotion of storage, processing and marketing (Annex VII provides the full text). These objectives have almost been equated by the member states and staff of WARDA with achieving self-sufficiency, as illustrated by the full text of the paragraph on objectives in the document prepared for the External Program Review:

"The main aims of the Association are to promote rice development and trade through sub-regional cooperation to achieve collective self-reliance and food security in the shortest possible time. The ultimate objectives include assisting the Member Countries to reach, as near as possible, self-sufficiency in rice and improving the economic and social well-being of the large number of rice farmers in the sub-region."

The Chairman of the Governing Council expressed similar views in his opening statement to the Rome meeting of WARDA donors in 1981.

In the light of the trends in West Africa's rice situation it is obvious that WARDA has not moved the region toward self-sufficiency. However, this stated goal of WARDA -- to assist member countries in achieving rice self-sufficiency -- is a poor criterion against which to assess WARDA's performance because the Association has limited capacity to deal with one of the major factors holding down rice production -- the level of economic incentives -- which are controlled by national policies.

Rice self-sufficiency, in fact, is probably subordinate to food self-sufficiency in the political-economic goals of most countries. Both, however, are probably subordinate to the maintenance of peaceful domestic conditions and continuation of political power in each member country. The dynamic interaction of urbanization, economic forces and political realities result in economic policies that work against achieving self-sufficiency.

As urbanization proceeds, the proportion of a nation's food consumption that must be delivered to consumers in cities increases. Urban consumers who tend to have higher income than rural consumers demand greater quantities of superior foods. Rice is preferred over most other grains in West Africa and can be moved through marketing channels at lower relative costs than roots and tubers.

Meeting urban consumer food demand has a high priority for most governments because of the ease with which urban people can cause trouble. This also encourages governments to try and keep rice prices as low as possible. Both objectives can be met either by increasing production or by increasing imports, but imports can be arranged with a shorter time lead and entail less effort. Thus the political realities force governments to import, with the unfortunate simultaneous effect of reducing domestic prices and hence incentives for domestic production. Therefore, one can conclude that the real mandate to WARDA from the member states is to conduct research and development activities that assist the member states to increase rice production and rice marketing efficiency.

3.2.2 CGIAR View

Within the context of the CGIAR system the concept of "mandate" has come to mean that portion of CG-supported agricultural research which is the recognized responsibility of a given center. In this sense WARDA clearly has the mandate to conduct adaptive research on rice in the 15 WARDA states. Adaptive research includes testing rice cultivars developed elsewhere and imported into the WARDA region. It also includes testing production technologies and "packages of practices" for their adaptability in the principal ecologies of West Africa. The question of whether "more basic" research activities such as the biological study of rice pests, plant breeding (hybridization and selection), soil chemistry, plant physiology, and economic studies to evaluate rice policies are also within the scope of WARDA's mandate seems to have been answered in positive terms through bilateral donor support (outside the CGIAR budget) for the Special Research Projects and the WARDA/Stanford rice policy project. Likewise, CGIAR members have supported on a bilateral basis the inclusion of constraints identification and pilot extension activities through the TAT program.

The Team believes that WARDA has and, indeed should have, the mandate for the rice ecologies that are important in the 15 West African member states, to conduct and assist member states to conduct a complete rice research and development program. This includes determining what technologies are required, discovering and testing those technologies, and helping member states in their efforts to transfer those technologies to farmers' fields.

3.2.3. WARDA's Strategy

An organization's strategy may be defined as the set of actions it follows in order to achieve its objectives. It is difficult to perceive a coherent overall strategy in WARDA, but the Five-Year Plan indicates that "the main objectives of the Association have been woven around the three principal areas of research, development and training and include the establishment of a series of agronomic, varietal, fertilizer, plant protection and other trials, reinforcing the existing network of research efforts; collecting, cataloguing and disseminating rice information; carrying out research on the socio-economic constraints affecting rice production, organizing training and arranging for conferences, seminars and workshops."

3.3. Performance Criteria and Assessment

While it appears that WARDA has not articulated a strategy to achieve its formal objectives, one may argue that in order to solve the problem of increasing rice production in West Africa, one must identify the important constraints, develop technologies or policies that can overcome the constraints and get those adopted. WARDA can do some of these things itself and can assist national institutions in the region to do some. Therefore, it appears reasonable to assess WARDA's achievements against the following criteria:

- (i) How completely has WARDA identified the constraints?
- (ii) What new knowledge that may lead to new technologies has WARDA discovered?
- (iii) What appropriate new technologies has WARDA borrowed, discovered or promoted?
- (iv) How has WARDA contributed to an increased understanding of the economic and policy related factors holding down rice production and increasing rice imports in member states?
- (v) How has WARDA contributed to the capacity of member states to generate new technologies and a better understanding of economic and policy factors?
- (vi) How has WARDA contributed directly to increasing farm land area planted to rice or to improving rice yields?

The team attempted to determine the answers to each of these questions through its interactions with the staff of WARDA and national programs and by examining the documents that were provided by WARDA. The remainder of this section summarizes the team's judgement while subsequent chapters provide more complete information on performance.

3.3.1. Understanding of Constraints to Production Increases

WARDA has contributed to an increased understanding of factors holding down rice production increases by identifying both biological constraints and economic conditions affecting production incentives and

capabilities. WARDA has stated that "the major constraints in rice production in the West African sub-region, center around the quality of land cultivated and the yield of paddy". They identify the following specific constraints 1/:

Related to land cultivation

- salinity
- soil erosion, mainly in upland rice
- lack of sufficient water in dry rainfed areas
- lack of adequate irrigation facilities in irrigated areas
- lack of inputs in some countries

Technical problems

- lack of improved cultural practices for weed control and land preparation
- inadequate use of modern inputs
- widespread crop damage caused by pests and diseases resulting from inadequate crop protection

Institutional and infrastructural problems

- poor and inefficient extension services
- inadequate mechanization facilities to support land preparation
- inadequate credit facilities to allow farmers to purchase inputs
- inadequate economic incentives caused by poor marketing systems and unattractive producer prices

Social and health problems

- low level of technical knowledge
- cultivation of rice as a subsistence crop

1/ From WARDA publication "2nd Quinquennial Review of WARDA",
Monrovia, April 1983.

- regard for rice cultivation as a female occupation
- prevalence of water-borne diseases associated with rice production.

The identification of these problems is a useful beginning but is not enough. WARDA should establish the relative importance of the various problems because the decision as to how much effort to devote to attempting to overcome each depends, at least in part, on how important each is. Of course, some aspects may be outside the capacity of WARDA to address, but among those that are not, some priorities should be established. For example, the Coordinated Varietal Trials are one of WARDA's main undertakings. Those trials may be useful in identifying some varieties that are resistant to certain pests and diseases, and those conducted under upland conditions may serve to identify some drought resistant varieties but otherwise it is not clear how these are related to the constraints that WARDA has pinpointed.

3.3.2 New Knowledge

WARDA research activities that can generate new knowledge leading to new technologies include the Technical Services research and the Special Research Projects activities.

Research in agronomy, plant pathology and entomology at Headquarters (Technical Services) and in the Special Projects contribute to new knowledge. In each of these areas, field experiments have been carried out to evaluate alternative input levels and packages of technology. In addition, scientists have identified the major diseases, weeds and insects, and in one special project are monitoring the populations of insect pests.

These activities have generated a modest amount of new knowledge about rice in West Africa. WARDA publishes a Technical Newsletter in which some of its results appear. Five issues of about 25 pages each, containing 10-15 short articles per issue have been published since 1979. Five Occasional Papers of more than journal length have been published. In addition, the staff have published about 30 articles in international scientific journals, an equal number of articles in regional agricultural research journals and in newsletters of the International Rice Commission and IRRI. They also contribute unpublished papers to regional and international conferences and prepare unpublished reports for institutions in member states.

3.3.3 Appropriate New Technologies

When WARDA was originally set up it was believed that the major need was the transfer of improved technology from other rice producing areas. Thus, technology testing has always been a major part of the activities, and the Coordinated Varietal Trials (CVT) are the main device for testing technologies. As mentioned above, the CVT have introduced many new varieties to the region and a number of those have been recommended in member countries. It is difficult to document the superiority of the recommended varieties from the data reported on the CVT, however, the estimates of the spread of these recommended varieties suggest that they are not grown widely.

WARDA has become aware of the need to confirm the appropriateness and economic attractiveness of its technologies and has implemented a Technology Assessment and Transfer program. The program has been carefully thought through and designed, combining certain aspects of yield constraints research with farming systems research. It involves a pooling of a prior knowledge with survey information obtained from farmers and from the technology design activities to specify particular technology packages for defined environments. These technologies are applied in farmers' fields with farmers' participation and evaluated economically. When appropriate technologies have been identified they are demonstrated in extension efforts conducted cooperatively by WARDA and local agricultural extension officials.

At present these activities are being conducted for the mangrove swamp ecology in Sierra Leone and for deepwater and floating rice in Mali. The activities are being conducted by the regional teams based at the Special Research Projects and are being extended to the upland and irrigated ecologies as funds permit.

In the project that has been underway since 1981 in mangrove swamp areas of Sierra Leone, the process has reached the stage where three pilot farmer cooperatives have been established to extend the technology package consisting of improved variety, fertilizer injector and single axle tractor for land preparation.

3.3.4. Economic and Policy Related Factors

WARDA has contributed substantially to a major study of rice policy and economics in five countries of West Africa in association with the Stanford Food Research Institute. In addition, WARDA has undertaken similar studies for two other countries. It compiles and issues annually a set of statistics related to rice production, consumption, imports and

prices in the member countries. In 1983 a new format was developed giving comparative data across countries. These activities provide a basis for generating further knowledge necessary for policy analysis.

3.3.5. Research Capacity of Member States

Some of the Association's activities contribute to improving the research capacity of member states, although WARDA apparently has not inventoried the current status and future development needs of the rice research capabilities in member states.

WARDA's training program is most often mentioned first by researchers in the member states when they are asked about WARDA's contribution. It is clear that the training is highly appreciated, not only by the participants but also by national researchers in responsible positions.

WARDA has offered nine different courses at least once since 1973. The courses have different objectives and the content of each is geared to the objectives. They vary in length from 3 weeks to 6 months. A maximum of 32 participants can be accommodated in each course because of space limitations. In recent years, certain courses have been offered in locations outside the Training Center in member states. A total of 9,946 participant-weeks of training has been provided since 1973, or an average of 32 weeks of training to 30 participants per year. Given the need to prepare for each course this appears to reflect a high rate of utilization of facilities.

The Sub-Regional Coordinators, located outside Headquarters in five WARDA countries, are the most direct continuous link to member states. They facilitate the coordinated trials, arrange for rice workers to attend training programs, workshops and conferences and carry other representational functions in the member states.

The Communication and Documentation Divisions provide the capacity for WARDA to reach the member states with a flow of information on scientific and development matters. Of course, the information itself is generated in the Research, Training and Development Departments. The latest available publication lists about 100 substantive papers including seminar reports, issues of the Technical Newsletter and Occasional Papers. These are distributed by the originating departments to scientists and other concerned persons in the member states and to other relevant persons.

The annual Rice Research Review is an opportunity for national program researchers to interact with WARDA researchers and with each other. In addition to exchanging professional ideas it provides a useful forum for overcoming nationalistic isolationism and for creating more cooperative attitudes among countries in the region.

3.3.6. Farm-level Production Increases

In addition to its role in technology generation and introduction WARDA has accepted the challenge of helping member countries design rice development projects. During 1978-1982, 35 reports have been prepared on project identification and evaluation. Of these, fifteen were concerned with setting up rice production units for seed, research or demonstrations. Eight were concerned with agricultural development projects or production systems, eleven were concerned with milling or marketing projects and one was an irrigation project. Five of these projects entailing about 30,000 ha. of rice have been implemented, and 10 other projects relating to milling, research stations or seed multiplication facilities have been implemented or are being implemented.

3.4. Organizational Structure and Management

A full Management Review was conducted concurrently with the Program Review and a report detailing its findings is available.

WARDA is a unique institution within the CGIAR that is quite different from other International Agricultural Research Centers. It is a regional, intergovernmental development and research association. The fifteen member states elect the top management and have committed themselves to provide a cash subscription to the budget of WARDA. Members feel very much that it is their own organization. However, the payment of country contributions has been seriously in arrears since 1980, giving rise to acute liquidity problems.

The WARDA constitution provides for a very broad range of objectives and functions (Annex VII). Its management therefore has had considerable freedom to set priorities and formulate specific programs in accordance with available resources. There are nineteen multi- and bilateral contributors, of which the CGIAR and USAID are amongst the most important. The Panel believes that the lack of an explicit strategy and priorities by WARDA makes the donors suggestions disproportionately influential on the programs of the Association.

3.4.1. Governance and Policy Making Process

The three main organs of WARDA were those established by the 1970 Constitution: the Governing Council (GC), the Scientific and Technical Committee (STC) and the Executive Secretariat.

The Governing Council is made up of one representative (i.e. the Minister of Agriculture) per member state. The GC determines the general policies of WARDA and its external relationships. It appoints the Executive Secretary and the Deputy Executive Secretary as well as the members of the STC. It approves the administrative budget, but does not consider WARDA's program as a whole.

The Scientific and Technical Committee consists of 13 members who are professionals in the field of agricultural research. Presently seven members are selected from member countries and the remaining six from cooperating institutions (African Development Bank, IRAT, IITA, IIRI and CGIAR ^{1/}). The latter sits on the Committee in a personal capacity. Members are normally appointed for a three year period, eligible for reappointment for a second term. Each annual meeting, an individual is elected as Chairman. Members are not paid for their services. The agenda is prepared by the Executive Secretary and the Committee acts in an advisory capacity. At the end of each meeting the STC prepares a set of recommendations for consideration of the Governing Council.

The STC carries out a key function in the WARDA structure. To the extent that it is done anywhere in the organization, the STC looks at the entire scientific program of WARDA. This is commendable and in this respect the STC carries out a key function on the WARDA structure. However, its impact on WARDA's policy and planning has been less than desirable. STC members must be selected on the basis of achievements, experience, breadth of vision, hence should be of the highest calibre.

The Executive Secretariat consists of the Executive Secretary (ES) and his Deputy (DES). The ES is the administrative head of the Association who oversees the implementation of the policies approved by the GC. Each serves for a three year period, eligible for a second term. Since its foundation, WARDA has always had a Francophone ES whereas the DES has been an Anglophone. The ES and DES are elected by the GC at different times.

3.4.2. Organizational Structure

The operating units of WARDA are the Departments of Research, Development, Training, Finance and Administration, plus a Division for Documentation and one for Communications.

^{1/} CGIAR has never filled its position.

Research Department - The Research Department is the largest unit. It absorbed 53% and 40% of the budget in 1981 and 1982 respectively. It is composed of (i) a Research Coordinating Unit; (ii) Technical Support Services Unit, which includes a Seed Laboratory and Nursery in Liberia and Plant Quarantine station in Nigeria; (iii) Sub-Regional Coordinators posted to five zones; (iv) Special Research Projects (in Sierra Leone, Senegal, Mali and Ivory Coast). Its program is discussed in Chapters 4, 5 and 6.

Development Department - The Development Department has three Divisions: (i) Agronomy; (ii) Economics, Finance and Statistics; (iii) Engineering.

The Department became operational in 1974 and concentrated its early activities on general and sectoral studies and assisted countries in the preparation and approval of rice-based projects under contract to financing institutions. It publishes a statistical regional yearbook. Since 1980/81 a main thrust has been the Technology Assessment and Transfer program (TAT) which focusses on the definition, assessment, evaluation and transfer of new rice technology. The Department's share in the total budget rose from 16% in 1981 to 27% in 1982. The program is discussed in Chapter 7.

Training Department - The Training Department (like the Research Department established right from the start of WARDA) has three Divisions:

- (i) Pedagogical Support Division, responsible for establishing and improving the course content of the training programs;
- (ii) The Training Centre, which implements WARDA's training program. The Centre is at Fendall, close to Monrovia. Nine types of courses are offered, varying in length from 3 weeks to 6 months; and
- (iii) Planning and Follow-up Division, which identifies training needs and undertakes follow-up studies on the activities of past trainees.

In 1981 and 1982 the Training Department received 10% and 13% respectively, of the budget.

Documentation and Communication Divisions - The Documentation Center produces bibliographies and indexes, stores documents and publications and provides information services. The Communications Division is responsible for the publication, translation, language training and public relations needs. Actual allocations were 6 and 8% respectively, for the two Divisions together in 1981 and 1982. Further details are given in Chapter 7.

Finance and Administration Department - The Department has two Divisions (Finance and Administration) and is responsible for providing financial and administrative services to the technical departments and divisions. The services include personnel, conferences, procurement, inventory and stores, transportation, security, liaison and welfare, accounting, financial reporting and budget control. Actual budget allocations were 10 and 8% respectively in 1981 and 1982. A detailed analysis of its activities is presented in the report of the Management Review Panel.

3.4.3. CGIAR Involvement

CGIAR involvement in WARDA dates back to 1973 when TAC at its 6th meeting endorsed the support of the Group to a clearly defined part of WARDA's program.

CGIAR funding started in 1974 and by 1978, the time of the first Quinquennial Review the total contribution amounted to US\$4.85 million. Support was concentrated on coordinated variety trials, research support and some training activities (W-1 program). The Coordinated Varietal Trials program was selected as the most appropriate for the Group's support on the assumption that WARDA's chief role would be to facilitate the transfer of technology from IARCs, such as IRRI and IITA to the country level. Varietal improvement in the region was then thought to be less important, as the concept of wide varietal adaptability prevailed. Furthermore, the W-1 program was considered attractive since it was expected to provide the smaller states in the region with the opportunity to participate in a cooperative effort aimed at the solution of a regional problem.

The Group's support for WARDA's W-1 program was tied to a number of technical conditions.

- that high priority be given to training and institution-building efforts in member countries;
- that active cooperation be developed with the main international research organizations working on rice;
- that other WARDA programs complementary to the W-1 effort be developed simultaneously;
- that in implementing its programs WARDA clearly focus on the comparative advantage in relation to both national and international programs;

- that WARDA continuously monitor its priorities and seek cost-effective ways of implementing its important regional mandate.

In 1978, the CGIAR conducted its first Quinquennial Review of WARDA. The Panel considered the continuation of WARDA's research program fully justified, made numerous recommendations aimed at improving the overall effectiveness of the Association and recommended a continuation of CGIAR support (Annex VIII).

During the second quinquennium (1979-1983) of its support to WARDA the CGIAR provided a total of US\$ 12.5 million for a continuation of the W-1 program and a minor part of the training program. The table in Annex IX gives the details regarding the application of CGIAR funding during the period under review and its relation to the overall funding of WARDA.

3.4.4. Relationships with Other Organizations

WARDA's relations with other institutions working on rice can be divided in two major categories, i.e. linkages with national research programs (research, development, agricultural extension) and with international programs.

(i) National Programs in West Africa

WARDA's mandate is very broad and its activities range over a vast area with its ensuing communication problems. Initially, WARDA's role in the development of improved technologies had been conceived primarily as a transmitter of improved varieties (the W-1 program) for the national agricultural research systems of member countries. It has been paying a fee to these countries for the tests (see Chapter 5). Concurrently, WARDA acts as the carrier which transmits research results between countries and regions. For example, findings on irrigated rice in Richard Toll can be of relevance to other areas in the region with irrigation facilities.

The next step was that WARDA acted as a generator of technology adapted to the sub-region's ecological and socio-economic conditions. In viewing WARDA's relations with other organizations a distinction must be made between countries with and without Special Research Projects. In the former the relations are usually quite close. However, they may vary for each country and are determined by several factors which are discussed in section 8.2.

In the latter countries WARDA's relations with national research programs are dependent on the activities and the rapport built by the Sub-Regional Coordinator. This impact is usually greatest in the country in which he is based (see section 8.1.) A range of conditions can be distinguished depending on the strength of national research systems. Nigeria has already relatively strong indigenous rice research systems (complemented with IITA) whereas Togo and Benin have virtually no rice research of their own.

(ii) International Institutions

In the first Quinquennial Review, WARDA's relationships with international centres (IITA, IRRI, IRAT) have been spelt out in some detail (QQR 1, paras. 112-120) and this picture has not essentially changed.

The relationships can be divided according to whether agreements bear a formal or informal character. The major issue is the de-facto system of collaboration with various institutes, which satisfies the criterion of cost-effectiveness and considers comparative advantage. This is discussed in section 8.3.

3.5 Evaluation of WARDA

3.5.1. External Evaluations

WARDA, like any other institution receiving external funding for its program, is subject to periodic evaluations by its donors. The funding structure of WARDA is such that a large number of donors - bilateral and multilateral - contribute to WARDA's program, both core and special projects. Most of these donors have their specific evaluative requirements. While the CGIAR, which funds part of WARDA's research program and some training activities, conducts its program reviews on a quinquennial basis, many bilateral donors that fund project activities have more frequent evaluation requirements. The consequence of this is that WARDA has to cope with a high frequency of external evaluation exercises, one to two per year on an average.

As a consequence of WARDA's funding structure and the absence so far of a truly integrated program, the scope of these evaluations is such that most of them focus on the specific project funded by a given donor. Two reviews so far have covered the full breadth of WARDA's substantive program, the first QQR conducted by the CGIAR in 1978 and the impact evaluation by USAID in 1981. The present exercise reviewed management of the Association as well as its program.

3.5.2. Internal Evaluation

There is no formal mechanism at WARDA for internal evaluation of the overall program. This is obviously linked to the absence of an institutionalized procedure for program planning, budgeting and monitoring.

However, WARDA's Research Department normally organizes an In-House Review seminar of one week's duration to review progress made. In 1982 this was not held due to funding problems. WARDA holds an Annual Rice Review Meeting, with strong outside participation.

The STC also reviews papers and reports presented by WARDA management, but does not conduct a systematic program review.

