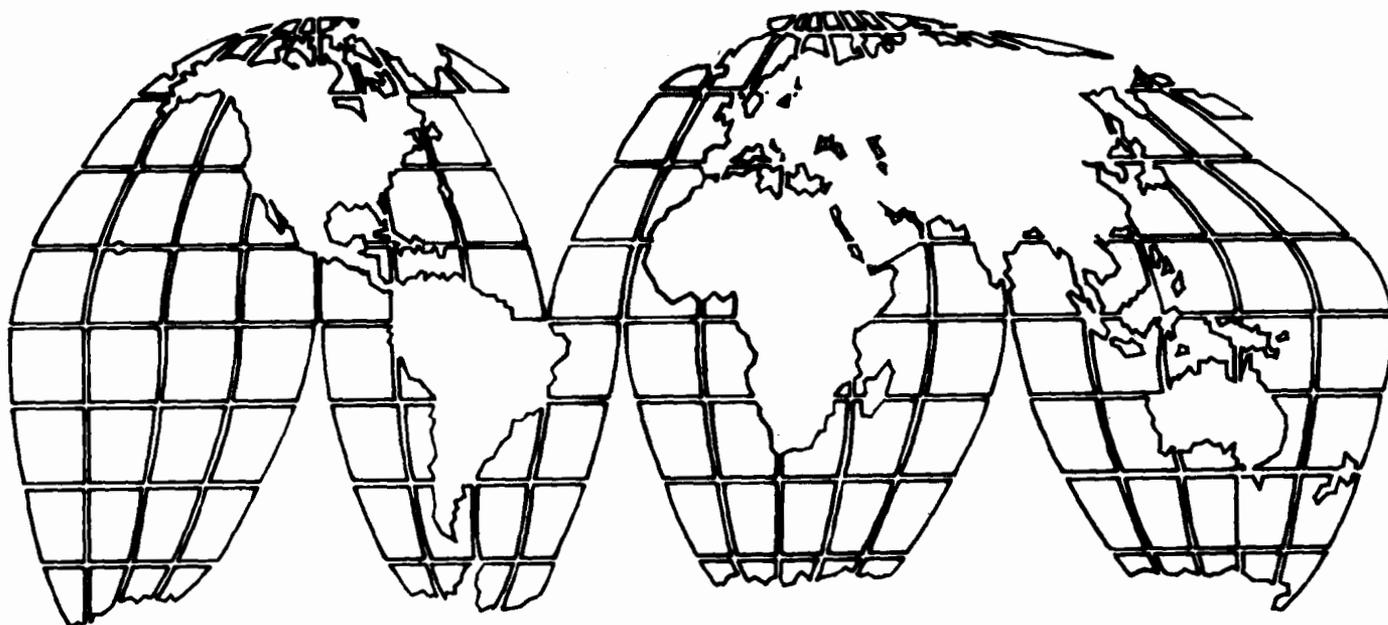

A.I.D. Project Impact Evaluation Report No. 44

West Africa Rice Research and Development

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May 1983

U.S. Agency for International Development (AID)

WEST AFRICA RICE RESEARCH AND DEVELOPMENT

A.I.D. Project Impact Evaluation No. 44

by

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FOREWORD

In October 1979, the Administrator of the Agency for International Development (AID) initiated an Agency-wide ex post evaluation system focusing on the impact of AID-funded projects. These impact evaluations are concentrated in particular substantive areas as determined by AID's most senior executives. The evaluations are to be performed largely by Agency personnel and result in a series of studies which, by virtue of their comparability in scope, will ensure cumulative findings of use to the Agency and the larger development community. This study of the impact of the West Africa Rice Development Association was conducted in October 1981 as part of this effort. A final evaluation report will summarize and analyze the results of all the studies in this sector and relate them to program, policy, and design requirements.

SUMMARY

The West Africa Rice Development Association (WARDA) was created in 1970 to increase rice production in the 15 member countries through research and training. Importation of the rice necessary to satisfy an increasing demand for what is becoming the food staple in urban areas is a drain on foreign exchange, yet the climate and ecology of West Africa are suited to rice production.