3.5.3. Follow-up and Monitoring

A review of recent evaluations (first QQR and USAID Impact Evaluation) reveals two interesting phenomena: similarity of findings and recommendations made and some laxity on the part of WARDA in the implementation of these recommendations (Annex VIII). This laxity appears to be due to the lack of a fully integrated, coherent WARDA program or procedure for overall program planning and the absence of strong, central leadership. In addition, the general scarcity of funds, imbalances in the funding of various programs and serious cash flow problems allow excessive influence, particularly by donors, on WARDA program planning and execution.

The Panel noted that WARDA was probably over-evaluated externally and under-evaluated internally. It was surprised to find a general absence on the part of WARDA management of any concern regarding the need for systematic internal evaluation. To some extent this may be explained by the frequency of external evaluations.

The Panel noted a high degree of selectivity in implementing review recommendations depending on the availability of additional funds for program expansion. Decisions tended to be taken on an ad hoc basis, essentially aimed at program expansion, without necessarily being in line with long-term needs and objectives.

3.6. Resource Allocation and WARDA's Five-Year Plan

The first QQR recommended the development of a core program and a five-year plan to indicate how such a core program should be implemented.

In 1980, a Five-year Plan was prepared and approved by the Governing Council. It was presented to a conference of donors in April 1981 in Rome.

The donors expressed their support for the Plan in principle but did not make long or medium term financial commitments to it. Thus, one objective of the recommendation was frustrated and the Plan failed to result in any longer term financial stability for the Association.

The co-sponsors requested a review of the Plan in 1983. The review was undertaken under the guidance of the Scientific and Technical Committee and published as: WARDA/82/STC-12/13. It consists of brief statements of the objectives of each unit in WARDA, a table showing planned and actual professional level staffing, planned and actual funding levels for 1981 and 1982 and a section showing budgets for each unit for 1983 and 1987 period along with brief statements of anticipated changes in programs.

Because of funding problems, the Association has been forced to adjust its program to levels below those set forth in the Plan and has engaged in a series of re-planning exercises, each with a budget. This has resulted in a number of different documents being produced, especially for the W-1 program. Data in this section (The Five-Year Plan) are taken from the STC document cited above.

Table 2 shows planned compared to actual expenditures for 1981 and 1982 and the original five-year plan as well as the revised plan projections through 1985. It is obvious that no major shifts in program that can be detected at this level of aggregation were planned in early 1983. It also appears that WARDA believed it could attract 30% more funds than it did in 1981 and 1982 because in the revised plan total projected funding for 1983 to 1985 was reduced by only 6% from the original plan, even though WARDA was 30% short of funds in 1981-82.

A clearer picture of program priorities can be obtained from table 3 which shows a more detailed breakdown of data. The major categories of expenditure are the special research projects, technology assessment and transfer, training, research coordination and technical assistance.

The data show that administrative and coordination activities were fully funded relative to planned levels in 1981 and 1982. The same is true for technical services in the Research Department. Activities that were greatly underfunded relative to budget include Special Research Projects, analytical work in the development department, training activities, communications and documentation and, to a lesser extent, technology assessment and transfer. The analysis also indicates that

activities funded solely from the W-1 budget (research coordination, technical services and sub-regional representatives) were essentially fully funded as were other activities partly funded by W-1 (general administration).

Table 2: WARDA Budget 1981-1985 and Actual Expenditures 1981-1982

(US\$'000)

	1981		1982		Projected Master Budget ^{a/}					
					1983		1984		1985	
	Planned	Actual	Planned	Actual	Original	Revised	Original	Revised	Original	Revised
Executive Secretariat	482	576	501	566	493	762	522	755	544	750
Research Department	7502	5228	6921	4533	6657	6652	6752	7774	6576	7134
Development Department	2884	1568	3714	3078	3703	2601	3902	2593	4125	2585
Training Department	2263	947	2585	1452	2760	2874	2833	2472	3162	2979
Support Services	2117	1621	2318	1856	2443	2267	2623	2472	2758	2631
<u>Total</u>	<u>15248</u>	<u>9940</u>	<u>16039</u>	<u>11485</u>	<u>15956</u>	<u>15115</u>	<u>16633</u>	<u>16086</u>	<u>17864</u>	<u>16079</u>

Source: Table 3 below and Table 37 in WARDA/82/STC/-12/13.

a/ The original five-year plan envisioned transferring the Sub-Regional Coordinators into the Executive Secretariat. In fact, their funding remained in the Research Department. The data presented here show the amount budgeted for Sub-Regional Coordinators in the Research Department.

Table 3: Budget of WARDA Program Elements 1981-1985 and Actual Expenditures 1981-1982

(US\$'000)

	1981		1982		Actual as % of Planned		% of 1982
	Planned	Actual	Planned	Actual	1981	1982	Actual
Executive Secretariat	482	576	501	566	120	113	4.9
Research Department							
Coordination and Support	811	1104	860	1056	136	123	9.2
Technical Services	611	833	657	775	136	120	6.7
Sub-Regional Representatives	1195	1273	1177	1121	106	95	9.8
Special Projects	4367	2015	3846	1581	46	41	13.8
Development Department							
Coordination and Administration	121	93	127	122	77	96	1.1
Technology Assessment and Transfer	1388	529	1908	1513	38	79	13.1
Technical Assistance	961	872	965	1124	91	116	9.8
Analysis <u>a/</u>	414	74	714	319	18	45	2.8
Training Department							
Training Centre	1514	822	1786	1317	54	74	11.5
Planning and Support	749	125	799	135	17	17	1.2
Supporting Services							
Finances and Administration	873	1024	975	964	117	99	8.4
Communications and Documentation	1244	597	1343	892	48	66	7.8
Total				11485			100.0

Source: Tables 1,2,3,4,5,6,7,8,9,10,11a,11b,12,14,16,17,18,19,21,22,24,27, and 28 of WARDA/82/SIC-12/13.

a/ Includes Policy and Trade Analysis, Statistics and Data Analysis, Mechanization and Water Management.

This analysis highlights two aspects of WARDA's funding situation: its revealed priorities and the problems associated with depending on a large number of donors for program support. Special Research Projects received only funds that were specifically designated for such projects by donors, despite the recommendation of the 1st QQR that the special projects be increasingly considered the core program of the Association. When WARDA is unable to obtain funds for the Special Research Projects they operate at a lower than planned level of activity.

The Management Review details the WARDA financial crisis and budgetary process. It is necessary to recognize that the financial crisis of 1983 is very acute. One of WARDA's responses has been to attempt to cut back future activities, but because of a fragmented budgetary system the Team was not presented with an Association-wide revised budget. Instead, we received the "Approved 1984 Administrative Budget", and a program and budget document for the W-1 program that was prepared in September, 1983. Using the data at Headquarters, together with the budgets for the remaining items from the STC document gives a total budget for 1984 of US\$12.4 million, which is considerably below even the revised Five-Year Plan estimate of US\$16.6 million, and quite comparable to the 1982 actual level.

To determine the impact on program, the Team allocated all expenditures into the four functional areas of:

- (1) research
- (2) development
- (3) training and communications
- (4) administration and coordination

Although located in the Development Department, the Technology Assessment and Transfer program is largely research to identify constraints and assess technology. For purposes of the breakdown we have assumed that 75% of TAT is research, the rest being development (transfer). The Sub-Regional Coordination activities include the research involved in coordinated trials (assumed at 25%), the training and communications involved in identifying and servicing trainees and conference attendees (25%) and the administration work of representing WARDA in the sub-region (50%). Using these assumptions the budgets of WARDA for 1981, 1982 and the latest budget for 1984 were regrouped into the four functional categories with the results shown in Table 4.

This Table shows that in adjusting its plans WARDA expects to considerably increase its spending on the Special Research Projects and

to somewhat increase expenditures on training. Expenditures on Technology Assessment and Transfer, Sub-Regional Coordination and coordination and support in the Research Department are reduced below their 1982 level.

In general, the direction of adjustments are approved by the Team. More specific recommendations for program adjustments are made in the relevant sections.

The Team would have liked to have a revised Association-wide integrated budget for 1984 and recommends that the Association prepare such a budget annually. It should be approved by the STC and presented to the Governing Council, individual donors and the CGIAR, even though the GC may choose to approve only the administrative budget and individual donors may be primarily interested in projects they fund.

Table 4: Expenditures 1981 and 1982, and Budget 1984 Allocated to Functional Areas

(Allocated by Review Team)

	<u>Actual Expenditures</u>		<u>Planned</u>		<u>a/</u> Data
	1981	1982	1984		
<u>Research</u>	3637	4090	4942		
Technical Services ^{b/}	833	775	774		W-1
25% of Sub-Regional Coordination	318	280	241		W-1
Special Research Project	2015	1581	2934		W-1
75% of Technology Assessment and Transfer	397	1135	712		STC
Economics, Mechanization, Water Management Analysis	74	319	261		STC
<u>Development</u>	1004	1502	1337		
Technical Assistance	872	1124	1100		STC
25% of Technology Assessment and Transfer	132	378	237		STC
<u>Training and Communications</u>	1737	2489	2780		
Training Center	822	1317	1735		STC
25% of Sub-Regional Coordination	318	280	241		W-1
Communications and Documentation	597	892	804		W-1/AS
<u>Administration and Coordination</u>	3559	3404	3361		
Executive Secretariat	576	566	591		A-B
Research Department					
Coordination and Support	1104	1056	761		W-1
50% of Sub-Regional Coordination	637	561	482		W-1
Development Department					
Coordination and Administration	93	122	126		A-B
Training Department Planning and Support	125	135	301		A-B
Finance and Administration	1024	964	1100		A-B
<u>Total</u>	<u>9937</u>	<u>11485</u>	<u>12420</u>		

a/ All data for 1981 and 1982 taken from "Implementation of the WARDA Five-Year Plan" (STC-12/13). 1984 data taken from "Approved 1984 Administrative Budget" (A-B), "WARDA W-1 Programme and Budget 1984" (W-1), for items included in these budgets, and for the items "STC-12/13".

b/ Called "Technical Services" in the STC document, called "Research Support" and "Conferences and Training" in the W-1 budget. "Research Coordination" is a sub-item of "Research Support" in W-1, but a separate category in the STC document, so it is separated in this table.

CHAPTER 4. WARDA'S RESEARCH DEPARTMENT

The Research Department is responsible for the coordination of the WARDA's research program. Nevertheless, some components of this program, such as identification of constraints and testing the improved technology at farmers fields, are presently carried out or coordinated by the Development Department. In this chapter will be reviewed the objectives and the coordinating mechanism used by the Research Department. Substantial components of its research program are reviewed in chapters 5 and 6. An overall assessment of the WARDA's research program presented in chapter 9.

The stated objective of the Research Department is "to promote and increase the quantity and quality of rice in West Africa.

The objective is pursued by:

- (a) developing technological packages adapted to West Africa by encouraging, coordinating and undertaking basic and applied research programs;
- (b) collecting, analyzing and disseminating information on methods applied, experience gained and results obtained within and outside the region;
- (c) assisting training programs for rice researchers;
- (d) promoting and organizing rice research conferences, seminars and workshops;
- (e) advising national rice research programs."

4.1. The Research Department Program

The Department's program includes four main activities:

- (i) Research Coordination - planning, formulating, implementing and supervising approved research projects;
- (ii) Coordinated Trials (Chapter 5) - introducing and adapting varieties and agronomic practices to the region;
- (iii) Special Research Projects (Chapter 6) - generating technology adapted to special ecological conditions, filling gaps in the rice research in the region and reinforcing existing national research programs;

- (iv) Sub-Regional Coordination (Chapter 8) - providing logistic, administrative and technical support to WARDA and national programs, and technical liaison between WARDA; the national programs and international research centres.

The department's program also includes four small special projects dealing with rice stemborers, azolla, rodent/bird control, germplasm.

4.1.1. Research Coordination

The research coordination is carried out at headquarters by the Research Coordination Division supported by a Technical Support Service (Plant Quarantine, Seed Nursery Farm, Seed Laboratory - see Chapter 5 for details).

The Division is headed by the Director of Research, and has two professional staff: one agronomic statistician and one architect. The Technical Support Service has 9 staff members: three breeders, one entomologist, one plant pathologist, one associate plant pathologist, one agronomist, one seed technologist and one associate seed technologist.

The statistician is responsible for the Statistics Service which design and analyze the results of the coordinated trials and other research and assist national programs of member states (see Chapter 5).

The architect supervises construction projects in all WARDA stations.

The staff members from the Technical Support Service participate in the research coordination, give technical backstopping to the Special Research Projects, participate in WARDA's training program and carry out research activities at the Seed Nursery Farm at Suakoko and Seed Laboratory at Fendall. One breeder is responsible for the Coordinated Varietal Trials and the other is the WARDA/IITA Liaison Officer in charge of the coordination of the IRRI IRTPs and germplasm project. The third breeder position is vacant.

WARDA has sponsored and organized a series of seminars and workshops where special subjects were thoroughly discussed. Some of the subjects were: long-term strategy for transfer of technology in rice production, bird and rodent pests, integrated management of rice diseases and insect pests, environmental constraints on rice production and upland rice research policy.

In-House Reviews were held in 1980 and 1981 and the Research Department activities were critically discussed by the Department's staff. The Review planned for 1982 was not held due to financial difficulties.

Annual Rice Review Meetings have been held that include WARDA's Research, Development and Training Departments as well as country reports on national activities. Participants are drawn from WARDA member countries, international institutions and WARDA staff.

4.1.2. The Azolla Research (AR) Project

The objectives of the AR Project are to:

- (a) stabilize and improve the rice soil nutrient status;
- (b) reduce the use of chemical nitrogen fertilizers;
- (c) control weeds; and
- (d) reduce water loss.

The activities were programmed to take place at Suakoko in Liberia, Rokupr in Sierra Leone and Richard-Toll in Senegal. However, it was not implemented at Suakoko.

4.1.3. Bird and Rodent Control (BRP) Project

The objective is to study bird and rodent pests in order to develop effective control measures for them. It has two separate components. The bird component is a tripartite project involving WARDA, OCLALAV, and CILSS as implementing agencies and UNDP/FAO as donor and executing agencies, respectively. The program was started and an FAO expert located at Headquarters has completed a preliminary survey. The rodent component has not yet found sources of funding.

4.1.4. Rice Stemborers (RSB) Project

The objective is to develop effective and long-term control strategies for the economically important rice stemborers. It is a cooperative project between WARDA and ICIPE. So far, the project has no financial support.

4.1.5. Germplasm Program

This is a collaborative program involving WARDA; IRAT, IRRI, WARDA member states and Tanzania.

The objectives are:

- (a) to extend logistic or administrative support to IITA, IRAT, IRRI, IBPGR when needed for germplasm collection, conservation, evaluation and training in the WARDA Region;
- (b) to evaluate in cooperation with IITA and IRAT, African rice germplasm collected;
- (c) to maintain collections in medium-term storage facilities;
- (d) to encourage in the Region the utilization of the collected germplasm;
- (e) to collect in certain key areas in West Africa; and
- (f) to make available any of the cultivars in WARDA germplasm bank to any requesting scientists or institution.

The officer in charge of the program is the IITA/WARDA Liaison Scientist located in Monrovia.

The construction of the germplasm bank started in 1979 and walk-in-coolers were installed in 1981. Two units of combined volume of 59 m³ are in operation.

WARDA has given backstopping to ORSTOM/IRAT, IITA and IBPGR collections in the Region. From these collections, it has received 1957 accessions. WARDA itself has collected 560 different species.

4.2. Budget

Budget and expenditures for 1981 and 1982 are shown in Table 5. In 1981 the Research Department expenditures were 53% of WARDA's total budget and in 1982 this decreased to 40%.

4.3. Assessment and Recommendations

Aside from the Director, 11 professionals are located in the Research Department at Headquarters. Most of them, apart from their

participation in coordination, training, and technical backstopping to the special projects, carry out research at Suakoko.

Periodically, the staff should pay visits to the research projects outside Monrovia. They represent the main connexion between the Director and the research field. Nevertheless, the Panel noticed that some stations have not received visits, and among stations that had received visits, some saw no benefit coming from them.

The research work carried out at Suakoko seems fragmented and isolated from the programs developed by the Special Research Projects.

The Panel recommends that the following staff be deployed from headquarters to the Special Research Projects: the breeders, the entomologist, the pathologist and the agronomist. The headquarters (Suakoko) staff should be kept at the bare minimum necessary for carrying out the seed programs and germplasm project and IRTP coordination. The Panel sees no need for an architect in the Research Department and recommends that the position be eliminated.

Table 5: Research Department - Budget and Expenditures for 1981-82

(US\$'000)

ACTIVITY	BUDGET		EXPENDITURE		FUNDING SOURCE
Research Coordinators	436.3	467.5	756.6	622.0	CGIAR
Technical Services	611.8	657.3	833.1	775.3	CGIAR
Sub-Regional Coordination	1,195.1	1,177.0	1,273.8	1,121.0	CGIAR
Mangrove S. P.	577.9	562.5	539.3	421.3	ODA/USAID/WARDA
Upland S. P.	1,642.6	1,498.7	175.0	150.0	FRANCE/WARDA
Floating S. P.	601.1	508.1	529.6	520.9	USAID/WARDA
Irrigated S. P.	1,271.3	1,024.2	652.9	370.9	IDRC/WARDA/Belgium
R. Stenoborers	171.3	140.0	-	-	None
Azolla	104.0	112.0	118.9	118.9	Belgium
Bird Control	314.2	218.6	-	25.0	UNDP
Rodent Control	202.0	161.9	-	-	None
Administrative Support	374.8	393.4	348.8	434.0	CGIAR
TOTAL	7,502.4	6,921.2	5,228.0	4,559.3	
WARDA TOTAL BUDGET	-	-	9,937.0	11,485.0	
% OF WARDA TOTAL	-	-	53	40	

CHAPTER 5. COORDINATED TRIALS

5.1. Introduction

The introduction and adaptation of elite varieties and breeding materials to the West African Region together constitute one of the most important components of the WARDA research program. These activities are channelled through the coordinated trials.

In this chapter the historical background, the structure and contents, the physical and human resources, the financial support and the achievements of the trials are reported and assessed.

5.2. Historical Background

In 1973, the CGIAR on the advice of TAC chose to support the coordinated trials from four alternatives submitted by WARDA (Coordinated Varietal Trials (W1), Varietal Improvements (W2)). The coordinated trials were considered to be the best mechanism for transferring technology generated at the IARCs to the national programs and obtaining some feedback on its application to West Africa. It was thought that the High Yielding Varieties plus other inputs could substantially improve rice production in the Region.

In 1979 the WARDA first Quinquennial Review Panel recommended that the program be continued and consolidated.

5.3. Objectives

WARDA has clearly defined the objectives of the coordinated trials. They are to:

1. make elite germplasm available to rice scientists in the Region;
2. provide cooperating scientists and institutions with the opportunity to evaluate the performance of the materials originating from breeding programs within and outside the Region;
3. furnish WARDA and the cooperators with valuable information on the performance of materials under a wide range of soils, climates, diseases and pests with a view to:

- a. identifying varieties with a broad spectrum of resistance to major diseases, insects and other stresses;
 - b. evaluating the genetic variation of pathogens and pests;
 - c. detecting new sources of genetic variability that could be used by WARDA and cooperating scientists in crosses within their respective breeding programs;
4. provide each scientist the means of having his material systematically evaluated against diverse stresses;
 5. place a range of materials at the disposal of national programs for testing widely under their individual conditions prior to release as commercial varieties;
 6. promote understanding and cooperation among rice scientists in the Region and other parts of the world.

5.4. Structure and Content

The program comprises two types of trials:

- a. The Initial Evaluation Test (IET)
- b. The Coordinated Varietal Trials (CVT).

The introduced elite varieties and breeding materials are grown during three successive years in the Seed Nursery Farm (SNF) at Suakoko for screening, observation and seed multiplication. The selected varieties are nominated to the IETs. The top varieties from the tests and from the national programs in the Region are nominated to the CVTs. Varieties originating from other breeding programs can also be nominated to the trials.

Approximately 2,000 lines are introduced every year. About 10% are selected in the first year and from these about 50% are selected in the second year at the SNF. The selection is for disease resistance (mainly to blast, Helminthosporium, Rhynchosporium, glume discoloration), resistance to iron and manganese toxicity, plant type, yield and grain quality.

Different varieties are included in the IETs carried out in each of three rice ecologies: upland, irrigated, deep flooded. The number of

localities increased from 21 in 1978 to 49 in 1979 and then decreased gradually to 25 in 1983. Since 1981, in consultation with the Sub-Regional Coordinators, 14 sets of varieties have been designated for the CVTs, one for each of the 14 ecological conditions for rice growing in West Africa:

- upland short raining season - short duration;
- upland long rainy season - short duration;
- upland long rainy season - medium duration;
- upland bimodal sowing in first season and heading in second season - short duration;
- upland bimodal sowing and heading in first season - short duration;
- irrigated - short duration;
- irrigated - medium duration;
- mangrove;
- shallow flooded;
- deep flooded;
- floating;
- cold tolerance;
- rainfed lowland.

The number of entries to the IETs varies but in the CVTs it does not usually exceed 15. The varieties are kept in the IETs only one year, unless they have been nominated to the CVTs. In the CVTs the varieties are normally tested for three years, but can be eliminated after the first year if their performance is very bad.

The nomination of materials to the trials is the responsibility of the Varietal Nomination Committee. The criteria for nomination are well defined but differ for each rice ecology considered. In general they are based mainly on the plant architecture, resistance to the main diseases, acceptable grain quality, stable and good yield, appropriate maturity, response to fertilizers, salt tolerance, tolerance to soluble iron toxicity, tolerance to submergence, nodal rooting and tillering habit.

The general guidelines for the trials sent to the experimentors are well elaborated and contain information on the varieties and lay out, management required and instructions for data collection.

5.5. Physical and Human Resources

Several units from WARDA's organization contributed with physical and human resources to the CVTs: Seed Nursery Farm (SNF), Seed Testing Laboratory (STL), Regional Plant Quarantine, Statistics Services, Varietal Nomination Committee, Sub-Regional Coordinators and National Programs.