A decade after its creation, one cannot hold WARDA responsible for the fact that West Africa is importing more rice than ever. WARDA was encouraged to look for technological solutions to this deficit, not for economic policy solutions. But a technical solution cannot be divorced from its economic environment. One of the greatest weaknesses of WARDA's research design is its tendency to separate these two. Some of WARDA's research results demonstrate the disadvantages of this tactical separation, laid on the association by its founding charter and by the orientation of the donor and member state support it has received. Nevertheless, because of its scientific professionalism, WARDA, through its development department, has discovered a politically acceptable way of targeting project identification research design on specific situations that are not only ecologically but also economically conducive to expanded rice production.

Much of the more recent, second phase of AID support to WARDA (project 698-0429) is built upon WARDA's evolving skill in contextualizing rice research and development inputs such that, for specific contexts, their outputs are not hindered by the widespread economic constraints on rice production in West Africa. With the advantages of hindsight therefore, we are evaluating the first phase AID/WARDA project (698-0382), not only in terms of its own stated goals, but also to identify the part it played, if any, in helping WARDA define this more successful, interdisciplinary role for itself.

Under the first phase project, 698-0382, AID supported (1) two special research projects--one for mangrove rice at Rokupr, Sierra Leone, and one for deepwater/floating rice at Mopti, Mali; (2) a training center adjacent to Liberia's agricultural University at Fendell just outside of Monrovia; (3) participant training in the U.S. for key WARDA researchers; and (4) a rice economics study undertaken in conjunction with the Food Research Institute at Stanford University.

Project Results

1. The end of the first phase project in FY 1980 provided the Rokupr special project with important research results that are being disseminated while the Mopti special project can still be described as spinning its scientific wheels. This difference can be attributed, among other things, to (a) Rokupr's longer continuous history as a research station; (b) the financial independence of its special project from WARDA headquarters; (c) better communications with neighboring farmers, facilitated by better relations between the latter and the national extension system; (d) strong scientific leadership on site; and (e) independent administrative prerogatives.

2. While WARDA's rice production course can be improved on the margin, there is no question that its graduates (over half of whom were interviewed) are an important stimulus to a higher level of public sector rice competence in the region,

3. As none of the participant trainees have returned from the United States, their absence on the research station is more keenly felt, so far, than the results of their training,

4. The Stanford/WARDA Rice Economics Study gave important new scope for interdisciplinary research within WARDA.

The record of success listed above must be viewed with caution as the least successful part of this project, the Mopti deepwater/floating rice research station, consumed over half of its funds. This fact raises the question as to whether WARDA remains the most appropriate vehicle for pursuing some of the more successful outputs of the project, if, at the same time, it can expend so much money in such an undisciplined research effort as Mopti has been.

Lessons Learned

1. It is difficult for a donor to target its agricultural development priorities by simply tying down its funding to certain subactivities of a larger organization, if that organization does not share or does not articulate those priorities in the same fashion. A common strategy for at least each department (research, training, development, etc.) should have been worked out between the donors and WARDA before the latter was used to achieve more specific objectives than those it was setting for itself.

2. This is not to say that a regional organization with a widespread scientific network is not the proper sort of framework for understanding and undertaking scientifically focused research and development. That this has happened too rarely in the WARDA framework can be attributed to the project administration burdens

that the donors and the member states have imposed upon the association. Donors and member states seem to have used WARDA as an organization to implement their strategies rather than as a scientifically better suited resource for helping them collectively define strategies that the member states themselves could or should implement.

3. Regional institutions should not be used as a fallback resource when national systems prove administratively inadequate for pursuing research objectives, but rather as a means to improve the scientific inadequacies of these national systems. Unfortunately, rather than face the task of institution-building at a national level, donors have unloaded the administrative burden of their programs on regional organizations like WARDA simply because they were easier to deal with. Economies of scale for technical competence can be found and developed at a regional level, to be sure, but not if they are used to rationalize the designation of regional organizations as implementation organizations in their own right. Designation as an implementation agency blocks such a regional organization from the pursuit of its proper scientific agendas.