(a) Seed Nursery Farm (SNF)

The screening, observation and part of the seed multiplication are carried out in the SNF located at Suakoko, 180 km from Monrovia, Liberia. Because the seeds produced at Richard-Toll are cleaner and the yields are much higher than in Suakoko, the seed multiplication has been concentrated more recently at this location. The building and land for experiments at Suakoko have been provided by the Central Agricultural Research Institute (CARI) of Liberia. These consist of one laboratory-cum-office building, one toolhouse and threshing floor and 5 ha. of land, (4 ha. of lowland and 1 ha. of upland). The lowland is well developed and the water supply is good. There are good conditions for testing varieties for tolerance to high levels of soluble iron. The upland area needs further development mainly in relation to bunding and terracing.

The annual precipitation at Suakoko is over 2,000 mm, creating excellent conditions for testing material adapted to the humid tropics.

The staff consists of one senior rice breeder, one associate rice breeder (position frozen since 1980 due to lack of funds), one agronomist, one senior field technician, five field assistants, one clerk/typist, one laboratory attendant, one driver, one tractor driver and laborers. One entomologist and one plant pathologist from the Technical Support Services in WARDA's headquarters provide specialist support to the station.

The rice breeder is responsible for the introduction of materials, multiplication of seeds, nomination of entries to the trials and preparation of protocols.

(b) Seed Testing Laboratory (STL)

The Second Testing Laboratory gives support to the Coordinated Trials, Development Department and member countries in seed quality analysis, participates in training program, conducts research on maturity indices of some of the varieties introduced in the WARDA Region, the fungal flora of seeds from member states, and on dormancy mechanism of wild rice species.

The unit plays a vital role in the IETs and CVTs. It receives the multiplied seeds; tests, processes and treats them with hot water and chemicals and also packs and distributes them to the experimental locations.

The laboratory is located on the campus of the University College of Agriculture of Liberia at Fendall, about 30 km from WARDA headquarters in Monrovia.

The infrastructure available includes seed processing and treatment facilities, seed testing and storage as well as a seed health testing section.

In the last five years the staffing has improved and now the laboratory has one seed technologist (M.Sc. degree), one assistant seed technologist (completing M.Sc. degree), three laboratory assistants (one with intensive training in Denmark), two laboratory attendants and one typist. Temporary laborers are hired during certain periods of the year.

The installations, equipment and staff are more than appropriate.

(c) Regional Plant Quarantine Station

The Regional Plant Quarantine Station located at the Nigerian National Cereals Research Institute (CCRI), Moor Plantation, Ibadan, Nigeria, plays a critical role in the successful operation of WARDA CVTs. Samples of seeds shipped to any country in West Africa must be passed by the quarantine station, where they are tested, and any prescribed treatments must be carried out by WARDA before the seeds can be released.

Materials take several weeks to several months for clearance. WARDA gives the station partial support needed for quicker services.

(d) Statistics Services

Since 1977 WARDA has had an agronomic statistician who provides the statistical backstopping to the coordinated trials and the research at Special Projects, develops the necessary computer software, and cooperates with member states on statistics analyses.

In 1979, a micro-computer was acquired by WARDA to cope with the large volume of data generated from coordinated trials and the Special Projects.

The Statistics Service analyze the trials data and help in their interpretation. A computerized information storage and retrieval system was

developed for the data on varieties. All the information obtained from the coordinated trials on morphologic and agronomic traits have been stored. The researchers can recall specific data quickly and identify desirable traits, such as high yield, grain quality and resistance to insects, diseases, drought and toxic elements.

(e) Varietal Nomination Committee

The final nomination to the IETs and CVTs is done by the Varietal Nomination Committee. The composition of the Committee changes but in general it is formed by senior breeders from WARDA Technical Support Services, IITA/WARDA Liaison Officer, Richard-Toll and Rokupr Special Projects, IDESSA-Bouake, NCRI in Nigeria, IITA and IRRI.

WARDA's senior breeder acts as Chairman for the Committee at its annual meetings. The members make their own nomination and also collect nominations from national breeding programs for consideration.

(f) Sub-Regional Coordinators and National Programs

The IETs and CVTs are carried out by institutions in the national programs under the supervision of WARDA's Sub-Regional Coordinators. The institution receives from WARDA a fee for carrying out each trial.

5.6. Other Coordinated Trials

Until 1980 WARDA carried out coordinated trials on the use of insecticides and herbicides. Because of their local specificity they were stopped and the responsibility for testing these materials was transferred to the Special Projects. In 1979 WARDA started the on-farm trials as part of its pre-extension activities.

(a) Coordinated Insecticide Trials

During 1978 and 1979 a series of insecticide trials were conducted at several places in the five sub-regions. In most of the trials the objective was to study the rates and frequency of application of the systemic insecticide Furadan 3G in controlling insect pests of rice. In Upper Volta insecticides were evaluated for the control of rice gall midge. Significant increases in yield were observed with two or three applications of Furadan and Miral was found to be the best insecticide to control gall midge.

(b) Coordinated Herbicide Trials

The herbicide trials were carried out in several locations during 1978 to 1980. The objectives were to compare selected herbicides, identify the effective ones suited to the various rice ecologies in the West African region and explore the possibility of using selected herbicides as alternatives to manual weeding.

For upland conditions handweeding generally gave higher yield. Under irrigation, good land preparation and water control naturally controlled the weeds, and in the man-rove swamp good land preparation before transplanting gave adequate weed control. Nevertheless some herbicide combinations were effective in controlling weeds.

(c) On-Farm Trials

Since 1979 the on-farm trials have been conducted by the farmers on their own land under the supervision of the WARDA Sub-Regional Coordinators. The stated rationale of these trials is that the farmer will adopt a new technology once he is convinced that it is adapted to his own system and is profitable.

The objectives of the trials are to assure that varieties introduced by WARDA in the region are evaluated and used by the farmers; to speed up the transfer of results from the experimental fields to those of the farmers; to encourage farmer-to-farmer spread of technology.

Three promising varieties and one local check are grown in plots 5 x 10 metres with improved cultural practices. A similar plot size is demarcated on the farmer's field. The production from the five plots is harvested and compared.

The Sub-Regional Coordinators jointly develop the protocol for the conduct of the trials in all the sub-regions, consequently the trials are as uniform as possible.

The number of trials has been fixed at 10 for each sub-region. In some cases the on-farm trials also include the demonstration of agricultural practices. WARDA pays the farmers a fee to conduct the trials.

5.7. Budget

The coordinated trials are entirely financed through the CGIAR. The funds have been provided by Germany, Sweden, Netherlands, Nigeria, Canada, ADB, France, Belgium, IBRD, IFAD, OPEC, Japan.

The CVTs and total WARDA expenditures and planned budget for 1981 up to 1985 are shown in Table 6. The percentages of the CVTs expenditures and budget in relation to WARDA totals have decreased gradually from 1981 to 1984.

The budget items specific to the trials are shown in Table 6, and indicate the priorities in relation to this program. In the 1983 budget it can be observed that there is a reduction in all items except personnel and others. However, the payment for trials was the most affected. The budget proposed for 1985 in general returns to the 1982 levels. The only item which is kept lower is payment for trials.

The numbers discussed in the paragraphs above reflect the policy observed in WARDA towards a reduction in the coordinated trials activities. In the past the maximum number of trials per year was fixed at 224 and has now been reduced to 125.

Table 6: Division of WARDA's Expenditures (1981-82) and Budgets (1983-84) for CVTs

(US\$'000)

Years	EXPENDITURES		BUDGETS		
	1981	1982	1983	1984	1985
Personnel	1,516	1,815	1,957	2,067	2,297
Services	160	172	139	139	193
Travels	192	208	101	101	227
Equipment Replacement	49	7	9	9	48
Payment for Trials	225	228	98	158	189
Others	419	281	409	443	875
Total for CVTs	2,561	2,711	2,713	2,917	3,829
% from total WARDA	26	24	-	23	-
TOTAL WARDA	9,937	11,485	-	12,480	-

5.8. Results and Assessments

During the last five years 10,369 varieties and breeding lines have been introduced into the region. Most of the introductions (8,458) are adapted to irrigated conditions and 1,911 to upland. Around 80% originated from the IRTPs (IRRI) grown in West Africa.

The others were received directly from Bangladesh, Indonesia, Sri Lanka, Japan, CIAT and Brazil. A small number of introductions are specifically adapted to deep water, flooding and mangrove swamp conditions.

Since 1981 segregating populations of the Rapid Generation Advance (RGA) program have been introduced from IRRI. Some populations are derived from crosses between one deep water rice variety (suited to shallow water depth and having photoperiod sensitivity) and one non deep water variety. The progenies showing deep water adaptation are under test at Mopti Special Project and others showing semi-tall habit and photoperiod sensitivity were kept in Suakoko for the development of photosensitive varieties for inland swamps. F4 and F9 populations derived from crosses involving rainfed lowland varieties X imported varieties and upland varieties X irrigated varieties were also introduced. The objective is to identify lines adaptable to different water regimes in inland rainfed valley swamps. The Panel feels that this new approach is correct and should be emphasized.

WARDA has not been very successful in carrying out the planned IETs and CVTs. During the last five years, out of 199 IETs planned to be planted in 40 localities within the 15 member states, only 119 produced useful results (Table 7).

Table 7. WARDA IETs, 1978-82

Year	1978	1979	1980	1981	1982	Total
Number planned	39	39	41	41	39	199
Number with useful results	16	29	25	24	25	119
% Success	41	74	61	59	64	59

Also among the planned CVTs for 56 localities only 59% were successful (Table 8).

Table 8. WARDA CVTs, 1978-82

Year	1978	1979	1980	1981	1982	Total
Number planned	156	156	174	174	162	822
Number with useful results	84	107	89	99	102	481
% Success	54	69	51	57	63	59

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In some countries like Mauritania and Guinea less than 20% of the trials produced good results in five years. In some localities no results were obtained during all this period, while in others the percentage of success was 100% (see table, Annex X).

The percentages of trials in upland and irrigated conditions are similar but both are much higher than in the other conditions (Table 9). The difference indicates the level of priority given to the ecological types but also reflects the availability of material for testing in each condition.

Table 9. Percentage IETs and CVTs in Different Rice Ecologies

	<u>IETs%</u>	<u>CVTs%</u>
Upland	42	42
Irrigated	50	45
Mangrove	-	7
Deep flooded	8	4
Cold	-	1
Floating	-	less 1
Total %	<u>100</u>	<u>100</u>
Total	<u>120</u>	<u>388</u>

The lack of success in carrying out the planned trials can be frustrating and a waste of time and money. WARDA is presently reorganizing the Coordinated Varietal Trials and there is an opportunity for detecting and correcting the causes of the failures. During the review the Panel noticed some problems that could be contributing to this lack of success: information on climate and soil in some localities was not available or insufficient; the interest or enthusiasm found in some local people was low, there was a degree of uncertainty about the continuity of financial support from WARDA; the amount of money available was not sufficient or it did not come when needed.

It has been reported by WARDA that more than 50 varieties (see table Annex XI) from the Coordinated Varietal Trials have been officially released by associated countries or were recommended to farmers. Some of them have been included in the seed multiplication program of certain countries.

Some countries have produced seeds from varieties introduced by WARDA and distributed them to the farmers. For example Senegal produced in the last three years 190 tons; Guinea Bissau in 1981 produced 95 tons; and Gambia in the last three years produced 105 tons. The main varieties were IR 8, IR 442-2-58, IR 22, IRAT 9, IRAT 10, ROK 5,

BG 90-2, BW 78, SE 302 G, 149 B/9, I-Kong-Pao, Phar.Com.En. In Ghana IR 442-2-58 and CICA 4 made up 37% and 13% respectively of total quantity of seed distributed by the Ghana Seed Company in 1981.

In the last five years WARDA produced and distributed to the national programs 230 tons of foundation seed of the following varieties I-Kong-Pao, Jaya, IR 5, IRAT 9, TN 1, IR 442-2-58, IR 8, Phar.Com.En., IR 22, IR 1529-680-3, TTN, IR 20, ROK 5, IRAT 10.

In some countries materials introduced by WARDA have been used in the local breeding program for crossing with local varieties. In Nigeria specific examples are I-Kong-Pao, SC 302 G, 144 B, IRAT 13 and IRAT 194/1/2.

WARDA carries out pre-extension activities such as On-Farm Trials and Foundation Seed Production. There is a proposition to extend this kind of activity by installing on farmers' fields small "seed production farms" under the supervision of the Sub-Regional Coordinators and financed by WARDA. Although the Panel recognizes the need to improve extension and seed production in the region it considers these activities to be more the responsibility of the individual country.

Rather than do it itself WARDA should continue to encourage and support the national programs to carry on these activities as it already does in Nigeria, Mali, Senegal and Gambia.

The Panel noticed that the associated countries seem pleased with the opportunities that the coordinated trials are creating for testing new materials locally. In some countries the trials represent the only research activity. Nevertheless, there are only a few indications that the varieties are or will in a short period be broadly adopted by the farmers and produce any impact on the rice productivity.

WARDA claims that the main constraints to the prompt adoption of varieties are the lack of efficient extension and seed production programs in the associated countries. During the review the Panel noted these deficiencies and also the problems that local policies can bring to the transfer of technology to the farmers. Nevertheless the Panel made other observations which are relevant to the whole problem.

Among the promising varieties there are few high yielding modern varieties developed by IIRI in Asia. However, the IRAT varieties developed at Bouake for upland conditions are amongst the

top-performing varieties in almost all regions. Less than 20% of the recommended varieties originate from the preliminary selection in the SNF at Suakoko, although from 60 to 80% of the materials nominated to the IETs come from this same origin.

The materials from IRRI are mainly taken from the IRTPs after they have been submitted to a process of selection to the West African region. When they are included in the coordinated trials they are submitted to a second process of selection and adaptation. This duplication probably reduced the chances of finding materials adapted to the specific ecological conditions where the trials are grown.

Suakoko station can be considered representative of one of the main ecological conditions where rice is grown in humid West Africa. A strong selection pressure, during the early stages of the coordinated trials, in this area, can also reduce the probability of finding varieties adapted to the other main ecological conditions. The chances of success will increase if the early selections are made in the ecological condition where the selected varieties will be grown by farmers. The relative success of upland material from Bouake mentioned above, supports this observation.

The four WARDA Special Projects are located in regions representative of four main ecological conditions and the chances of success could increase if the early selection could be made there. The facilities and the staff in these projects seem capable and sufficient to develop this work. The program could be strengthened by the deployment of scientists located at the headquarters and working at Suakoko, mainly in the coordinated trials program.

Considering the specific conditions found in Africa and the existence of well adapted old varieties in the region, the selection of early segregating populations from crosses between these adapted varieties and high-yielding varieties developed elsewhere could be a better approach. This is particularly true for the upland and mangrove swamp conditions. As reported elsewhere, WARDA has already taken this approach by introducing in its work RGA population from IRRI.

WARDA follows the policy of paying national institutions quotas, fixed annually, for the work in carrying out the trials. The rationale is that the countries do not have enough money and without payment the trials would not be planted at acceptable standards.

However, during the visits to experimental fields in national programs the Panel noticed that although the trials were well tended the researchers did not show the interest and/or enthusiasm for them as for their own work. This was for WARDA and not for their own country. Some complaints were heard because WARDA was paying for the job after its completion and not in advance.

The need for payment is understandable and acceptable, considering the economic situation of the countries in the region. However, an effort should be made by WARDA at all levels, Governing Council down to the laborers, to emphasize that the trials represent cooperative work for the benefit of the countries where they are planted. The researchers must recognize the trials as their own programs of research and not part of their obligations. The role of WARDA is to strengthen the national capability through cooperation.

5.9. Recommendations

Based on the above observations, the Panel strongly recommends that WARDA carefully reexamine the coordinated trial activities and aim to:

- a) conduct the initial screening of all the varieties at the Special Projects;
- b) strengthen these projects by the redeployment of staff located at headquarters and working at Suakoko;
- c) choose more carefully the location of the trials in relation to the rice ecologies, local interest, supporting facilities, availability of basic data on climate and soils;
- d) integrate better the coordinated trials and the IRTP to avoid unnecessary duplication;
- e) focus the program more on generating technology for the local conditions, particularly in relation to the upland and mangrove conditions and concentrate less on introductions;
- f) phase out the payment for carrying out the trials, and
- g) build up more strongly the sense of cooperative work and its value for strengthening the national programs.

CHAPTER 6. SPECIAL RESEARCH PROJECTS

Almost from its inception, WARDA planned to establish four major Special Research Projects, based at national rice experiment stations, each one in a separate ecological area representative of the kind of rice culture that is typical of the region.

The four projects and their locations are as follows:

1. Irrigated Rice, at Richard Toll/Fanaye in Senegal. This site is representative of the more arid parts of the region where irrigation water is available, solar energy is high and disease incidence is low.
2. Mangrove Swamp Rice at Rokupr, Sierra Leone. The environment is typical of the coastal parts of West Africa where the rainfall is high and rice can be grown along the rivers that flow into the sea.
3. Deep Water/Floating Rice at Mopti, Mali. This site is representative of large areas along the Niger River and its tributaries, where light rains in July and August make it possible to establish a stand of rice. Normally, the rivers overflow their banks in September and October and permit the growing of deepwater and floating rice varieties in varying depths of water.
4. Upland Rice at Bouake, Ivory Coast. This site is typical of the savannah ecology where annual rainfall ranges between 1,000 and 1,200 mm.

Although at the start, the research conducted by the special projects was largely confined to the experimental fields of the stations, as improved varieties and cultural practices were developed, the work was extended to farmers' fields near the stations, as well as to areas in member countries that had similar climatic and soil conditions to those at the main research stations.

The projects differ in type of program as well as in progress. Therefore, their nature and major achievements are set forth separately in this chapter. At the end of each project presentation, the Panel's assessment and recommendations are given.

6.1. Irrigated Rice Project - Richard Toll/Fanaye, Senegal

6.1.1. Historical Background

The Special Project on Irrigated Rice was started in July 1976 with grants to WARDA from the Belgian Government, the International Development Research Centre (IDRC) of Canada, and the Canadian International Development Agency (CIDA).

The project was located at Richard Toll and Fanaye, because a small national rice research station was already located at Richard Toll and a new experimental area was being developed at Fanaye, 60 km up the Senegal River from Richard Toll. Furthermore, it was recognized that there was a great potential for growing irrigated rice in the Senegal River Basin, especially after the proposed dams were built, one in the delta area to prevent the intrusion of salt water during the dry season and the other in Mali to regulate the flow of water during the entire year.

6.1.2. Objectives

Irrigated rice with complete water control (as exists along the river basins in the arid parts of West Africa), represents, at present, only about 2% of the total area on which rice is grown in the 15 member countries. Although the approximately 52,000 ha area devoted to this type of culture is small at present, it represents the largest potential for increasing rice production with high and stable yields. As irrigation schemes are developed, especially along the Senegal and Niger rivers, rice production in West Africa should show a marked increase.

Although some of the results obtained at Richard Toll/Fanaye will be applicable to lowland, rainfed areas, separate varietal trials must be conducted on such sites, particularly because insect and disease attacks are more severe in humid environments.

The principal objective is to identify, through a testing program, superior rice varieties adapted to irrigated rice culture in the West Africa region. Other objectives are to investigate soil and crop management practices, the control of insects and diseases, the use of Azolla, and to conduct on-farm trials along the Senegal River.

6.1.3. Structure and Content of the Research Program

Varietal Improvement - Many varieties are screened during the winter months for cold tolerance; several IRRI-IRTP nurseries are planted each year; varieties selected by WARDA for use under irrigated

conditions are tested; special trials are conducted for tolerance to hot, dry winds and to attack by mites and stemborers.

Agronomic and Soil Research - The following studies are currently active: the physical and chemical characteristics of the soils of the Senegal River basin; the response of modern rice varieties to nitrogen, phosphorus, potassium, trace elements and compost; the effect of sowing date and spacing on nitrogen response; sources and methods of application of nitrogen and phosphorus; the influence of different water regimes in combination with nitrogen on the yield of rice; a survey of noxious weeds in the Senegal River area; screening of chemical herbicides for irrigated rice; a comparison of hand weeding and herbicide application on the yield of rice.

Entomology - The research program includes the following studies: the effect of Furadan granules on the control of rice stem-borers; the seasonal distribution of stemborers; varietal resistance to borers; observations on the damage and seasonal distribution of attack by mites.

The Azolla Project - This is a relatively new project centered at Fanaye to study methods of growing Azolla in flooded rice paddies, the effect of the incorporation of Azolla into the soil on rice yields and the partial substitution of Azolla for nitrogen fertilizer.

Trials on Farmers' Fields - The research staff on the project are conducting trials on farmers' fields at a number of locations along the Senegal River as far upstream as Matam. Trials are being conducted on response to fertilizers including sulphur-coated urea. Several varietal trials are being conducted.

6.1.4. Resources

a. Human - The senior research staff on the project consists of a team leader, who is a plant breeder; a soil scientist who conducts trials on farmers' fields; an assistant entomologist, an assistant soil scientist, an assistant weed scientist, an Azolla specialist and an agricultural economist. The team leader has a Ph.D., one has an Ing. Agronome, and two have M.Sc. degrees. The other two who have only B.Sc. degrees have been granted leave recently to pursue advanced study abroad.

b. Financial Resources - As in the other special research projects, CGIAR funding is provided for the salary of the project leader. The estimated budgetary requirements of the project for the next five years ranges between 500 and 600 thousand US Dollars annually.

The Panel did not detect any scarcity of funds for the work at the main station, and the project leader stated that current income was sufficient for cooperative trials in the nearby countries of Mauritania and Guinea Bissau. Some of the staff have visited most of the member countries and have prepared cooperative projects to be undertaken if funds become available.