4. Although WARDA may have been mistakenly given too much of an administrative role, its more strategically placed roles still transcend that of the scientific. WARDA is a particularly effective quality control, advisory backstop to the national research systems of the 15 countries it serves because of its sensitivity to the political and administrative environment in each country.

ACKNOWLEDGMENTS

It is a measure of the West Africa Rice Development Association's (WARDA) success as a scientific network that any list we might prepare of West African officials who are responsible for rice and whom we were able to interview would correspond almost identically with the list of WARDA trainees interviewed. In the 10 countries visited, most of the officials who were responsible for rice were graduates of WARDA's training courses. By the same token, most of the WARDA training graduates whom we were seeking with our questionnaire (we found 116) turned out to be these same rice officials. The list of these trainee/officials occupied 11 pages of the draft report. It has been deleted here. Not only did all of them answer the training questionnaire analyzed in Appendix E, but they made themselves available for extended interviews on rice in West Africa and on WARDA.

Furthermore, it is a measure of WARDA's success as an organization that any special acknowledgments we might give to staff members who assisted us would merely reproduce the professional staff list available in WARDA's annual report. The only staff members who did not make themselves completely available to our evaluation (in spite of the fact that WARDA is almost continually besieged by design and evaluation teams) were those who were absent at the time of our visit. This accessibility prevailed as much at Mopti, Rokupr, Richard Toll, Banjul, Bobo-Dioulasso, and Niamey as at the Monrovia headquarters (see Appendix A for itinerary).

Much of the credit for this level of cooperation can be given to the time and skill with which Jack Cornelius' Agriculture Division of USAID/Liberia explained to WARDA the purpose and scope of an impact evaluation. However, the fact that this well-articulated message so quickly and completely filtered down and out through all levels and sites of WARDA's organization and beyond to the national systems of the member states visited must be attributed to the high regard with which WARDA is held in the region and to the sagacious and confident leadership of WARDA's Executive Secretary, Mr. Sidi Coulibaly.

WARDA has continued to devote high levels of attention to this evaluation since its field phase ended a year ago, including the preparation of a thorough and thoughtful set of "Comments" (WARDA publication 7453--see Appendix F) to our draft report. With the help of these comments, the draft report has been substantially revised and, we hope, improved.

PROJECT DATA SHEET

1. Location:
West Africa region, 15 countries (located on map), listed from west to east: Mauritania, Senegal, The Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Mali, Upper Volta, Ghana, Togo, Benin, Niger, and Nigeria
2. Project Title:
West Africa Rice Development Association (WARDA): Rice Research and Production (Formerly Rice Production and Marketing)
3. Project Number: 698-11-190-382, 698-0382
4. Project Implementation:

a. First Project Agreement	FY 1975
b. First Obligations	FY 1975
c. Final Input Delivery	FY 1980
d. Second Phase Project Agreement	FY 1981
5. Project Completion--Final Disbursement: FY 1980
6. Project Funding:

a. AID--Total Disbursement		\$ 6,379,000
b. WARDA (with member states)	(in kind)	
Total		\$ 6,379,000
7. Mode of Implementation: Through WARDA
8. Evaluations: 1978, see Appendix B
9. Responsible Mission Officials During Life of Project: Van Henderson, Peter Daniels, and George Jespersen
10. Host Country Exchange Rates: N/A, Liberian currency is the U.S. Dollar.