WARDA has been informed that IDRC will not continue its financial support beyond October 1983, when its current grant expires. WARDA did not seem unduly concerned about this. Abu Dhabi has provided some support in the past but no funds are coming from the OPEC region now.

c. Physical Resources - The area of land available at Fanaye is about 70 ha, of which about 15 ha have been developed into experimental plots with good water control. Water is pumped from the river and all plots are provided with water intake and drainage outlets.

At Fanaye there are four houses for technicians, but the scientists live in Richard Toll (one even living in St. Louis) and adequate accommodations have been provided. Also the Senegalese government has provided offices and laboratories for the senior professional staff at Richard Toll.

It is the opinion of the Panel that land and building resources are adequate.

6.1.5. Relationships with Other WARDA Departments

There were no serious complaints from the staff at Richard Toll about the infrequency of visits from WARDA Headquarters. The entomologist visited more often than others. One feature which is different at Richard Toll, as compared with the Rokupr Project on Mangrove Rice, is that the research staff of the station conducted the on-farm trials, while at Rokupr, these are done by the Development Department. However, in 1983 an agricultural economist has been added from the Development Department who is starting some assessment studies.

6.1.6. Achievements

From its inception the Special Research Project for Irrigated Rice has shown that during the main growing season excellent rice yields can be obtained in the Senegal River Valley using improved varieties imported directly from Asia. Today the principal varieties being grown by farmers are I-Kong-Pao, brought in by the Chinese teams

before WARDA was established, and Jaya, imported from India by a Senegalese official who visited India around 1970.

Many varieties from IRRI's cold tolerance nursery have been tested during the cool season when night temperatures are 10°C or lower. No superior varieties have yet been recommended to farmers, but the work is continuing.

The agronomists have conducted many studies on the response to nitrogen, phosphorus and potassium and can now make firm recommendations to farmers. It has been thoroughly proved that split applications and the use of slow-release nitrogenous fertilizer are needed to prevent excessive nitrogen losses. Optimum rates of nitrogen application (in terms of N) appear to be about 120 kg/ha. Continuous cropping after the third year depletes the soil of phosphorus, so that modest rates must be applied. So far, there has been no significant response to potassium applications. Among the products tested, sulphur-coated urea proved to be the best form of slow-release nitrogen.

Considering the unavailability of chemical pesticides to the farmer, the best weed control results from thorough land preparation before planting and one hand-weeding if necessary.

No varieties have been tested that are highly resistant to rice stemborers.

Incorporating 40 t/ha of Azolla with 60 kg/ha of N makes it possible to obtain the same yields as that obtained by applying 120 kg/ha of nitrogen alone.

It appears that the on-farm trials are successful and that particularly the use of fertilizer and modern rice varieties is having a favorable impact on rice production. The limiting factor is the scarcity of diesel-power pumps for irrigation. Currently it requires one pump for each 20 ha of land.

6.1.7. Limitations and Weaknesses in the Program

The Panel was a bit disappointed to find that out of all the varieties tested through the Coordinated Varietal Trials (CVT) of WARDA, the varieties being recommended to farmers were essentially the two (I-Kong-Pao and Jaya) that had been introduced before WARDA was established. The project leader did state that two other varieties are now being tried on farmers' fields. They are BG 90-2 and Sri Malaysia. These have come out of WARDA's CVT program.

During April and May, hot dry winds from the Sahara desert cause severe damage to the rice plants by inducing spikelet sterility and leaf dessication. Also during this same period, mite infestation is severe. The project is testing varieties for resistance to hot wind damage and to attack by mites. However, as yet, little progress has been made. A suggestion for an alternate line of research is presented under "recommendations."

The mite-damage problem has been present since 1979, but as yet the life history of the pest has not been worked out. The mite comes each year in April and May and then goes, but it is not known what happens to it. Detailed studies of this pest should be conducted by the entomologist. Although it is known that there are severe losses of fertilizer nitrogen, the scientists have not demonstrated actual causes. For example, whether it is due to leaching from frequent irrigation, denitrification or volatilization.

6.1.8. Future Plans

From the Panel's discussions with the staff it seemed that the future plans are to conduct at the main station whatever research seems important and to expand the work to other member countries of WARDA. Naturally their results would be applicable most appropriately in such arid countries as Mauritania, Mali, Upper Volta, Niger and the drier part of Nigeria.

6.1.9. Assessment and Recommendations

Other than the weaknesses presented above, the Panel felt that the project in Senegal has a good program. Staff morale seemed to be high and the scientists appeared to be dedicated and enthusiastic about their work.

The Panel makes the following recommendations:

1. Because it has been shown that in the relatively disease-free environment of the Sahel, Asian rice varieties perform well, the project should test more thoroughly the latest improved varieties from Asian sources, principally from IRRI. For some reason varieties successful at other sites did not appear in their trials. Perhaps it was because the CVT program screened them out in the humid climate at Suakoko.

2. The project should conduct research on cropping systems. This should determine whether substituting another crop or crops for rice during the cold and dry season from December to June will prove more profitable because rice is affected adversely by cold winds in

January and February and by hot, dessicating winds and by mites during April and May. Such crops as sorghum and millet grow well during this period, if irrigated, and there is some possibility that spring wheat can be grown during that season. In the Dagana area farmers are already growing a tomato crop instead of rice during the cool season.

3. The entomologist should concentrate his efforts on studying the life history of the mite that has been causing severe damage to the rice crop on the station and on farmers' fields since 1979.

4. A greater effort could be expended in studying the causes of nitrogen losses from the soils in the Senegal River basin.

5. The above modifications to the program should be conducted without adding staff beyond the 1983 level.

6.2. The Mangrove Swamp Rice Project - Rokupr, Sierra Leone

6.2.1. Historical Background

Rokupr, located in the Northeastern part of Sierra Leone on the Great Scarcies River, is the site of the National Rice Research Station (RRS). It was founded in 1934 and became the West Africa Rice Research Station in 1952, and then reverted to national status in 1964.

Although FAO and IITA had provided financial assistance to the station earlier, WARDA's program there began in 1975-76 when USAID made a grant for support of a mangrove rice research project over a 4-year period. At that time U.K. and IITA/FAO were providing funds, largely for scientific personnel. Today the project is almost entirely supported by USAID.

6.2.2. Objectives

The principal objective of the WARDA project is to test and develop varieties adapted to mangrove swamp conditions, and to discover through research, improved methods of land preparation and crop management.

Mangrove swamp cultivation in West Africa is important where rainfall during the wet season is high enough to keep the salt water from intruding into the paddies. It is estimated that mangrove swamp rice occupies over 190,000 ha of land in the member countries, with the largest areas being in Guinea Bissau, Guinea and Sierra Leone. Although Senegal and the Gambia have appreciable areas of

mangrove swamp rice, yields are low because of inadequate rainfall.

6.2.3. Structure and Content of the Research Program

The project's research program has the following principal components:

1. Observational and yield trials of short, medium and long duration promising varieties, including screening for tolerance to high levels of soluble iron, salinity and to water level fluctuations in tidal swamps.
2. Studies of insect population dynamics both at the station and on farmers' fields.
3. Comparisons of crab damage in relation to different numbers of seedlings per hill, plant spacing and age of seedlings, and different rice varieties.
4. The effect of time of planting on insect attack.
5. The response of rice varieties to nitrogen, phosphorus, and potassium, and to zinc under iron toxicity conditions (15 different field experiments being conducted in 1983).
6. A series of comprehensive studies of Azolla as a partial substitute for chemical nitrogen.
7. Studies of varietal resistance to the most severe diseases including rice blast, brown spot (Helminthosporium) and the pale yellow mottle virus.
8. The chemical control of rice diseases, as well as studies of cultural practices (spacing and date of planting) on disease incidence.
9. Methods of weed control in mangrove swamps.
10. On-farm adaptive trials of improved varieties, land preparation techniques and fertilizer response. These are now being conducted in Sierra Leone along the Great Scarcies River, and in Guinea and the Gambia. During the past two years, these trials were preceded by baseline socio-economic surveys which served as a guide to the design of the adaptive farmer field trials.

6.2.4. Resources

a. Human - The principal scientists on the project consist of the project leader who was trained as an entomologist, a breeder, an entomologist, a pathologist, a weed scientist, a soil scientist, an agricultural economist, an extension agronomist, and one ODA research assistant provided by the U.K. Although there are only two Ph.D. degree holders on the staff at present, three are now pursuing their Ph.D. degrees and two have B.Sc. degrees only.

In addition to the above senior staff there are 22 field assistants and 11 regular employees such as clerks, typists, drivers, etc. Also there are between 60 and 100 daily-paid workers, depending upon the need.

The Panel feels that the Project is well-staffed with an energetic and resourceful team leader and rather well qualified research scientists. The experimental plots are well managed and labelled.

The professional staff is a mixture of personnel from both the Research and Development Departments who are working well together.

b. Financial Resources - The current budget of the Mangrove Swamp Project is provided almost exclusively by USAID. It appears that the funds provided in the grant are reasonably adequate for the operating program. There are serious problems in transferring funds from Headquarters on time, and there are needs for improved physical facilities.

The USAID has made two large grants. From 1976 to 1979 the project spent between \$215,000 and \$275,000 annually. The budget for 1983 is about \$535,000.

c. Physical Resources - The National Rice Research Station and the WARDA project share the experimental field area, and their plots are intermingled. WARDA is using approximately 5 ha of the area for its field experimentation which appears to be adequate.

Good staff houses have been built for the senior scientists and their families. The WARDA laboratory and office building are overcrowded and more space is needed. A WARDA Guesthouse is partially constructed, but because of lack of funds it has not been completed.

The water supply system for the compound is old and needs renovation. There is no public power at the station and its private generator is run only at night. Field equipment, boats and vehicles appeared to satisfy the needs of the project.

6.2.5. Principal Achievements

A few of the more important achievements of the project are as follows:

1. The response of N, P, and K of the mangrove swamp varieties has been thoroughly explored.

2. By testing several types, the Project identified a suitable power tiller for mangrove swamp land preparation.

3. Hundreds of varieties and genetic lines have been tested for mangrove swamp conditions, although none have been identified so far, that are superior to ROK 5 and ROK 10 (varieties developed at the RRS before WARDA existed).

4. Spacing, number of seedlings per hill and varietal resistance have been rather thoroughly examined as a means of reducing damage by crabs (at present the most destructive pest of mangrove swamp rice).

5. Some 50 trials are being conducted annually by the TAT program of the Development of WARDA on farmers' fields mostly along the Scarcies River. These trials are to acquaint farmers with the advantages of using fertilizers, an improved variety and mechanical land preparation.

6.2.6. Constraints

The distance of the site from Freetown, the poor road conditions, and the lack of other sources of communication (telephone, telegraph and mail services) in Rokupr; and the absence of good sources of supply are serious constraints to the efficient operation of the station. Most of these cannot be changed in the near future. In spite of these constraints, however, the ecological environment and the degree of development of the experimental fields are excellent and good research work is being accomplished.

6.2.7. Future Plans

The project expects to intensify and extend its socio-economic surveys, and its trials of varieties and crop management techniques to other countries, including Nigeria which has specifically asked for assistance.

6.2.8. Assessment and Recommendations

The Panel's assessment of the project is that it is performing well. Using varieties currently available and applying fertilizer and good weed control, average yields on farmers' fields conceivably could be increased from the current level of 1.5 t/ha to 2.5 to 3.0 t/ha.

The Panel noted that the plant type of the improved varieties (ROK 5 and ROK 10) is not far different from that of the traditional varieties. The scientists explained this by stating that modern plant types were so succulent that crabs would eat them in the early stages of growth, and that varieties introduced from Asia would not have tolerance to high levels of soluble iron, saline soils and varying levels of flood water encountered in the tidal swamps.

Nevertheless, the Panel feels that an attempt should be made to develop varieties of rice that combine tolerance to adverse soil and environmental conditions with a plant type adapted to mangrove conditions. The project might wish to request the assistance of IRRI in making crosses between local varieties from Sierra Leone and varieties from Asia that have a more desirable plant type with a high yield potential, and then ask to have seed of the F₂ or F₃ generations sent to Rokupr for testing and selection.

Support for this project should remain at least at the current level.

6.3. Deep Water and Floating Rice Project - Mopti, Mali

6.3.1. Historical Background

Some deep water rice research has been conducted near Mopti (Ibetemi Village) by the French since 1925. The early work concentrated mainly on selection of improved Oryza glaberrima varieties and new introductions from Guinea. In 1962 the station was taken over by IRAT and O. sativa varieties were introduced from Asia and crossed with local varieties. The scientists experimented with cultural practices as well.

The Governing Council of WARDA in 1972 decided to establish a station at Mopti, which was at a lower evaluation than Ibetemi. By 1974, USAID agreed to provide support for the station and by 1976 IRAT abandoned its work in the area in favor of WARDA. During the

period that IRAT conducted its research in the area, several improved varieties were identified such as Mali Sawn, Khao Gaew, Nang Kiew, HKG 98 and Gambiaka, which are still being recommended to farmers.

Buildings and polders had to be constructed at Mopti and the first WARDA research assistants were posted at the station in 1977. However, the program did not really get underway until 1979.

6.3.2. Objectives

Deep water and floating rice culture, according to various statistics occupies between 300 and 450 thousand ha in the member countries, with most of it in Mali, Guinea and Nigeria. Unfortunately, this type of rice farming is risky because yields depend upon adequate rainfall during July and August when the rice is sown and upon the flood waters coming in September and October when the rivers overflow their banks.

The purpose of the project is to conduct research on deepwater and floating rice in order to increase yields and production through testing and developing improved varieties and by conducting research on soil and water management. It is the ultimate aim of the project to assemble a package of improved practices that can be offered to farmers in the deep water areas of the member countries, and thus increase the profitability of deepwater rice production.

6.3.3. Structure and Content of the Program

The principal areas of research included in the program are varietal improvement, agronomy, weed control, and entomology. Also, an extension specialist is posted there to conduct on-farm trials. The varietal improvement program involves screening introduced varieties for tolerance to drought, to varying water depths, and to submergence for short periods. Some crosses are being made between local and introduced varieties.

The agronomy program includes studies of land preparation methods (hand hoe, animal and machine drawn equipment), weed control, seeding date, spacing, and response to fertilizer applications.

The entomology program emphasizes insect identification, population dynamics, varietal resistance to insect attack, and insect control with insecticides.

The on-farm trials are part of the TAT program of the Development Department of WARDA. Many trials are on farmers fields not far from the experiment station.

6.3.4. Resources

a. Human - The project has been without a permanent Director until recently. However, the program has been progressing under an Acting Director. The new Director arrived on post only in early September 1983.

The senior staff consists of seven scientists as follows: the Director, the former Acting Director (an agronomist), a plant breeder, an agronomist, a weed scientist, an entomologist and an extension specialist (on-farm trials). The remainder of the permanent staff consists of five field or laboratory assistants, a farm manager, a finance officer and a bilingual secretary.

b. Financial Resources - The operating costs of the project are provided almost entirely by USAID. A grant of \$2,461,000 was made in 1975 which covered the cost of training young scientists abroad, building seven residences for the scientists, purchasing needed equipment, constructing polders on the experimental field and salaries and operating costs.

Saudi Arabia made a grant of \$300,000 for the construction of the office and laboratory building.

The Government of Mali provided the land, a house for the farm manager, a laboratory and office for the breeder, and a storage building, generator rooms, garage and workshop. WARDA contributed the cost of three cars, purchased the oxen and built a cold room for seed storage. In 1983 the Mopti Project had an operating budget of \$753,100.

c. Physical Resources - In the above section the buildings were listed. In addition, the project has an experimental area of 46 ha which is divided into four polders. Three are for growing rice at three different water levels with maximum depth ranging from 1 to 1.7 m. The fourth is used for seed multiplication.

The station owns four small, portable diesel-powered pumps and two large movable pumps that can be used either for pumping into canals or be connected to overhead large portable sprinklers (which they possess). The project has a 4-wheel tractor for land preparation, with the appropriate attachments.

6.3.5. Relationships with other WARDA Departments

The Development Department conducts its TAT program in co-operation with the station. The CVT program supplies the project with varietal collections for trials.

6.3.6. Achievements

The project's accomplishments have not been as great as expected at the outset. The conditions during the last three years have been far from normal. In 1981 there was a severe drought in July and August, and many seedlings died. Then when the floods came in September, the plants that survived the earlier drought could not cope with the rapidly rising flood water and died. In 1982 and 1983, the Niger and Bani rivers did not overflow their banks, so the crops essentially failed in both years. With the pumps that are now at the station perhaps part of the 1983 crop can be salvaged.

The results since 1979 that are worthy of mention are as follows:

1. Two varieties, DM 16 and DM 17, outperformed Khaw Gaew and Mali Sawn, varieties commonly grown by farmers.
2. When land was prepared with a 4-wheel tractor, rice yields were considerably higher than when only hand hoes or oxen were used. The increase in yield was a result of better control of wild rice and other weeds when the land was well prepared.
3. Thorough surveys of the insect and weed populations in the area have been made, and the population dynamics of the three species of stemborers that occur have been studied.

6.3.7. Constraints

The largest constraint at the Mopti station is the lack of control of flood waters. The Bani River flows right by the station, but it does not always overflow its banks. Obviously, this is more of a constraint to the farmer than to the station, because the station has pumps but the farmer does not. In normal years both the Niger and Bani Rivers overflow their banks in September but for the past two years they have not. When the Panel visited the Mopti station on 21 September 1983, the farm manager had pumped some water from a canal

onto the plots and there had been a slight rain the day before. When the Director was asked why the station was not pumping water regularly out of the canal or the river, he replied that they had exhausted all their funds and that the station had not received any operating funds from Headquarters since April 1983. Obviously a station cannot operate unless it receives regular payments to maintain a flow of cash for paying laborers and buying supplies.

The Panel noted that the fields within the polders are not well levelled, which prevents the maintenance of uniform water levels. A qualified agricultural engineer could not only level the land but also develop a system of water control far superior to that which exists.

6.3.8. Future Plans

The project plans to intensify its screening of varieties, using materials distributed by both WARDA and IRRI. It has used IRRI's deep water nursery in the past but much of the seed has been lost from either drought in the early stages or from excess flooding later on.

The weed control research will continue work on practical methods of controlling wild rice (Oryza barthil and Oryza longistaminata).

If flood waters come on schedule in the years ahead, the project plans to expand its work with farmers.

6.3.9. Assessment and Recommendations

The Panel feels that the Deep Water and Floating Rice Project at Mopti, Mali, has a good physical plant, and well constructed polders on its experimental fields. Therefore, if flood water can be controlled, it will be able to conduct valuable experimental work.

Naturally, the question arises whether the levels of the Niger River at flood crest will continue to decrease making it less likely that the full potential area can be flooded for deepwater rice production. It is thought by some authorities that the various dams that have been constructed to use water for other projects may have reduced permanently the level of floodwater in the river. Others are confident that the current crisis is a temporary one. Assuming that the latter view is correct, the project's primary need is a qualified irrigation engineer for a one year period to design a dependable water control system.

Staff strength should not be increased, and if flooding actually ceases during the next few years, some alternative use for the station should be found.

6.4. Upland Rice Research Project - Bouaké, Ivory Coast

6.4.1. Historical Background

The agronomic rice research station at Bouaké was established in the 1930s. It worked with upland crops, and at that time rice research was considered to be a minor component.

In 1965, after independence, the station was entrusted to IRAT. Concurrently, the government embarked on an extensive project for the development of upland rice in the country, and IRAT was asked to backstop this project with an enlarged upland rice research program at Bouaké.

Since 1977, the Bouaké station has become a part of IDESSA (Institut des Savanes), which is entrusted with all the agronomic research in the area (food crops, fiber crops and animal husbandry). Rice research at Bouaké is an important activity today, with 15 scientists on the team.

The idea of WARDA becoming involved with the station at Bouaké originated with a survey that was made in 1968 by a FAO and UNDP team which advised the participants at the WARDA organization meeting in 1969 in Monrovia that the Bouaké station was the most appropriate place for WARDA's upland rice research program.

The Governing Council of WARDA in 1972 approved projects at Bouaké in agrometeorology, varietal improvement and weed control. The Council authorized assigning five specialists and five research assistants to the project.

Due to several "unforeseen circumstances" that were not clear, the project was not implemented. Two research assistants (provided by the French but used on WARDA projects) were assigned to the station.

From 1975 IRAT/IDESSA has supplied one senior scientist to the station who looks after WARDA trials. Until mid-1983, the only WARDA activity at Bouaké was in varietal improvement.

6.4.2. Objectives of the Program

Because the WARDA program until this year has been limited to varietal improvement, obviously the past objective has been confined

to testing and identifying rice varieties that are adapted to upland conditions.

Although Bouaké is in the savannah area with annual rainfall ranging between 1,000 and 1,200 mm, upland rice varieties have been tested in other areas with higher rainfall and where the disease-stress factor is greater than in the drier regions.

The upland rice areas have been classified into four zones based on rainfall amounts and patterns as follows:

- Zone I - short monomodal rainy season - only short-duration varieties can be recommended;
- Zone II - long monomodal rainy season with little likelihood of moisture stress;
- Zone III- bimodal rainy season - rice is sown during the first season and harvested during the second. There is considerable chance that drought may occur during the tillering or booting stage.
- Zone IV - a second bimodal rainfall regime in which rice is sown and harvested during the first rainy season when there is little chance that production will be limited by drought.

Upland rice culture is highly important in many West African countries. There are approximately 2.5 million ha of rice in the 15 member countries of WARDA, of which about 60% is planted to strictly upland rice. Of the area devoted to upland rice, 1.22 million ha are in Ivory Coast, Guinea, Sierra Leone and Liberia.

A large proportion of the upland rice in these countries is grown under shifting cultivation under relatively high rainfall (Zone II). Yields are low and disease, weed competition, birds and rodents take their toll. This is a badly neglected area of rice research and development which deserves increased attention from WARDA, national rice research programs, and IRRI and IITA.

6.4.3. Structure and Content of the Program

As mentioned above, the program of WARDA based at Bouaké has been devoted exclusively to varietal improvement, mostly testing and selection. In June 1983, however, WARDA posted two additional scientists at Bouaké - a team leader and an agricultural economist. The economist has already made a survey of bio-socio-economic conditions in upland rice-growing areas of the Ivory Coast.

The WARDA varietal improvement program at Bouaké includes yield stability studies in the various rainfall zones. Some of the CVT data from other member countries were included in the analysis, along with results obtained in different ecological zones in the Ivory Coast.

IRRI's upland nurseries from its IRTP program are grown at Bouake. Grain discoloration (brown glumes) is prevalent in upland rice in the higher rainfall zones, and many varieties are being screened for resistance to it. Yield trials are conducted at low fertility levels in an effort to identify varieties suitable for the African farmer who for various reasons is unable to use fertilizer.

6.4.4. Resources

a. Human - In September 1983, the personnel on the project were a project leader, an agricultural economist and a plant breeder. The Panel was impressed with the personnel assigned to the project. The new project head appeared to be a capable scientist and should make a good leader.

b. Financial Resources - The budget for 1983 lists the value of the budget "in cash and kind" as \$438,600. Presumably it includes the salary of the plant breeder who is supplied by IRAT/IDESSA:

c. Physical Resources - WARDA used the physical resources of IDESSA Station which appear to be satisfactory for the current program. The physical plant consists of a large office/laboratory building, various service buildings and a large experimental field (4.6 ha assigned to WARDA). The project provides two vehicles, but the field equipment is provided by IDESSA.

6.4.5. Relationship with Other Departments of WARDA

In June 1983 an agricultural economist from the Development Department of WARDA was added to the project. He has already conducted one assessment survey of upland rice farming areas in the Ivory Coast. Thus already research and development personnel are working together on the project.

6.4.6. Achievements and Constraints

The project is so thoroughly mixed with the work of the IDESSA group that it is difficult to separate out achievements that are wholly WARDA's. However, in WARDA's recent annual reports (1981 and 1982) the following results have been emphasized:

1. Among 20 varieties tested on many sites in the Ivory Coast, IRAT 104 is the best medium duration variety for the central zone and IRAT 13 for the western zone (high rainfall area). Among early varieties, IRAT 144 and IRAT 109 outyielded 17 other selected varieties.

2. A study of the frequency of stained and discolored grains (a serious problem in Zone II sites in West Africa) showed that there are wide variations among varieties in the percentage of stained grains, ranging in 1981 from 12 to 92% and in 1982 from 6 to 57%. The varieties with the lowest percentage were ROK 16 in 1981 and ITA 116 in 1982. The percentage of discolored grains was negatively correlated with yield, largely because stained grains are lighter than unstained ones.

3. Although the studies have just started, significant observations of the preliminary survey conducted between June and September 1983 are that very few IRAT-recommended varieties are being used by farmers, and almost no upland rice farmers use fertilizer.

The main limitation in the program until this year is that it has been confined to varietal improvement staffed by the French-supported rice breeder alone.

6.4.7. Future Plans

In 1982 WARDA prepared a program and budget for a greatly expanded upland rice research project centered at Bouaké but spreading its investigations into the various upland rice-growing ecologies. This proposed project has not been started for lack of a donor.

The project document requested over \$4.5 million for buildings alone and other three-quarters of a million dollars for laboratory and field equipment and vehicles. There are 12 senior scientists included in the proposal and with their assistants and service people the cost was estimated at \$1.5 to \$1.8 million a year.

Although the plan of work was broad enough to make it a complete project, the Panel feels that the more significant parts of the program could perhaps be carried out by changing the emphasis from some of the activities which demand more money than can be justified and diverting current funds to the new activities. Such a proposal is presented in Chapter 9 of this report.

6.4.8. Assessment and Recommendations

Although WARDA has tested many varieties of upland rice under varying ecological conditions within the member countries, it has

failed to address thoroughly one of the more important issues-- a permanent system of soil and crop management for rice production in the wet forest zone of West Africa. At least 1.2 million ha of rice in West Africa are now grown under the traditional system of shifting (slash and burn) cultivation.

The Panel recommends that this phase of research be greatly intensified. The constraints to increasing rice production under the traditional system have been identified. The most important are: (1) high disease incidence, especially rice blast, brown spot (*Helminthosporium*), and stained and discolored glumes; (2) heavy infestation of weeds; (3) soils erosion on steep slopes; (4) damage by birds and rodents; (5) the rapid decline of soil fertility after a year or two of cultivation of a site after the forest is cleared; and (6) the large amount of labor required to clear the forest in order to plant crops in a new area.

The Panel recommends that WARDA not activate the entire new upland rice project (as briefly described above under "Future Plans"), but that it inaugurates a research program with specialists in plant breeding, agronomy, entomology and plant pathology, with the assistance of the project leader and the agricultural economist who are already on the team.

Although several senior scientists can be based at Bouaké, capable field assistants must be stationed at several locations in the wet zone (annual rainfall between 1,600 and 2,400 mm). Sites in Ivory Coast such as Man, Gagnoa and Danane are possible locations where the actual research could be conducted.

The general plan of work is to establish experimental areas where continuous cultivation of rice and other upland crops can be studied building on the experience of researchers at IITA and other research centers.

CHAPTER 7. OTHER COMPONENTS OF THE WARDA PROGRAM

Other components of WARDA Program are: the Development Department, the Training Department, the Finance and Administration Department and the Communications and Documentation Divisions. The description of each of these, their objectives and their organization within the WARDA structure are given in the appropriate section of this chapter; the activities of each and their linkages within WARDA are examined and assessed.

7.1. The Development Department

7.1.1. Objectives

This Department, established in 1974, has the following major objectives:

- (i) Participation with other WARDA departments in the development, assessment and transfer of appropriate technology for rice development in the major rice ecosystems in West Africa;
- (ii) Provision of technical assistance to member countries and financing institutions in the areas of rice development, planning (including project identification, preparation, appraisal), implementation and evaluation;
- (iii) Collection, analysis and dissemination of information on the rice industry of member countries, including the conduct of general sectoral and socio-economic studies.

7.1.2. Programs and Staffing

The first objective is to be achieved through the Technology Assessment and Transfer (TAT) program; the second through the Technical Assistance Program (TAP); the third through programs dealing with Rice Policy and Trade Analysis (PTA); Statistics and Data Analysis (SDA); Mechanization and Water Management Studies (MWMS), altogether five programs.

The Department is divided into three divisions. In "Agronomy and Extension", work is done on these two subjects and it also makes major contributions to the TAT and TAP programs. In the "Economics, Finance and Statistics Division" major activities center around policy analysis, financial analysis and advice, statistics, and inputs are

given to TAT and TAP as well. In the "Engineering Division" are found: water management, mechanization, post harvest technology and rural engineering with contributions to the TAP.

The organizational structure is typically based on disciplinary divisions but may evolve into program divisions in the near future as programs develop further.

Staffing

Apart from the Director of the Department, the professional staff positions are as follows:

Table 10. Development Department: Staffing Positions, 1983

	Agronomy and Extension	Economics, Finance and Statistics	Engineer- ing	Total
Staff at HQs	4	5	6	15
Staff in Field	3	5	1	9
Total Staff	7	10	7	24
Qualifications	2 Ph.D., 5 M.Sc.	5 Ph.D., 5 M.Sc.	all Engi- neering degrees	-
Remarks	-	-	3 irrigation/drainage eng. 3 rice processing eng. 1 mechanization eng.	-

Major emphasis is now on the TAT program, as the following table on funding shows.

Table 11. Development Department: Funding Levels, 1981 and 1982

ACTIVITY	FUNDING LEVEL		FUNDING SOURCE
	1981	1982	
Technology Assessment and Transfer	528.8	1,512.8	USAID/EEC/UNDP/FAO/WARDA
Technical Assistance	872.0	1,123.6	EEC/Japan/France/Switzerland
Policy and Trade Analysis	-	-	None
Statistics and Data Analysis	74.0	103.3	France/USAID/Switzerland
Mechanization and Water Management	-	215.7	Netherlands/Italy
Coordination and Administration	93.2	122.1	WARDA
TOTAL	1,568.1	3,077.5	

Expenditure has nearly doubled over the period of one year with over 60% spent on staffing. TAT and TAP form the principal programs, with 90% and 86% of the Department's expenditure in 1981 and 1982, respectively. PTA has not been funded officially but professional support has been given by a TAT economist.

(a) Technology Assessment and Transfer (TAT)

In brief, TAT has five objectives:

Technology assessment:

- assemble information, identify farmers' constraints and guide technical and scientific experimental research (on farm trials);
- design/test appropriate technological packages under farmers' conditions (adaptive farm trials) for major rice production systems;

Technology Transfer:

- monitor/evaluate adoption of WARDA improved technology in rice development projects;
- identify major extension problems, work with national extension services;
- encourage establishment/efficient functioning of national seed multiplication projects.

Major activities under these phases involve conducting socio-economic surveys (exploratory, formal ones), identification of a technology package and its assessment through adaptive farmers' field trials and finally assist in testing extension education strategies.

These activities are carried out at the four special rice research projects. During 1981-82, TAT activities were established in Mopti and Rokupr, followed in 1983 at Richard Toll and Bouake.

Analysis and Impact of TAT

TAT is not only expenditure-wise the most important program of the Department but it has the greatest potential for agricultural research programs designed to produce results which are more useful, relevant and acceptable to farmers. The impact of a new technology is not just measured by its yield level in experimental plots but by the extent to which it is adopted by the farmers. Surrounded by so many constraints, the farmer has to make decisions which encompass risk, limited resources, time constraints and adverse conditions from land preparation to marketing. Technology assessment is particularly important where institutional links (e.g. extension) are weak. Thus, the concept of technology assessment and transfer has to work both on assessing improved technology within the farmers' decision-making framework and on testing an extension education strategy. For the past one and a half years, a Coordinating Committee consisting of three members of the Research Department and an equal number from the Development Department at Headquarters work together on launching this TAT program, linked to the Special Research Projects. At the local level, a similar small team of one agronomist with one agricultural economist is actually operating the TAT program. This is a positive approach, presenting farming/cropping system research as a methodology for improving the performance of the research system. In the past agricultural economists carried out ex-post studies of agricultural technology, often returning from the

field to inform biologists that they were wrong. Such an approach was clearly unconstructive.

While it is difficult to measure impact at this early stage, only two years after initiation of the program, the Panel feels that its positive influence is being noted on the relevance of the research program.

For most rice-based cropping systems in West Africa a well-tested technology package does not as yet exist. Technology packages are being developed, as for instance for tidal swamp rice. It is hoped that in a few years a number of packages may become available for the farmers which are technically sound and economically attractive.

The Panel believes that this TAT program carried out in conjunction with the Special Research Projects will speed the development of appropriate technology. A major factor for success is the close team cooperation needed between the agronomist and the agricultural economist in getting the program effectively underway. The Coordinating Committee of members from Research and Development Departments seems to work effectively.

(b) Technical Assistance Program (TAP)

The objectives of these activities, which have also substantially grown in importance in 1981 and 1982, are to provide multidisciplinary teams of irrigation and drainage engineers, mechanization experts, rice mill experts, agronomists and economists to provide technical assistance to Member Countries. During the last five years, over 30 missions have been undertaken and over 20 small-scale rice projects identified. The Department carries out these activities upon the request of Member Governments and may assist in procuring funds for implementation. Financing is not only by multi- and bilateral donors but in a number of cases, WARDA funding has been made available. For example, in 1982/83, to help the acutely serious rice milling situation in Gambia, WARDA donated to the Gambia Produce Marketing Board two small rice mills and extended several other services (including local in-service training) based on a TAP review missions' recommendations.

Analysis and Impact

It is felt that these activities serve a useful purpose in the region. With this program, WARDA distinguishes itself clearly from

other IARCs in that it provides development-oriented services directly to its clientele. There are a number of drawbacks, such as lack of funds for implementation and in some areas, lack of appropriate technology packages. Whereas the greatest part of the TAT program can be considered as part of the research activities of WARDA, the TAP presents the development orientation of the Association. The program also provides necessary feedback for the other programs of this Department and other Departments.

(c) Rice Policy and Trade Analysis (PTA) and Statistics and Data Analysis (SDA)

These two programs combined deliver at a relatively low cost a lot of useful information. The Statistics and Data Analysis Program became fully staffed by June 1982. In view of the dearth of data and lack of professional personnel in most member states it performs not only the function to supply other Departments within WARDA but is considered of great use to policy and decision makers in the member states as well.

(d) The Mechanization and Water Management Studies (MWMS)

The objectives of these activities are to study the major mechanization problems of rice development in WARDA member states and study the technical/economic aspects of water use, particularly in small irrigation schemes. The pilot mechanization study is conducted at Rokupr; the water management study has started at Richard-Toll. Expenditure has so far been modest. The need has arisen to hire a sociologist to study the consequences of likely new interventions, particularly their effects on the role of women. There is clear evidence that their role is very important in Gambia, Casamance Region (Senegal), the Western Region of Ghana, the whole of Liberia, Guinea Bissau and Sierra Leone. Information is needed that allows proper integration of women in rice development projects identified and planned by WARDA. In the Gambia, the introduction of mechanization may well threaten the position of women. The STC has so far refused the addition of a full-time rural sociologist to the Department's staff and has suggested to hire consultants whenever the need arises.

It is felt that this proposal of the Department deserves consideration in view of the many social aspects which come to the fore in design and execution of farming/cropping system development in West Africa. A specialized full-time scientist can contribute far more effectively to this development than ad hoc consultants. However, given limited resources, hiring such a specialist has to be set against other staffing priorities.

7.2. The Training Department

The objectives of WARDA's training program are:

- to promote rice research, production and technology by training personnel of the member states;
- to coordinate the overall WARDA training and training assistance to member states;
- to assist the member states in planning and developing rice training programs at the national level when requested;
- to establish and maintain contact with the member states and cooperating agencies with respect to training.

The Training Department has the training center at Fendall as one of its Division's and two other Divisions, a Pedagogical Support Division, and Planning and Follow-up Division are located at WARDA headquarters in Monrovia. The Department is headed by a Director, and has a special assistant.

7.2.1. The Training Center

The Training Center which is located at the campus of the University College of Agriculture of Liberia at Fendall, was established in 1976 with the financial support of USAID. Training was begun in 1973 at IITA. The main reason for locating the Center at Fendall was, as argued, to gain access to some college facilities/ services and thereby reducing the initial capital investment and operational costs. The Panel considers this argument to be valid despite some shortcomings observed, such as its remoteness from the major typical rice production area.

The Training Center has conducted the following different types of courses in English and French simultaneously:

- specialized courses, organized to train field assistants, research assistants, production extension agents or trainers, rice technologists, seed technologists, project managers, and rural engineers from the member states of the Association;
- tailor-made courses, especially designed short-term non-degree courses on request by member states for individual or groups of individuals of the member states;

- training in library science (short-term non-degree training) aimed at improving library services, cataloguing and dissemination of agricultural information in the Region;
- special language training, for WARDA staff in either English or French; and
- non-scheduled courses; so far these have covered mechanization, audio-visual communication and extension, and post-harvest technology.

The staff at Fendall consists of four lecturers including the chief and two interpreters. Scientists from the Research Department of WARDA in Monrovia, Universities within the region, and international research and training centers are invited as guest lecturers.

7.2.2. The Director's Office

The Director's Office in Monrovia consists of the Pedagogical Support and Planning and Follow-up Divisions of the Training Department and has two professional staff including the Director.

(i) Pedagogical Support Division

The Division which was created only recently, is still in the phase of establishment. It is yet unstaffed and is not expected to become operational before 1984.

The essential functions of this Division are:

- to assist both WARDA's Training Center and member countries in the design of appropriate training programs;
- the development of teaching materials for the Training Center and relevant institutions in member countries.

The creation of this Division's responds to increasing requests from member countries for WARDA's assistance in the organization of national training courses. While staffing (one professional) and funding levels proposed for this effort appear adequate, the Panel questions the need to elevate this activity to the rank of Division. Merging this activity with that of the Planning and Follow-Up Division would have appeared more reasonable.

(ii) Planning and Follow-up Division

The Division was created at the same time as the Pedagogical Support Division. It is in its phase of build-up and is not yet operational.

Its main functions are:

- the planning of the Department's activities both on-campus (at the Fendall Training Center) and off-campus;
- planning and handling of donor scholarships for WARDA sponsored training activities at the Center and elsewhere;
- follow-up to WARDA's training courses.

The Panel agrees that these are functions that need attention and considers the staffing proposed (one professional) as reasonable.

Yet, the Panel reiterates its concern at two general trends it has observed all throughout WARDA:

- (i) excessive departmentalization, i.e. the build-up of micro units that are inefficient in terms of resource utilization. This could and should be avoided by combining related functions into larger and more viable units;
- (ii) excessive build-up of staff at headquarters. This build-up takes place at the cost of those units in the field that constitute the basis of WARDA's program, the raison d'être of its existence.

The Panel considers that further distortions of the ratio of field staff to headquarters staff should not be allowed to take place and recommends that this ratio be closely monitored. In the case of WARDA's Training Department this ratio for professional staff is projected as follows:

Training Center

1983:	4	(1 Chief + 3 Trainers)	2	(1 Dept. Head + 1 Swiss TA)
1984:	5	(addition of 1 trainer)	2	(replacement of TA by core staff)
1985:	6	(addition of 1 trainer)	3	(add. of 3rd core staff person)
1986:	6	(constant)	3	(constant)

7.2.3. Funding

The levels of funding for the three Divisions of the Training Department for 1981-82 were as follows:

<u>Activity</u>	<u>Staffing Level</u>		<u>Funding Level</u> ('000 US\$)		<u>Funding Source</u>
	<u>1981</u>	<u>1982</u>	<u>1981</u>	<u>1982</u>	
Training Center	3	3	822.0	1,317.8	USAID/CGIAR/ JAPAN/SWISS/ BELGIUM/WARDA
Planning and Pedagogical	<u>2</u>	<u>2</u>	<u>125.4</u>	<u>134.6</u>	WARDA/SWISS
TOTAL	5	5	947.4	1,452.4	

The planned position for staff during this period was twice the actual levels and twelve courses had been planned. However, they only received 50% of the budget and 75% of the courses were implemented.

7.2.4. Facilities

Offices of the Director, the Special Assistant and their supporting general service staff are at the WARDA headquarters, and there may be a good reason for maintaining their position there so that they can interact with other WARDA Departments and also handle overall administrative matters related to the training program.

The Center has one lecture room with equipment for simultaneous interpretation, a library, a dormitory for 32 trainees, a kitchen/cafeteria/lounge (which seem rather inadequate) and irrigated lowland for the students' field practicals. Farm machinery is available, and the trainees have access to WARDA rice processing laboratories, germplasm bank and seed laboratory all of which are located within the vicinity of the Center. In all, these facilities are considered adequate for the present level of student intake, and already USAID is providing funds for the expansion of the kitchen and dining room, and a dormitory for 30 additional students.

7.2.5. Analysis of Impact of WARDA's Training Program

The provision of trained personnel for rice production and technology to the member states of the Association has been

commended by many, and this element would seem to augur well for WARDA's future as a viable entity in the region. Up to October 1983, 907 participants from all 15 member states have been trained. Annex XIV gives an analysis of the number of trainees by country and by type of training. The Department has been able to fulfill the major objectives in its program by placing in each country a nucleus of middle-level technicians and thereby, also, establishing and maintaining contacts between WARDA, the member states and other cooperating agencies. In a study conducted in 1982 by a Swiss expert in which eight countries and 100 past trainees were covered, it was observed that 97% of trainees were directly or indirectly engaged in rice production, research management and training.

Although each member state is entitled to two places per course, the variations of the number of trainees by country (Appendix I) clearly indicate that some countries have not taken full advantage of the program.

The involvement of some headquarter WARDA scientists in training is commendable.

Some specialized training courses have already been conducted at some of the Special Research projects, e.g. Rokupr and in member countries. In view of WARDA's increased attention to Special Research Projects, the Panel feels that in the future, as these are strengthened, more of the training could be carried out there.

The degree-related training program which has depended largely on the financial assistance from outside has so far trained thirty-one graduates, eleven of whom have come from WARDA Special Research Projects. The Panel feels that as opportunities arise in the future, WARDA should give priority to member states.

7.3. The Finance and Administration Department

The organizational structure and management of WARDA have been outlined in Chapter 3. The Department of Finance and Administration provides financial and administrative services to the technical departments.

7.3.1. Organization

The Department has a Director and two Heads of Division responsible for Administration and Finance. The former is responsible for personnel recruitment, procurement, liaison, inventory, insurance and maintenance; and the latter looks after

the budget and financial management of the organization. The Finance Division is also responsible for budgetary control of WARDA Special Projects and Sub-Regional Programs. A division of audit and planning has been proposed but not yet implemented.

7.3.2. Resources: Staff

The total employees for both Divisions of the Department is 42 of whom 7 are professional. The Panel considers this level of staffing to be more than adequate.

The Special Projects and Sub-Regional Offices are serviced by the Department by an imprest account which must be accounted for and replenished on a monthly basis by WARDA headquarters in Monrovia. There are frequently long delays in reimbursement of funds which have had an adverse effect on staff morale as well as on the program itself. This matter and the cashflow problem are treated in the report of the Management Review Panel.

7.4. Communications Division

The objectives of the Communications Division are: to assure the timely production and distribution of all the Association's publications and documents; to carry out the information activities aimed at sustaining the interests of the member states and donors in WARDA's program; and to promote interaction amongst scientists, research and development workers in the member countries. These objectives are achieved through:

- translations and editing;
- printing and distribution of publications;
- public relations and technical communications;
- language laboratory; and coordination of conferences and organization of meetings, including reporting.

Currently the Division is operating with a staff strength of 8, and 3 vacant positions exist consisting of two interpreters and a translator.

The budget for the Division was US\$561,400 in 1982. This budget is 50% of the planned level which coupled with outmoded equipment and inadequate storage has reduced the effectiveness of the operations.

It has been difficult to assess the impact of the Communication Division. However, the Panel noted that it has been involved in the following major activities.

1. Editorial work involving proceedings of seminars and annual departmental meetings, Technical Newsletters and WARDA reports some of which were used as material for the Review.
2. Translation of materials into either English or French.
3. Revision and up-dating of two documents:
 - WARDA, What It Is, What It Does, How It Functions; and
 - The Principal Insect Pests in West Africa and Their Control.
4. Organization and servicing of WARDA meetings.

The Panel feels that the Division is doing as good a job as can be expected given its limited facilities.

7.5. Documentation Division

The main objective of this Division is to provide information services on all aspects of rice production in West Africa to the Governments of the WARDA member states, WARDA projects and personnel, research institutions, universities and other organizations concerned with rice. The unit operates a library service and a photographic and microfilm laboratory.

There are four permanent employees and two unfilled positions. The position of Chief of Division has no budgetary allocation and is likely to remain vacant unless it is funded by a donor.

In 1982 the budget was US\$241,000, about US\$40,000 below the planned amount.

A microfiche laboratory which became operational in 1974 has produced 5,500 microfiche and has distributed 36 microfiche readers to member countries.

The library is located at WARDA headquarters in Monrovia. It has a collection of 12,000 volumes classified on AGRIS scheme;

800 periodicals and 1,550 monographs. The space allocated to it is minimal and the library is used little by WARDA staff and others.

The library has not been able to keep up to date with preparation of bibliographies (the last one came out in 1975). This is largely because all data processing is done manually. A request for computer facilities has been made to the French Government.

In spite of its limitations, the library issues quarterly accession lists of books and documents, maintains a photographic and microfilm service, and offers a training program in library service, documentation, microfilming and photography.

CHAPTER 8. COOPERATION WITH NATIONAL PROGRAMS AND OTHER CENTERS

This chapter is concerned with the relationships between the WARDA Sub-Regional Coordinators, Special Research Projects and the national programs in the region and with the collaboration between WARDA and other international institutions and organizations.

8.1. WARDA Sub-Regional Coordinators

The importance of rice in the agriculture and economy of the 15 member states of WARDA varies widely and largely determines the extent to which each country supports national research and development programs. This in turn influences the ways in which the WARDA mandate is implemented but, in general, WARDA supports existing national programs, specifically by reinforcing applied research, and assists in the development of rice cultivation in member states where the present minor role of rice precludes a specific research and development program.

WARDA member states are grouped into five sub-regions.

- Zone I - Mauritania, Senegal, Gambia, Guinea-Bissau; Office at Banjul;
- Zone II - Guinea, Sierra Leone, Liberia, Office at Conakry;
- Zone III - Mali, Upper Volta, Ivory Coast, Office at Bobo-Dioulasso;
- Zone IV - Ghana, Nigeria, Office at Accra;
- Zone V - Niger, Togo, Benin, Office at Niamey.

Each sub-region is managed by a Sub-Regional Coordinator whose primary tasks are to advise on research policies and programs, help to organize the training of national personnel, supervise the coordinated and on-farm trials and encourage national programs to expand on-farm trials so that a package of practices can be demonstrated to farmers.

Each Sub-Regional Coordinator is allocated an Assistant, though currently not all have one, and obtain technical support from the Technical Support Services and from staff at Headquarters

and at the Special Research Project.

The scientific and technical tasks of the Sub-Regional Coordinator, specifically the supervision of the coordinated and on-farms trials and helping with the training of national personnel are of primary importance. In these respects they both act as the outreach of the WARDA Research and Development Departments, especially in respect of Technology Assessment and Transfer, and also contribute to institution building within the countries to which they are assigned. The latter is one of their most important functions because it is the practical means by which national programs are encouraged to adopt the technological packages emanating from WARDA and to take over from WARDA some of the responsibility for technical assistance to rice growers.

The Sub-Regional Coordinators also act as representatives for WARDA within their sub-regions with diplomatic status. They have direct access to officials with authority, such as Ministers, Permanent Secretaries and Directors of Agriculture, which allows them to advise on and influence research policies and programs concerned with rice.

All seem to have established good relationship with the research units, both national and special projects, within their sub-regions. It was less easy to appraise their achievements in relation to the coordinated and on-farm trials but their comments on the Coordinated Varietal Trials and identification of constraints on the distribution of improved varieties suggest at least a reasonable involvement.

It was clear that, except in Zone IV, the impact of the Sub-Regional Coordinator is greatest in the country in which he is based. His influence in other countries of the sub-region is much less which is a reflection of the difficulty of making frequent or extensive visits.

The role of the Assistants to the Sub-Regional Coordinators appears ill-defined. Even the Sub-Regional Coordinators view them in different ways. Some feel they are useful when assigned to the same location especially when the Sub-Regional Coordinator is away, others that they are not useful when assigned to the same location and yet others that they are less useful than having more field assistants.

The Sub-Regional Coordinators are professional scientists capable of solving many problems but would like to see more interest

shown by headquarters staff in the national programs through visits. Delays in obtaining allocated funds, even salaries, from the Administration at headquarters have been unhelpful in fulfilling their programs.

The Sub-Regional Coordinators consider the two major constraints on the adoption of improved varieties to be government policies which do not encourage rice production and the lack of seed of these varieties.

The roles of the Sub-Regional Coordinator as professional scientist, liaison officer and representative of WARDA in the sub-region, require a person capable of assessing situations, making judgements and taking decisions on his own. This requirement for a Sub-Regional Coordinator to operate independently of Headquarters to a considerable extent makes it difficult to supervise him in a formal way and to evaluate his achievements. Nevertheless, the Panel was impressed generally with the calibre of the personnel involved and the extent to which relationships had been developed between the Sub-Regional Coordinators and the national programs, particularly in the countries where the coordinators are based.

However, the Panel considers that some changes could be made in relation to WARDA representation at the sub-regional level. It recommends that:

- (1) the Project Leader of each Special Research Project be designated as the WARDA representative for the country in which it is situated, leaving the Sub-Regional Coordinator to deal with other countries in the sub-region;
- (2) responsibility for Liberia be assigned to the Research Director;
- (3) the posts of the Assistants to the Sub-Regional Coordinators be abolished.

8.2. WARDA Special Research Projects

The first Quinquennial Review recognized the value of interdisciplinary teams working on problems affecting rice in specific ecological areas. These Special Research Projects were seen to be an effective way of achieving technological progress and fulfilling WARDA's mandate. They thus have a commitment to pursue relevant applied research and to relate to both national and regional programs.

These relationships between the WARDA Special Research Projects and the national programs are influenced by several factors:

- (1) the output of scientific and technical information from the project itself;
- (2) the proximity or otherwise to the national stations;
- (3) the extent to which the project team has been able to conduct surveys and on-farm trials within the region;
- (4) the state of development of the national research and extension services, the level at which they are staffed and funded and how effective they are in transferring information to farmers.

Overall, the Special Research Project at Rokupr is clearly the most effective in linking with national programs. It co-exists with the national agricultural research station and the project team has been active in many aspects including trials on farmers fields, a socio-economic survey of mangrove swamp farmers in Sierra Leone and Guinea; collaborative adaptive research with scientists of national programs and rural development agencies in Sierra Leone and Gambia and training of scientists and technicians from national programs.

At Richard Toll/Fanaye there has been some limited extension to the surrounding area through farmers' trials. Also when part of the Panel visited Richard Toll, the project leader presented a survey of major problems of growing irrigated rice based on visits by members of the Special Research Project team to other countries within the region.

At Mopti there are on-farm trials near the experiment station as part of the TAT program of the Development Department of WARDA.

The establishment of the Special Research Project at Bouake is too recent to expect any achievements related to national programs at this stage, but there is considerable potential. The link now established between the Special Research Project and the on-going program of IRAT/IDESSA at Bouake opens up further possibilities of cooperation between WARDA and these organizations leading to a significant impact on the national programs.

Special Research Projects are now a major component of the research and development effort and should be effective both as centers for applied research and outreach to national programs. In view of the importance of upland rice throughout the region, these requirements apply particularly to the Special Research Project at Bouake.

The Panel endorses the value of the Special Research Projects as centers for the generation and transfer of appropriate technology to national programs. It sees this function as essential in fulfilling WARDA's mandate within the region and encourages WARDA and the donors to consider these projects as part of WARDA's core program.

8.3. Collaboration with Other Centres

WARDA collaborates with many national and international institutions. The relationships can be divided into three groups: (1) formal agreements (memorandum of understanding, memorandum of agreement, letter of agreement) most of which have resulted in appointments to and/or funding for WARDA; (2) formal agreements which have been limited mainly to exchange of information because funding has not been obtained; (3) informal agreements.

The agreements with the International Rice Research Institute (IRRI), the International Institute of Tropical Agriculture (IITA), the International Fertilizer Development Centre (IFDC), the Catholic University at Louvain (UCL) and the joint project on bird control involving WARDA, OCLALAV (Organisation commune de lutte anti-acridienne et de lutte anti-aviaire) and CILSS (Comité permanent inter-états de lutte contre la sécheresse dans le Sahel) are in category 1. Those with the International Centre of Insect Physiology and Ecology (ICIPE), International Crop Protection (ICP), the Bangladesh Rice Research Institute (BRRI) and the Indian Council of Agricultural Research (ICAR) are in category 2. WARDA has informal links with Centro Internacional de Agricultura Tropical (CIAT) and close working relationships with the Institut de Recherches Agronomiques Tropicales et de Cultures Vivrières (IRAT), especially through the IRAT/IDESSA program at Bouaké.

WARDA, IRAT, IITA and IRRI are the four main organizations presently involved with rice in West Africa. WARDA performs several functions in cooperation with these Centres. The most important are that WARDA arranges for the testing in West Africa

of genetic material from these Centers and thus facilitates feedback to them; it satisfies the needs and demands of national programs for genetic material and it assists national programs to test these materials by providing money and personnel.

These Centres in turn provide some personnel. There is a liaison scientist from IRRI based at IITA with major commitments to the West African region and a senior plant breeder at IITA is presently seconded to WARDA, Monrovia, to coordinate WARDA activities in the International Rice Testing program and manage the germplasm program.

The recent increase in staff involved with rice research at IITA focuses attention particularly on the relative roles in specialist research of that institute and WARDA.

WARDA has four advantages in relation to rice research in West Africa. As an organization with Sub-Regional Coordinators and Special Research Projects, it is particularly suited to identify problems as they occur in the various rice ecologies in the region. It can also research on these problems in the localities where they occur. It has the formal structure through its Governing Council and Scientific and Technical Committee and lines of communication through the Sub-Regional Coordinators to reach agreement with member states fairly readily on the deployment of scientists where needed. The member states consider WARDA to be their own organization.

Such considerations lead to the relative roles of these institutes in a broader context. IITA has a commitment for rice in Africa and a special concern for rice on hydromorphic soils. WARDA has a mandate for rice research and development in West Africa and in this regional role covers many activities within the whole range of rice ecologies in the region. Among the international organizations it is the only one which deals with mangrove swamp rice in West Africa. Of the remaining ecologies, upland rice is most important because of the present and potential land area that could be used and because there is relatively little research elsewhere in Africa. The close relationship that WARDA has established with IDESSA/IRAT at the Bouake station should facilitate the development of this research.

The role of IRRI vis-a-vis WARDA and IITA remains at present largely one of supplying genetic material to these institutions, providing a great deal of expertise in rice research, and having

available the infrastructure for basic research to support some activities of the organization in Africa. Given that problems are best dealt with in the areas where they occur, there must be some organization for rice research in Africa. This could have been set up under the aegis of IRRI but it was not. Despite its global mandate, IRRI does not yet have a research program in Africa though it has a liaison scientist at IITA. Both WARDA and IITA deal with rice research in West Africa. With so many problems to be solved for rice in this region it is important that there should be no duplication of effort. Some control could be affected by TAC appraising critically its support for specific projects but it would be better if the division of topics were agreed mutually between the two organizations. The close cooperation of these two organizations cannot be over-emphasized. The Panel reaffirms that WARDA has a mandate for rice research and development in West Africa and considers that it should implement this fully with support in basic research from IITA and other Centers.

CHAPTER 9. OVERALL ASSESSMENT AND RECOMMENDATIONS

WARDA has achieved some of its program objectives. It has introduced a large number of rice cultivars to the countries of the region, has established productive research activities in the Richard Toll and Rokupr Special Projects, has trained over 900 participants in its training programs, has established links with national programs through its Sub-Regional Coordinators and Special Projects, and has developed and implemented its own version of farm-level technology evaluation and constraints identification.

The Panel is impressed with the high quality of most staff members of the Association. Scientists have good qualifications and are capable of carrying out good research, development and training if they are properly guided and motivated. Many support staff are also capable.

However, the Panel is disappointed with the efficiency with which the Association uses its resources. It is an institution that spends nearly half as much annually as the largest of the other IARCs but neither its research output nor its contribution to national rice development capacity is consistent with that level of resources. The Panel believes that this low productivity can be attributed to the lack of clearly stated and appropriate program objectives geared to the needs of West Africa, to the lack of an operational strategy and performance criteria against which WARDA can evaluate its own performance, to an excessive number of support and administrative staff, and to the lack of firm and dedicated leadership. Despite the considerable financial resources devoted to coordination and administration, the essential contribution of charting the courses of the Association as a whole has been largely missing. Another apparent cause of low efficiency is the lack of funds allocated for repairs, maintenance, supplies and equipment replacement, items that are cut when funds are tight. Personnel, on the other hand, are seldom cut.

Part of the responsibility for WARDA's fragmented program must be attributed to donors. Aside from the member states' contribution, most of WARDA's resources come from donors who are members of the CGIAR yet only about one-fourth of total donor support comes through the CG. Thus WARDA responds to the individual interests of a large number of donors which requires considerable time and efforts, rather than concentrating on defining and promoting a core program.

During the recent past, WARDA has experienced recurring financial crises. The situation in 1983 has been particularly acute. At the time of the Review it was virtually impossible for program staff to conduct any activity requiring expenditures. The causes of the crisis are discussed in the Management Review report, but it is clear that actions of both donors and member states as well as those of WARDA management and staff have contributed to the crisis.

Morale in WARDA is extremely low, especially among staff at headquarters. This springs from a number of sources including (i) a lack of confidence by many staff members in the Association's leadership, (ii) the apparent encouragement of divisive groupings along Anglophone vs. Francophone lines by institutionalizing the split through the separate selection of Executive Secretary and Deputy Executive Secretary, and (iii) the continuing financial crisis. In many ways the staff posted to Special Projects and the Sub-Regional Coordinators are scarcely affected by the first two forces, but the financial crisis has affected them along with the rest of the organization.

The Panel senses that one missing ingredient for success is a well developed sense of institutional loyalty. WARDA headquarters staff tend to work either for their own gain or for other individuals, but one does not sense that the interest of the Association transcend these very often.

9.1. WARDA's Program

Increased rice production in West Africa requires more land devoted to growing rice using improved technologies so that rice can be produced at a lower unit cost. WARDA's development and training activities can show member states how to bring more land into production and how to use improved technologies; its research activities can develop the necessary new technologies.

The training program has contributed to building the research and development capacity of member states by training rice production specialists, field research assistants, seed production specialists and post-harvest technology specialists, among others. It is highly appreciated by the rice workers in the member states.

Aside from training, WARDA's program has five major components: Coordinated Varietal Trials (CVT) (supported by the CGIAR), Special Research Projects, Technical Services, Technology Assessment and Transfer (TAT) and other Development Department activities.

These components have the potential to be formed into a complete research program. TAT can assess biological, farmer related and economic constraints. The CVT can organize widescale testing of varieties that may relieve constraints while Technical Services can provide a better understanding of why some technologies are effective while others are not and can generate better technologies. The Special Projects, being located in four distinctly different ecologies in four countries, can evaluate technology in the field, generate new technologies, and interact directly with national scientists. TAT can assess the appropriateness of technology for farmers, and design mechanisms for transferring those technologies to farmers.

However, it is the opinion of the Panel that the potential of these programs has not been fulfilled because no clear view of the total research and development process has been crystallized by the Association as a whole. The process must identify the problems (constraints), propose possible solutions to overcome the problems (improved technologies), test the possible solutions and clearly state the value of the possible solutions. If any of the possible solutions warrant it, development activities can begin (extension, project preparation).

Until recently, the main vehicle for identifying constraints was the coordinated trials, especially the on-farm trials. However, these are carried out by national researchers; the only WARDA personnel who observe them are the Sub-Regional Coordinators. Technologies to overcome the technical constraints are important in the form of varieties or generated by WARDA staff in the Technical Services group or in the Special Projects. Imported varieties are distributed by the CVT program throughout the region, but there is no comprehensive judgement of their appropriateness except their adoption by farmers, which has been disappointing. Scientists in Technical Services conduct research needed to understand imported technologies but being located in headquarters they have little chance to evaluate the technologies in the diversity of ecologies that exist. For that, national scientists, researchers in Special Projects or staff from the Development Department must be involved. Because of the fragmented structure of research in WARDA, a clear vision of the process, together with strong leadership would be required to weld these activities into a well integrated, productive research program. That has been lacking.

The Special Research Projects come closer to carrying out the complete research process because they are located in the rice ecologies on which they are focused. Over the past 18 months the

TAT program has been conducting research in the Special Project areas that purposively examines farmer level resources and problems. Personnel from both Research and Development Departments are involved so problem identification, hypothesis generation, technology testing and technology transfer are integrated in TAT.

Thus, while there is some basis for saying that the situation is improving, the Panel believes that without a clear view of the total research process the potential of the research program will not be fulfilled. This is likely to go on as long as (i) responsibility for research is split between the Research and Development Departments, (ii) research activities are not strongly shaped to complement each other, (iii) research scientists who need field plots to carry out their work are located at headquarters, and (iv) activities like CVT are routinely conducted without the personal interest of scientists in national programs who carry them out. This is not a matter to be solved through additional reviews, hiring additional coordinators or drawing new lines on organization charts. It requires strong, clear thinking about the total research and development process.

9.2. WARDA's Potential

Despite the limitations mentioned above, the Panel believes that if WARDA implements the recommendations of this Review and those of the Management Review, its productivity will be greatly increased. Therefore it should continue to receive the support of the CGIAR. Among the alternative organizations, WARDA has the greatest potential to help develop the capacities of its member states; it is a creation of its member states who deserve the support of the donor community as long as they support their Association; it has staff located where they can identify problems and test possible solutions and can shift staff to cover priority problems; it can link research to farm production through its development program.

The recommendations of the Management Review will, if implemented, allow for strong leadership to design and manage the Association's program efficiently. The recommendations of this Review should help WARDA to redesign its program to more efficiently generate the kind of technologies needed for West African rice development. These steps should greatly enhance the productivity of the organization and ensure that the earlier investments by member states and donors are not wasted.

WARDA has Special Projects in four member states, Sub-Regional Coordinators in five member states and its headquarters

in Liberia. This physical presence is a great asset in identifying ways in which the Association can assist its members, and if properly used, can provide a two-way flow of ideas, people and technology. WARDA has a critical mass of researchers devoted to the problem of rice development; it needs to direct and focus their capacities more sharply, but has adequate numbers for the task.

WARDA is a creation of its member states, and represents the embodiment of the ideal of regional inter-governmental cooperation. It has also suffered from problems that arise from being an inter-governmental organization. Member states seem especially interested to ensure that their own nationals find employment at WARDA which should not be unexpected, but this has not been a major cause of WARDA's problems. Arrears in meeting financial obligations are. Donors who provide financial support have a right to expect that the member states which created WARDA fulfill the obligations which they have taken upon themselves. As long as they do, and the Association is productive, the donors should continue their support.

The WARDA staff in 10 countries not only assist in communications but provide WARDA an opportunity to carry out research in all the rice ecologies with which they are concerned. This should enable them to quickly identify problems and efficiently test possible solutions, as is being done in a number of the Special Projects. And, given its nature, WARDA will experience a minimum of delay in getting approvals from governments to place researchers in member countries.

Because WARDA has a mandate for development as well as research it can work directly with the extension programs of the member states. This is especially important in those countries that do not have the resources to support their own research programs. It has initiated pilot extension work for the transfer of technology in cooperation with extension officials, and has responded to numerous requests for project identification missions by its member states.

All those concerned for the objectives of WARDA should view it as an investment which, if operated properly will generate a payoff in terms of new technology that is far in excess of the amount invested. It has particular value in the region because it is a device by which countries that do not have the resources for a complete rice research and development program can have rightful claim to such a program. Member states and donors alike must recognize that research advances take time and that new

technology without appropriate marketing and price policies will not necessarily lead to increased rice production.

9.3. Recommendations

1. Assuming the implementation of Rec. 2, the Panel recommends that WARDA be recognized as having the CGIAR mandate for conducting and assisting its member states to develop the joint capacity to conduct a complete rice research program. The program should extend from determining the technologies required to developing and testing those technologies and assisting member states to put those technologies and related development policies into effect. WARDA should continue to maintain close working relations with other rice research institutions to facilitate its work, and in light of their common interest, WARDA and IITA, perhaps together with IRRI and IRAT, should periodically meet and discuss their respective programs in order to ensure the most productive use of all resources.

2. The Panel recommends the soonest possible implementation of the key recommendations of the Management Review Panel because it believes without that WARDA may cease to function. The report of the Management Review Panel fully states and justifies their recommendations, but briefly stated they are:

- (a) WARDA's Governing Council (GC) should reconstitute the Scientific and Technical Committee (STC) to include, in addition to the members from WARDA's states chosen by the current system, seven individuals from outside the sub-region selected by the CGIAR to serve in their individual capacities, plus the Executive Secretary (ES) as an ex-officio member, and it should delegate to the STC specific responsibility for reviewing integrated financial and program plans for determining the process of international recruitment of senior professional staff, and for constituting the search committee to select candidates for ES to recommend to the GC.
- (b) In order to strengthen WARDA's leadership, the GC should eliminate the position of Deputy Executive Secretary as it is currently defined and it should authorize the ES to recruit a senior staff officer to assist in performing the duties of his office.

- (c) WARDA should establish standards and procedures of recruitment and compensation for senior scientific and professional staff as required to attract and retain personnel of international caliber at this level.
- (d) WARDA should strengthen the financial management system by creating and filling the position of chief financial officer who would report directly to the ES, improving internal and external audit controls, and taking immediate measures to overcome WARDA's present liquidity problem.

3. The Panel recommends that WARDA work toward the development of an integrated and coherent Association-wide program for both the short and long term. This implies both more active internal planning as well as a serious effort to harmonize this rigorous planning effort with the needs and desires of WARDA's multiple donors. Towards this end, WARDA should establish mechanism for an integrated cycle of program planning-budgeting-monitoring-review. This is considered an essential tool of good research management.

- (a) The Panel recommends that WARDA conduct an annual Association-wide program review and program planning workshop in which accomplishments are measured against goals and goals are translated into operational plans for the coming year. If these imply substantial changes in program direction the Association's long term plan should be revised to reflect them. This is an important device for ensuring the quality, relevance and coherence of WARDA's program and is a responsibility of the regular administrative structure. No staff should be added for this purpose.
- (b) Through this planning process, WARDA should define an integrated program that includes those elements it considers to be essential to meeting its mandate. The Panel believes the activities in the Member States like the Special Projects should form a more central role in such an integrated program.
- (c) WARDA should prepare an integrated Association budget showing all its activities. This budget should be approved by the STC and the Governing Council.

- (d) The integrated program and its budget should be presented to the CGIAR and other donors to ensure that all funded activities are consistent with the integrated plan. Donors who are members of the CG are encouraged to direct their contributions to WARDA through the CGIAR.

4. The Panel recommends that WARDA make upland rice the top priority in its program because of the importance of upland rice in the region and the many difficult upland rice problems that need attention. All aspects of upland production systems may be addressed, drawing on the accumulated knowledge and research activities of other research in addition to WARDA's own activities.

5. The Panel recommends that varietal development work, which heretofore has rested largely on the introduction of varieties and their testing, be expanded to include hybridization and be otherwise modified by adopting measures such as the following:

- (a) Some resources now used for IET and CVT, such as the Assistant Sub-Regional Coordinators and some technical services scientists at headquarters should be devoted to identifying constraints and generating new technology for the dry upland, humid upland, inland swamp and mangrove swamp ecologies.
- (b) The initial screening of introduced varieties intended for IET should be carried out in each of the Special Research Projects to avoid screening out varieties that may perform well in one ecology but not in another. The Special Research Projects should participate fully in the IRTP coordinated by IRRI, according to their capabilities and needs.
- (c) The locations for planting IETs and CVTs should be chosen more carefully in relation to rice ecologies, local interest, supporting facilities and data on climate and soils.
- (d) WARDA should implement the recommendation of the first Quinquennial Review for a "transfer of full responsibilities for implementation of the trials to the member states." That is, WARDA should make no cash payments to national research units to carry out the trials. At the same time national program staff should receive more training to enhance their capacity for monitoring and selection of varieties suited to their countries.

- (e) The "on-farm trials" should be integrated into the TAT program or else discontinued.

6. The Panel recommends that no net additions above WARDA's present level of professional staff be made for at least two years but that recommended program changes be accomplished through reassignments and termination of staff with less needed skills in favor of recruitment of staff with more needed skills. The present level is defined to mean the number of professional staff holding appointments in September 1983. Within this limit the following suggestions are made:

- (a) There should be no increase above the present level in the professional staff assigned to the Special Research Projects in the irrigated ecology at Richard-Toll or in the deepwater/floating rice ecology at Mopti.
- (b) Professional staff and program in the mangrove swamp ecology of Rokupr should be kept at least at their current level. A small breeding program should be initiated to develop varieties with improved plant type that are resistant to high soluble iron and salinity levels, tidal effects and crabs.
- (c) The Special Research Project on Upland Rice at Bouake should be strengthened as soon as possible through the transfer from headquarters of specialists in plant breeding, agronomy, entomology, and plant pathology who are currently assigned to "Technical Services."
- (d) The Technology Assessment and Transfer program should be strengthened, perhaps by transferring some of the assistant Sub-Regional Coordinators to the Special Projects to work on TAT efforts, if their skills are appropriate to that assignment.
- (e) The Technical Assistance Program should continue at a level which enables it to respond to requests for project design and other services.

7. The Panel recommends strengthening and support of the training program within the limits of WARDA's resources. Keeping this in mind:

- (a) The Training Department should conduct its headquarters operations with the present staff.

- (b) The Panel recommends no further expansion be undertaken at the Fendall Training Centre but supports the plan to enlarge the dining room and lounge because the available facilities are inadequate. Further expansion of training should be directed at increasing training opportunities in the member states.
- (c) The Training Department should make an effort to ensure that a larger proportion of higher degree training opportunities offered to WARDA are made available to member country staff than has been true in the past.

8. The Panel recommends that a concerted effort be made to consolidate communication activities and supporting services and improve their efficiency. Among the things that should be considered are:

- (a) Merging the Documentation Division into the Communications Division which should continue the operation of the library at its present level, and eliminate the microfiche operation until adequate resources are available to purchase supplies and its value to users is established.
- (b) All documentation, editorial, printing, translating and interpreting activities should be conducted by the Communications Division. If their facilities are inadequate to handle WARDA's needs, they should arrange for appropriate outside contracting.

9. The Panel believes the number of staff engaged in support, administrative and coordinating activities is excessive. It recommends that ways be found to reduce the number and increase the productivity of staff in the administrative area and that with the exception of adding a Finance Director, the present complement be considered as the absolute upper limit. The position of architect should be eliminated. WARDA should strive to return to the concept of disaggregated program components located in member states and served by a small secretariat. WARDA should seriously consider placing all drivers, maintenance men, messengers and janitors at headquarters into functional pools so that their allocation be consistent with the priorities of the whole Association.

TERMS OF REFERENCE

This Annex contains the following three elements composing the Terms of Reference for the Review:

- A. The Terms of Reference (TOR) provided by TAC;
- B. List of Issues to be addressed by the Panel;
- C. List of Questions supplementing the TOR.

A. Terms of Reference

Introduction

The Consultative Group on International Agricultural Research (CGIAR) has charged its Technical Advisory Committee (TAC) with the conduct of quinquennial reviews of the value and effectiveness of the International Agricultural Research Institutes, Centers and Programs which derive their financial support from the members of the CGIAR. It was agreed by TAC at its 28th Meeting held in El Batan (Mexico) that the work of the West Africa Rice Development Association (WARDA) should be reviewed by TAC in 1983. The present Review Mission is being organized in accordance with that decision.

Scope and Purpose of the Review

The major objective of such missions has been defined by TAC (in agreement with the Directors of the International Centers, and accepted by the CGIAR) as follows:

"on behalf of the Consultative Group, to assess the content, quality, impact and value of the overall program of the Centers and to examine whether the operations being funded are being carried out in line with declared policies and to acceptable standards of excellence."

It is hoped that the review will inter alia assist the International Centers themselves in planning their programs and ensuring the validity of the research priorities recognized by the Boards of the Centers.

In pursuance of the main objectives, defined above, the Mission is requested to give particular attention to the following aspects:

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- (i) The mandate of the Center, its appropriateness and the interpretation thereof with respect to:
 - (a) the immediate and long-term needs for improved food supply and human welfare in developing countries;
 - (b) present and possible future areas of work.

- (ii) The relevance, scope and objectives of the present program of work and budget of the Center and of its forward plans for the next five years in relation to:
 - (a) its mandate and the criteria for the allocation of resources as defined by TAC;
 - (b) the ongoing activities of other international institutes and organizations, and of the relevant national institutes in cooperating countries and in others where the work of the institutes has bearing;
 - (c) the policy, strategy and procedures adopted by the Center in carrying out its mandate, and the mechanisms for their formulation;
 - (d) the Center's rationale for its present allocation of resources its present and future overall size, and the composition and balance of the program in the fields of research, training, documentation, information exchange and related cooperative activities.

- (iii) The content and quality of the scientific and related work of the Center with particular reference to:
 - (a) the results of past research;
 - (b) the current and planned research and the role of the scientific disciplines therein;
 - (c) the information exchange and training programs, their methodologies, their specialization and decentralization and the participation of the research staff therein;
 - (d) the adequacy of the research support and other facilities;

- (e) the management of the scientific and financial resources of the Center and the coordination of its activities.
- (iv) The impact and usefulness of the Center's activities in relation to:
 - (a) the present and potential agricultural production of the relevant countries and regions;
 - (b) its information exchange and training programs;
 - (c) cooperation with national research and development programs;
 - (d) cooperation with other international institutes and organizations.
- (v) Constraints on the Center's activities which may be hindering the achievements of its objectives and the implementation of its programs, and possible means of reducing or eliminating such constraints.
- (vi) Any specific questions which concerned members of the CGIAR, cooperating institutions, the Center's Director or its Board of Trustees may request TAC to examine.

On the basis of its review, the Mission will report to the Chairman of TAC its views on the need for any changes in the basic objectives or orientation of the Center's program elements, and on means of improving the efficiency of operations, and will make proposals for overcoming any constraints identified under item (v).

While the Mission should feel free to make any observations or recommendations it wishes, it must be clearly understood that the Mission cannot commit the sponsoring organization viz. the CGIAR/TAC.

B. List of Issues

- (i) Place of WARDA in the CGIAR system: With particular reference to (a) the very regional nature of WARDA, its legal organization, which is linked with member states and its degree of overlapping with IRRI and IITA; (b) the objectives of the CGIAR and its criteria in supporting the core activities of the institutions of the system;

- (c) the follow-up and impact of the recommendations of the first quinquennial review.
- (ii) Role of coordinated trials: Among the points which may deserve attention: (a) the relative priority to be accorded to coordinated trials and varietal improvement as regards the diverse constraints to improved rice production; (b) the priority to be accorded to coordinated trials as regards the other parts of the WARDA program, the special projects in particular.
- (iii) Impact of coordinated trials: Among the points which may deserve attention: (a) the rate of adoption of new rice varieties in West Africa; (b) the size of the areas concerned by the specific role of WARDA in this adoption.
- (iv) Implementation of coordinated trials: Among the points which may deserve attention: (a) the number of sets of coordinated trials which are implemented in West Africa of different institutions; (b) the comparative advantage of WARDA over other institutions in organizing coordinated trials; (c) the financial compensation given to cooperating countries for implementing the coordinated trials and the modalities of the disbursement.
- (v) Management and cost/benefit relationship: Among the points which may be considered: (a) the adequacy of the organizational structure of WARDA as regards the attainment of its objectives; (b) the size and cost of the CGIAR-supported activities as related to the Association as a whole and the impact of its diverse programs and projects.
- (vi) Relationship WARDA/national services: Role and comparative advantages of subregion coordinators as regards national services in supervising (a) coordinated trials and (b) on-farm trials.
- (vii) Cooperation between IITA, IRRI, IDESSA-IRAT and WARDA in rice research in West Africa - Alternatives for a rice research strategy: Among the points which may be considered: (a) the comparative advantages of WARDA in rice research and development; (b) the present and future place of the Association as related to those of other institutions in a rice development strategy for the region; (c) measures which could be taken by countries and aid organizations to improve the use of the Association's experience in development schemes.

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C. List of Questions

(i) Situation of Rice Production in West Africa

What is the role of rice production in the national economies of West Africa; what are the major constraints to increase rice production of each of the main rice cropping systems; how well has WARDA assessed these constraints?

What is the place of and resources devoted to rice research in the research structure of West African governments?

(ii) The Value of Coordinated Trials

How relevant is the concentration of CGIAR inputs on coordinated trials?

Has the number of coordinated trials increased since the first quinquennial review? If so, why?

What are the criteria used for nominating entries into IET (Initial Evaluation Tests) and coordinated trials proper? For how long are varieties tested over time? Is the standard of coordinated trials adequate? Are descriptions of trials adequate in terms of soils, topography, previous cropping, current climatic conditions, etc.? Are trials procedures similar to the ones used by IRRI's IRTP?

Which indications can be drawn from the crops protection (herbicide and insecticide) coordinated trials? Should they be pursued?

Are the coordinated trials having an effect on the direction of rice research or development efforts at national level? What is the acreage cultivated under improved varieties in West Africa, the dissemination of which can be attributed to WARDA coordinated trials?

What has been the value of the Seed Multiplication Center of WARDA? Have the seed production capabilities of West African countries improved?

(iii) Role of Special Projects

Are special projects playing a national or a regional role? What has been so far the geographical extension of the results?

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What is the relative importance of the special projects considering the present rice supply/demand situation in West Africa and its likely future? Would a concentration of efforts be desirable? Does reliance on special projects distort the proper balance of WARDA's programs?

(iv) WARDA's Role in Training

What is the impact of the training program? Should the program be modified to respond to new demand from the countries concerned or to a new strategy for rice research and development? What would be the potential gains and losses in moving the training program to a site closer to a rice growing area?

(v) Management

(a) Role of Sub-Regional Coordinators

How effective is trials supervision by Sub-Regional Coordinators? What is the comparative advantage in having the supervision of trials done by Sub-Regional Coordinators? What is the role of national services?

What are the total funds allocated to the implementation of the trials; how is disbursement to national services made?

What are the lessons which can be drawn from the on-farm trials? What is the opinion of national services?

(b) Role of Headquarters Staff

Are WARDA's central services playing an effective role in back-stopping Sub-Regional Coordinators and special project teams? How can research support scientists on WARDA Headquarters staff be most effectively assigned or otherwise utilized to bring rigor into the research system and a closer contact with farmers' problems?

How best could recruitment and personnel policies be reconciled with normal CGIAR practices?

How best is WARDA structured to plan and evaluate research programs? Do WARDA program managers exercise control over the substantive content of each program under their direction?

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(vi) Respective Role of IITA, IRRI, IRAT and WARDA in Rice Research in West Africa - Alternatives for a Rice Research Strategy for West Africa

What are the comparative advantages of WARDA in rice research and development in West Africa? Should WARDA continue to operate within the CGIAR system? How could duplication be avoided and full cooperation ensured with IRRI, IITA, and CIAT? What would be an acceptable balance of WARDA activities within this division?

Can an indicative plan for rice research in West Africa be jointly developed? How best could or should CGIAR resources be allocated between three institutions, i.e. IRRI, IITA and WARDA?

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31. Rice Varieties Recommended in the WARDA Region (April, 1975).
32. A Decade of WARDA Training 1973-1983 (February, 1983).
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36. Research Programme for the WARDA Upland Research Project at Bouaké, Ivory Coast.
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COMPOSITION OF THE PANEL

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PROGRAM AND ITINERARY OF THE PANEL

A. FIRST PHASE OF THE REVIEW

Saturday, 11/6

Arrival of the Panel.

Sunday, 12/6

08:30

Panel meeting.

14:00

Meeting at WARDA Headquarters with members of the Scientific and Technical Committee (STC):

- Mr. M.F. Traore (Mali), Chairman, STC
- Mr. M. Toure (Senegal)
- Mr. I. Nebie (Upper Volta).

16:00

Meeting at WARDA with directing staff:

- Mr. S. Coulibaly, Executive Secretary
- Dr. Nah-Doe Bropleh, Deputy Executive Secretary
- Dr. B.A.C. Enyi, Director, Research Department
- Dr. S.C. Spencer, Director, Development Department
- Mr. D.K. Awute, Director, Training Department
- Mr. Bocar Ly, FAO Technical Coordinator
- Dr. V.K. Nyanteng, Chief, Economics, Finance and Statistics Division
- Mr. L. Faye, Chief, Communications Division
- Mr. A. Diallo, Acting Head, Documentation Division.

21:00

Panel meeting.

Monday, 13/6

07:00

Departure for Suakoko Research Station.

09:00

Visit to the Liberian Central Agricultural Research Institute (CARI) and to WARDA research facilities and field trials.

Discussion with CARI management and staff:

- Mr. A.F. Paye, Director, CARI
- Mr. E.A. Bashir, UNDP/FAO/WARDA Bird Research Control and Training Project.

- 13:30 Departure for Fendall (University of Liberia - College of Agriculture and Forestry).
- 15:30 Visit to WARDA Seed Laboratory, Germplasm Unit and Post-Harvest Technology Unit.
- 16:30 Visit to WARDA Training Center at Fendall. Visit of Training facilities and discussions with:
- Mr. D.K. Awute, Director, Training Department
 - Mr. K.M. Conteh, Director, Training Center
 - Members of the Center's training staff.
- 21:00 Panel meeting.

Tuesday 14/6

- 09:00 Visit of office of FAO Country Representative in Liberia Discussion with Mr. E. Bayagbona, FAO Representative.
- 10:00 Visit to Ministry of Agriculture. Meeting with:
- The Hon. J. Boikai, Minister of Agriculture
 - Mr. P. Young, Deputy Minister for Technical Services
 - Mr. D. Sirleaf, Deputy Minister for Regional Affairs.
- 12:00 Visit to Ministry of Foreign Affairs. Courtesy call on the Hon. Minekon, Acting Minister of Foreign Affairs.
- 13:00 Meeting with Mr. S. Coulibaly, Executive Secretary of WARDA.
Planning of Phase II of the Review Mission.
- 15:00 Visit to the UNDP office in Liberia. Discussion with Mr. H. Greenidge, UNDP Resident Representative in Liberia.
- 16:00 Visit to WARDA. Meeting with the staff of three substantive Departments:
- (16:00) Meeting with Research Department:
- Dr. B.A.C. Enyi, Director, Research Department
 - Members of the Research Department staff.
- (17:00) Meeting with Development Department:
- Dr. D.S.C. Spencer, Director, Development Department
 - Mr. K.M. Conteh, Director, Training Centre
 - Members of the Training Department staff
- 19:00 Reception hosted by the Executive Secretary of WARDA.

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Wednesday, 15/6

- 08:30 Panel meeting.
- 10:00 Consultation with Mr. S. Coulibaly, Executive Secretary, WARDA.
- 11:30 Visit to USAID Mission in Liberia. Discussion with Mr. S.A. Bowers, Project Manager.
- 13:00 Departure for Banjul, Gambia.
On this travel, the team was accompanied by Dr. B.A.C. Enyi and Dr. D.S.C. Spencer.

Thursday 16/6

- 07:00 Departure for Sapu Research Station, accompanied by Dr. R. Kagbo, Sub-Regional Coordinator, Zone I. Enroute visit of sites for adaptive farm trials on mangrove swamp rice.
- 12:30 Visit to Sapu Station, trial sites and farmers field; meeting with the station management and staff: Mr. L.K. Janneh and his research team
Return to Banjul.

Friday 17/6

- 08:00 Visit to Sub-Regional Coordination office.
Presentation of sub-regional activities in Zone I.
- 09:30 Visit to Gambia Produce Marketing Board.
Meeting with Kabba Jallow, Managing Director.
- 10:30 Visit to Minister of Agriculture.
Discussion with W. Alieu M. Jagne, Permanent Secretary.
- 11:30 Courtesy call on Mr. Bulcha Demeksa, UNDP Representative in the Gambia.
- 12:30 Discussion with Mr. Sompo Ceesay, Acting Director of Agriculture.
- 15:00 Departure for Dakar, Senegal.

Saturday 18/6

- 08:00 Visit to Ministry of Agriculture, Senegal.
Meeting with Director General.
- 10:00 Visit to Ministry of Scientific and Technical Research.
Meeting Dr. Moctar Toure, Director.
- 13:30 Departure for Richard-Toll Research Station accompanied by Dr. Coly, Director, Special Research Project on Irrigated Rice at Richard-Toll.

Sunday 19/6

- 07:00 Visit of on-farm trials at Diamandou.

10:00 Visit of experimental fields at Fanaye
12:00 Return to Richard-Toll
14:00 Meeting management and staff of Special Research Project on irrigated rice.
Dr. Coly, Director and his scientific staff.

Monday 20/6

07:00 Departure for St. Louis
Visit to Saed at St. Louis
Meeting with Dr. R. Chateau and Dr. Khoi Lee
11:00 Visit to Diama Barrage
14:00 Departure for Dakar
24:00 Departure from Dakar for home destination.

B. SECOND PHASE OF THE REVIEW

Team A: J. Liwenga, H. Luning, B. van Lommel
WARDA : S. Assegninou, E. Awoderu

Monday 19/9

11:00 Arrival in Ouagadougou, Upper Volta.
11:45 - 18:30 Meeting in Ouagadougou

- Visit to Ministry of Foreign Affairs
Mr. Comparaore (Representative of Secretary General, International Relations)
- Meeting CNRST (of the Ministry of Higher Education and Scientific Research)
Mr. G.E. Bonkounjou (out-going D.G.)
Mr. I. Kabore (incumbent D.G.)
Mr. M. Sedogo (Director of IVRAZ)
- Meeting at the Ministry of Higher Education and Scientific Research
Mr. Issa Tiendiebeogo, Minister
Mr. A.B. Ouedraogo, Director of Cabinet.
- Meeting at Ministry of Rural Development
Mr. S. Traore, Minister
Mr. A.S. Sawadogo, Director of Cabinet
Mr. J.D. Traore, Secretary General
Mr. M. Tatieta, Director Agriculture Services.

Tuesday 20/9

07:00 Departure by plane to Bobo Dioulasso

- 09:00 Meeting at Farako-ba station, Bobo Dioulasso.
Mr. Abou, Director of CERIC (Centre d'experimentation pour la Riziculture et les Cultures irriguées) and staff.
Mr. Sie.
- 11:00 Visit of upland rice trials at Farako-ba station (CERIC, WARDA)
- 13:00 Visit to Diakora and Banfora to visit on-farm trials and adaptive farm trials in rainfed lowland rice farming areas.
- 19:00 Return to Bobo-Dioulasso.

Wednesday 21/9

- 08:00 Visit to Vallee de Kou (irrigated rice area), Meeting with Director of Project and staff.
Visit to irrigation project, WARDA coordinated trials, on-farm trials.
- 11:00 Visit to Rice Milling Complex, Vallee de Kou, met with Mr. J. Frescata.
- 14:00 Meeting with Directors of Vallee de Kou Projects:
- Mr. L. Sow, Deputy Director of ORD
 - Mr. Y. Onattaka, Head of Extension in ORD.

Thursday 22/9

- 09:00 Departure by car for Bouaké, Ivory Coast.
- 18:00 Start of joint program of the entire Review Panel.

Team B: R.W. Herdt, B.E.J. Wheeler
WARDA: Mr. Olufowote, Dr. B.A.C. Enyi

Sunday 18/9

- 20:00 Arrival in Lagos, Nigeria
Overnight at IITA Guesthouse, Lagos

Monday 19/9

- 11:00 Discussions at the National Cereals Research Institute, Moor Plantation, with the Rice Program leader, Mr. Fagade.

Tuesday 20/9

- 10:00 Informal tour (led by Dr. John) of screen houses and some field plots devoted to rice research.
- 15:00 Informal tour (led by C. Garman) of IITA farming systems field plots and technical facilities.
- Evening Reception by Director of IITA for Review Panels.

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Wednesday 21/9

- 08:00 Conducted tour of screen houses and rice experimental plots with External Review Panel of IITA (Wheeler only). Discussions with Director of National Cereals Research Institute, Dr. Obasola, Moor Plantation (Herdt only).
- 10:30 Joint discussions with the External Review Panel of IITA, the Director, Research Director, and connected with IITA's rice research program.
- 15:00 Departure for Lagos.
- 20:20 Depart Lagos for Abidjan, Ivory Coast.

Thursday 22/9

- 09:00 Discussions at the Ministry of Agriculture, Ivory Coast with the Secretary of State, M. Gilles Laubouhet.
- 10:30 Discussions at the Ministry of Science and Technology with the Minister, Dr. Balla Keita.
- 15:00 Depart Abidjan for Bouaké.
- 18:00 Start of joint program of the entire Review Panel, Hotel Harmattan, Bouaké.

Team C: A. Blumenschein, R.F. Chandler, A. von der Osten
WARDA: H. Leroux, B.A. Akinsola, M. Agyen-sampong, D.S.C. Spencer

Thursday, 15/9

Arrival in Freetown, Sierra Leone

Friday, 16/9

- 10:00 Visit to Ministry of Agriculture and Forestry of Sierra Leone.
- Discussion with:
- Honorable Dr. Abass Bundu, Minister
 - Honorable Ibrahim Sorie, Deputy Minister
 - Honorable Sufian Kagbo, Deputy Minister
 - Mr. J. Sandy, Permanent Secretary
 - Mr. A.R. Siaffa, Chief Agricultural Officer
- 13:30 Departure by road for Rokupr.
- 16.30 Visit to trial plots of the National Rice Research Team at Masorie. Meeting with:
- Dr. I.P.S. Dias, Director, Rice Research Station (Rokupr)

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- Members of the National Rice Research Team.

18:00 Rokupr Rice Research Station (WARDA Special Project on mangrove swamp rice). Meeting with:

- Dr. Martin Agyen-Sampong, Team Leader
- Members of the WARDA team at Rokupr.

Saturday, 17/9

07:30 Tour of WARDA and RRS research facilities. Visit of WARDA and RRS experimental fields at Rokupr station.

13:30 Boat trip to visit trials on farmer's fields in neighbouring villages.
Meeting with farmers at Rosinor.

Sunday, 18/9

08:30 Meeting with WARDA project staff and national RRS members.

- Slide show on project activities
- Discussion

12:00 Visit to North-Western Integrated Agricultural Development Project - Kambia.
Discussion with Mr. Sorie Bangoura, Project Manager and his staff.

15:00 Departure by road for Freetown.

Monday, 19/9

09:30 Departure for Freetown Airport.

17:00 Due to cancellation of flight for Bamako, return to Freetown.

Tuesday, 20/9

09:30 Departure for airport. Flight to Abidjan. Day in Abidjan.

Wednesday 21/9

06:00 Departure by chartered plane of Air Ivoire for Mopti, Mali.

09:00 Visit of Special Project on deepflooded and floating rice at Mopti.
Meeting with Dr. Moolani, Project Leader Designate and his team.
Tour of research facilities, of trials sites and on-farm trials.

17:30 Arrival at Bouaké, Ivory Coast.

Thursday 22/9

08:00 Internal discussion of Team C.
Review of documentation made available by Special Research Team on Upland Rice.

Friday 23/9

08:00 Visit to IDESSA at Bouaké.
Courtesy call on Dr. M. Yao, Deputy Director General of IDESSA.

08:30 Meeting of IDESSA/DCV with:

- D. Kouame Miezán, Team Leader, WARDA Special Project on Upland Rice.
- Members of the Project Team.

11:30 Meeting with rice research team of IDESSA and ORSTOM.

15:00 Tour of research facilities and trial sites of WARDA and IDESSA.

18:30 Cocktail offered by the WARDA team; Dinner offered by the Mayor of Bouaké.

Saturday 24/9

07:30 Visit to CIDT Headquarters at Bouaké.
Meeting with:

- Mr. Chavatte, Deputy Director General
- M. Dosso, Director, Research/Development Department
- CIDT staff.

09:30 Visit to farmers' fields.

16:00 Departure by air for Abidjan and Monrovia.

Sunday 25/9

09:00 Meeting with members of the USAID Mid-point evaluation team:

- Dr. Donald Mitchell, Team Leader
- Dr. William Carlson
- Dr. R. Feuer
- Dr. Sidney Bowers.

13:45 Panel meeting.

Monday 26/9 -
Tuesday 6/10

Consultation at WARDA Headquarters with:

- Dr. H. Leroux, Executive Secretary

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- Dr. S. Coulibaly, out-going Executive Secretary
- Heads and staff of WARDA Departments
- Project Leaders and Sub-Regional Coordinators available at Headquarters during that period.

Friday 7/10

10:00

Presentation of report to Dr.H. Leroux, Dr. S. Coulibaly and the members of WARDA Executive Committee.

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CLASSIFICATION AND INVENTORY OF RICE CULTIVATION TYPESIN WARDA MEMBER COUNTRIES

(Total area under rice estimated at 2,300,000 ha for 1976)

	Percentage of Total Paddy Area (1976)		
1. Upland Rice Cultivation	65		
11. Strictly Upland Cultivation	62.5		
111. Hill Rice		5	
112. Flatland Rice		57.5	
12. Groundwater Cultivation with Rains	2	2	
13. Groundwater Cultivation without Rains	0.5	0.5	
2. Lowland Rice Cultivation	35		
21. Mangrove Rice Cultivation	8		
211. Without Tidal Control		2	
212. With Tidal Control		6	
22. Freshwater Cultivation	27		
221. Without Water Control		22	
222. With Partial Water Control		3	
223. With Complete Water Control		2	
	Total	100	100.0
		100.0	100.0

Source: Types of rice cultivation in West Africa. Occasional Paper No. 2, WARDA, July 1980, pp. 22-23.

PRICE INDEX FOR SELECTED FOOD ITEMS IN IVORY COAST
1964/66 AND 1976/77

P r i c e I n d e x							
Year	Total Food	Rice	Bread	Yam	Plantain	Cassava	Corn
1964-66	123	51	42	26	17	21	38
1976-77	213	117	120	91	66	98	106
% Increase	73	130	186	250	288	367	179

Data Source:

Humphreys C.P. and Rader P.L. - (1981) "Rice Policy in the Ivory Coast"
in Rice in West Africa edited by Pearson et al, page 9

FORMAL AIMS AND FUNCTIONS OF WARDA

(Excerpts from Article 1 of the Constitution of WARDA)

The Association shall assist the Government of Member States to achieve operational cooperation in the pursuit of the following aims:

- (a) promotion of rice production within the countries of West Africa;
- (b) increase of the quantity of rice produced;
- (c) improvement of the quality of rice produced in West Africa;
- (d) encouragement of production and use of varieties suited to the conditions of the countries in West Africa and to existing and prospective demand;
- (e) exploration, introduction and extension of national production methods adapted to the conditions prevailing in the countries of West Africa;
- (f) promotion and implementation of measures for effective phytosanitary controls in relation to rice;
- (g) promotion of storage and processing, as well as marketing of rice both within countries in West Africa and with respect to external trade in rice.

With a view to achieving the aims specified above, the Association shall adopt or promote the adoption of the following measures:

- (a) encouraging, coordinating, and undertaking as necessary, basic and applied research programs in the scientific, technical, economic and sociological fields;
- (b) collecting, analyzing and disseminating information on methods applied, experience gained, and results obtained both within and outside West Africa;
- (c) organizing or arranging for conferences, seminars and training facilities, securing of fellowships and establishing, or assisting in the establishment of advisory services and training and extension facilities;

- (d) elaborating requests for special financial and technical assistance and receiving and administering separately such financial and technical assistance (including movable and immovable property, services and loans), as may be made available under the appropriate programs of the United Nations, the Specialized Agencies, other organizations or governments desirous to support the aims of the Association;
- (e) providing, as appropriate, regional rice research and development facilities;
- (f) carrying out or promoting any other measure or activities at the regional as well as the national level, as determined by the Governing Council, for the purpose of developing rice production and marketing in West Africa.

IMPLEMENTATION OF THE RECOMMENDATIONS OF THE FIRST QQR

WARDA has tended to be quite receptive to suggestions made to it by donors and review teams. One might even argue that they have been too receptive in the sense that they have failed to develop an institutional program direction but instead have responded to perceive opportunities to obtain funds. The team was repeatedly told by high officers that the donors determine the program of the Association.

The failure to develop a coherent program for the Association is reflected in the failure to implement the final and perhaps the most important recommendation of the first QQR, which was stated as follows:

"...the Panel recommends that WARDA should utilize its accumulated knowledge to define a core program, an issue which has never been properly tackled... The differing ecological conditions in the region will make, in the future, the strengthening of the Special Project imperative and increasingly important to rice production in West Africa and would constitute the most important part of the core program of WARDA."

The first QQR summarized its report in a chapter that consisted of recommendations interspersed with justifications or explanations of the recommendations. In the following the recommendations have been grouped under a number of headings and the observation of the present team regarding implementation of each is noted.

<u>Category</u>	<u>Recommendations</u>	<u>Action</u> (see notes)
<u>Coordinated Varietal Trials (CVT)</u>		
-	"consolidation" of CVT	Partially implemented
-	transfer full responsibility to member states	Not implemented ^{1/}
-	reorganize on an ecological basis	Implemented
-	"devolution" of insecticide and herbicide trials projects	Implemented

1/ WARDA still pays member states for each trial implemented.

- Sub-Regional Coordinators should be fully briefed and assisted by Headquarters staff to carry out the CVT Implemented
- on-farm trials should be added to CVT Partially Implemented

Staffing

- add an assistant plant pathologist, assistant plant breeder and entomologist Implemented
- if the above staff are added to Headquarters, their deployment should be reexamined after a few years Implemented
- the above staff should only be added if they are closely involved in the monitoring of CVT Partially Implemented
- member states should continue to second to WARDA high level scientists and civil servants Not relevant
- a plant breeder from IITA should be appointed to work with the WARDA Implemented

Special Projects

- teams should be brought to full strength Not Implemented
- team leaders should be included in core budget and funded by CGIAR Implemented
- contact between scientists of separate special projects should be more frequent Not Implemented ^{1/}
- exercise caution adding research elements to special projects Implemented
- include a production economist in each special project team Partially Implemented

^{1/} Special project team leaders meet at the Annual Research Review Meeting

Research

- convene a seminar on upland rice Bouake conference
- select and test some aspects of N-
fixation technology Implemented
- assess and utilize the results of
mechanization projects in the region Partially implemented
- secure cooperative arrangements on
farming systems research with
institutions working on the subject
in the region Not Implemented

Other

- seek ways to establish a more viable
structure for its seed production
project Not Implemented
- produce more public information
material Not Implemented
- translate documents into the two
languages of the Association Implemented
- define a core program "an issue that
has never been properly tackled" Not Implemented
- for this purpose call a meeting of
major donors with a view of
establishing a consortium to insure
coordination and regulation Partially Implemented
- prepare a 5-year plan of work
detailing the substance of its core
program Not Implemented ^{1/}

^{1/} A meeting of donors was held, but no core program was articulated, just a series of projects and corresponding budget requests.

APPLICATION OF CGIAR FUNDING 1979-83 ('000 US\$)

Categories	Actual Expenditures				Estimate
	1979	1980	1981	1982	1983
Research Coordination	556	558	628	661	636
Technical Support Services	304	694	654	712	665
Sub-Regional Coordination	664	1,043	1,106	1,097	904
Administrative Support	234	278	297	292	338
External Program Review	-	-	-	-	170
Total CGIAR Funding	1,758	2,573	2,685	2,762	2,713
Total Research Department	N.A.	N.A.	5,228	4,559	4,843
Total WARDA Budget	N.A.	N.A.	9,937	11,485	10,573

PERCENTAGES OF SUCCESSFUL IETs AND CVTs IN THE LAST FIVE YEARS

<u>Sub-Region</u> <u>Country</u>	<u>IETs</u>		<u>CVTs</u>		<u>Range between</u> <u>Localities</u>
	<u>Country</u>	<u>Zone</u>	<u>Country</u>	<u>Zone</u>	
<u>ZONE I</u>					
Mauritania	80		19		12 - 23
Senegal	78	67	50	54	43 - 60
Gambia	67		64		25 - 77
Guinea-Bissau	60		85		60 - 93
<u>ZONE II</u>					
Guinea	15		16		11 - 20
Sierra Leone	100	56	58	50	35 - 80
Liberia	68		80		80
<u>ZONE III</u>					
Mali	52		54		0 - 83
Ivory Coast	54	63	68	67	40 - 100
Upper Volta	90		68		40 - 86
<u>ZONE IV</u>					
Nigeria	80	48	59	53	40 - 90
Ghana	40		54		30 - 100
<u>ZONE V</u>					
Niger	50		58		25 - 90
Togo	100	61	62	59	20 - 100
Benin	42		57		20 - 87
<hr/>					
TOTAL	59		58		

ANNEX XI

VARIETIES FROM THE COORDINATED TRIALS RECOMMENDED TO THE FARMERS

	Upland	Irrigated	Mangrove Deepwater Floating
Ivory Coast	IRAT 109 IRAT 112 IRAT 136	BOUAKE 1896 BG 90-2	
Upper Volta	IRAT 147	IR 1529-680-3 IET 2885 IET 1996	
Mali	IRAT 112		DM 16 DM 17 BK 6986-38-1 BKN 6985-105-P
Ghana	IR 442 IR 1820-210-2 Dourado precoce	CICA 4 IR 442 IR 20 IR 3273-P339-2	
Nigeria	IRAT 13 IRAT 194/1/2	IR 269-3-3-3 BR 51-46-5 ITA 212 ITA 123 BG 90-2	
Niger		IR 1529-680-3 BG 90-2 BW 5146-5 BW 196 IET 2885 IR 269-26-3-3-3 NTU 770-7-2	BKN 6323 T 442-36 FRRS 43/3 NEANG KHIEW 5 MALOBADIAN MALIONG
Benin	Col 38 CR 1002 IR 937-55-3	BG 90-2 BW 196 ADNY 11	
Togo	D52-37 IR 28 SML AWINI C 74	ADNY 1 BG 90-2 IR 841 BR 51-319-9-3 IET 1444	
Gambia	Se 302G IR 442-2-58 ROK 5 Phar Com En	IR 22 I KONG PAO IR 1529-680-3	ROK 5 Phar Com En IRAT 10 IR 1529-680-3
Guinea Bissau	Se 302 G IRAT 10 IRAT 109	IR 442 BW 78 BG 90-2 I-KONG-PAO	ROK 5
Mauritania	-	TN 1 THIU-THIO-WAY I-KONG-PAO BG 34-8 IR 1561-228-3	
Senegal		IR 8 I-KONG-PAO	
Liberia		MASHURI IR 1416-131-6	
Guinea	ROK 5	IR 20	

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SITES WHERE IETs HAVE BEEN CARRIED OUT - 1978-82

ZONE I

Mauritania	-	Kaedi
Senegal	-	Sefa, Richard Toll, Djibelor
Gambia	-	Sapu, Johali
Guinea Bissau	-	Caboxanque, Contobouel

ZONE II

Guinea	-	Kankan, Gueckedou, Kindia
Sierra Leone	-	Mange, Rokupr
Liberia	-	Suakoko Liberia

ZONE III

Mali	-	Mopti, Gao, Kongoni, Sikasso
Ivory Coast	-	Bouaké, Gagnoa, Khorogo
Upper Volta	-	Vallee de Kou, Farakobo

ZONE IV

Ghana	-	Kpong, Nyankpala
Nigeria	-	IITA, Ibadan, Badeggi, Bernin Kebbi

ZONE V

Niger	-	Kolo, Daikena, Libore
Togo	-	Dome, Mission Tove, Sotouboua
Benin	-	Domego, Bagou, Mawirr, Iwa

SITES WHERE CVTs HAVE BEEN CARRIED OUT - 1978-82ZONE I

- | | |
|---------------|--------------------------------|
| Mauritania | - Kaedi, Kindiao/Mpouri |
| Senegal | - Sefa, Richard Toll, Djibelor |
| Gambia | - Sapu, Johali, Jenoi |
| Guinea Bissau | - Caboxanque, Contobouel |

ZONE II

- | | |
|--------------|---------------------------------------|
| Guinea | - Kankan, Gueckedou, Kindia, Sanfonia |
| Sierra Leone | - Mange, Rokupr, Gbomsamba, Kenema |
| Liberia | - Suakoko |

ZONE III

- | | |
|-------------|---|
| Mali | - Mopti, Gao, Kongoni, Sikasso, Longarola |
| Ivory Coast | - Dabou, Bouaké, Odienne, Khorogo, San Pedro, Man, Gagnoa |
| Upper Volta | - Vallee de Kou, Farakoba, Banfora |

ZONE IV

- | | |
|---------|--|
| Nigeria | - IITA, Ibadan, Badeggi, Bende, Bernin Kebbi, Ikenne |
| Ghana | - Kpong, Nyankpala, Atebubu, Tono |

ZONE V

- | | |
|-------|---|
| Niger | - Kolomoli, Daikaina, Libore |
| Togo | - Lamakara, Amo Oblo, Dapaong, Mission Tove, Soutouboua |
| Benin | - Houada/G. Popo, Domego, Ima, Bagou |

TOTAL NUMBER OF TRAINEES BY COUNTRY AND COURSE 1973 - OCTOBER 1983

	Rice Production Specialist Course	Field Assistant Course	Research Assistants Course	Post Harvest Technology Course	Project Management Course	Water Management Course	Seed Multi- plication Course	Integrated Pest Manage- ment Course	Refresher Course on Milling	TOTALS BY COUNTRIES
1. Senegal	26	29	3	7	6	3	7	7	2	90
2. Sierra Leone	25	28	2	13	4	2	7	1	-	82
3. Mali	22	20	6	10	8	3	7	1	1	78
4. Liberia	22	21	4	13	7	4	4	-	2	77
5. Togo	15	15	6	12	8	3	6	2	-	67
6. Guinea	13	10	6	15	9	2	4	3	-	62
7. Upper Volta	21	7	4	8	9	3	4	2	3	61
8. The Gambia	18	16	3	5	9	4	4	2	-	61
9. Benin	15	15	4	8	8	4	4	2	-	60
10. Ghana	16	14	1	9	5	4	6	1	3	59
11. Nigeria	23	11	1	4	4	4	3	4	-	54
12. Guinea Bissau	13	12	2	10	5	1	3	2	2	50
13. Mauritania	10	15	2	4	5	2	3	1	-	42
14. Ivory Coast	6	14	1	2	5	-	6	-	-	34
15. Niger	6	7	1	3	3	3	6	-	1	30
	251	234	46	123	95	42	74	28	14	907

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GLOSSARY OF ACRONYMS

AR	Azolla Research
BRP	Bird and Rodent Control
BRI	Bangladesh Rice Research Institute
CARI	Central Agricultural Research Institute (Liberia)
CERCI	Centre d'Expérimentation pour la Riziculture et les Cultures Irriguées
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical
CIDA	Canadian International Development Agency
CILSS	Comité permanent inter-états de lutte contre le secheresse dans le Sahel
CVT	Coordinated Varietal Trials
DES	Deputy Executive Secretary
EPR	External Program Review
ES	Executive Secretary
FAO	Food and Agriculture Organization of the United Nations
GC	Governing Council
IARC	International Agricultural Research Centers
IBPGR	International Board for Plant Genetic Resources
IBRD	International Bank for Reconstruction and Development
ICAR	Indian Council of Agricultural Research
ICIPE	International Centre for Insect Physiology and Ecology
ICP	International Crop Protection
IDESSA	Institut des Savanes
IDRC	International Development Research Centre (Canada)
LET	Initial Evaluation Test
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Centre
IITA	International Institute of Tropical Agriculture

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IRAT	Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières (France)
IRRI	International Rice Research Institute
IRTP	International Rice Testing Program
ITC	International Institute for Aerial Survey and Earth Sciences
MWMS	Mechanization and Water Management Studies
NCRI	National Cereals Research Institute
OCLAVAL	Organisation commune de lutte anti-acridienne et de lutte anti-aviaire
ODA	Overseas Development Administration
ORSTOM	Office de la Recherche Scientifique et Technique d'Outre Mer (France)
PTA	Rice Policy and Trade Analysis
QQR	Quinquennial Review
RGA	Rapid Generation Advance
RSB	Rice Stemborers
SDA	Statistics and Data Analysis
SNF	Seed Nursery Farm
STL	Seed Testing Laboratory
STC	Scientific and Technical Committee
TAC	Technical Advisory Committee
TAP	Technical Assistance Program
TAT	Technology Assessment and Transfer
TOR	Terms of Reference
UCL	Catholic University of Louvain
UNDP	United Nations Development Program
WARDA	West Africa Rice Development Association