THE AID PROJECT BUDGET

In the first quarter of FY 1975, AID/Washington approved \$1,450,000 for 4 years of continuing AID support to WARDA. This money was budgeted as follows:

I.	Personnel		
a.	Training Center		
	Johnsonville, Liberia.....	240,000	
b.	Research Center		
	Rokupr, Sierra Leone.....	159,000	
	Total		399,000
II.	Participant Training		233,000
III.	Commodities		
a.	Training Center		
	Johnsonville, Liberia.....	88,000	
b.	Research Center		
	Rokupr, Sierra Leone.....	80,000	
	Total		168,000
IV.	Construction		
a.	Training Center		
	Johnsonville, Liberia.....	175,000	
b.	Research Center		
	Rokupr, Sierra Leone.....	105,000	
	Total		280,000
V.	Operating Costs		
a.	Training Center		
	Johnsonville, Liberia.....	276,000	
b.	Research Center		
	Rokupr, Sierra Leone.....	94,000	
	Total		370,000
	GRAND TOTAL		1,450,000

In the second quarter of FY 1976 AID/Washington approved the following additions to this budget:

I.	Personnel	
	Extension Training Advisor	
	(3 Years).....	250,000
IV.	Construction	
a.	Training Center	
	Johnsonville, Liberia.....	160,000

V. Operating Costs (Training & Rokupr Research).....	387,000	
VI. Stanford/WARDA Economics Study.....	240,000	
VII. Other ¹	218,000	
Total		<u>1,255,000</u>

At the same time, \$2,461,000 for the Mopti (Mali) deepwater/floating rice research station was also approved. It was budgeted as follows:

I. Technical Assistance.....	552,000	
II. Participant Training.....	254,000	
III. Equipment.....	141,000	
IV. Construction ²	652,800	
V. Operating Costs.....	1,145,600	
VI. Inflation Factor.....	211,100	
VII. Contingency.....	55,900	
Total		<u>2,461,000</u>
GRAND TOTAL		<u>5,166,000</u>

It should be noted that the initial activities, for Training and Rokupr Research, which were funded lean and then received incremental funding supplements, out performed the Mopti Center which was funded upfront in one large tranche.

¹ This sum covered a number of consultancies some of which, like the Mopti feasibility study, had been funded out of Training and Rokupr Research technical assistance funds and were being reimbursed here.

² Mostly for houses, because the Saudis built the research facility itself.

GLOSSARY

AID	U.S. Agency for International Development
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CGIAR	Consultative Group on International Agricultural Research
FAO	Food and Agriculture Organization of the United Nations
FED	European Development Fund
IDRC	International Development Research Council (Canadian aid agency)
ITTA	International Institute of Tropical Agriculture
IRAT	Institute for Tropical Crops Research
IRRI	International Rice Research Institute
PPC	Policy and Program Coordination Bureau of AID/Washington
SAFGRAD	Semi-Arid Food Grain Research and Development
TAC	Technical Advisory Committee to CGIAR
UNDP	United Nations Development Program
USDA	U.S. Department of Agriculture
WARDA	West Africa Rice Development Association



I. PROJECT SETTING AND DESCRIPTION

A. WARDA Origins and Objectives

By 1978 the West African Region, as defined by the 15 contiguous countries comprising the membership of the West Africa Rice Development Association (WARDA), was losing approximately half a billion dollars a year in foreign exchange by importing rice for its more prosperous consumers (largely urban based). This foreign exchange drain seemed entirely unnecessary because much of that imported rice was being grown in parts of the world with a climate and ecology similar to West Africa's. Why was not West Africa producing that rice itself? Should not income from the increasing (urban) demand for the rice staple go to West African farmers and into West African countries, instead of overseas?

By 1970 two answers to these questions had gained considerable urgency:

1. West Africa had not received the technological benefits of the green revolution as had those regions (e.g., Southeast Asia) producing the rice that it was importing.
2. In order not to offend vocal, urban populations of rice consumers, West African states, instead of protecting local rice production with tariffs, subsidized local rice consumption through various means at their disposal. This subsidy undermined any price incentives for West African rice production that this urban demand for it might have generated.

When the nations of West Africa and concerned foreign donors began to organize to address this problem (1968-1970) it was assumed that with green revolution technological advances first, and maybe some sort of policy reform later, the West African rice farmer could come to compete with the Southeast Asian one. Judging from the rationale stated for the formation of WARDA, the mandate it was given, and the functions it was funded for, one can surmise that the member states were more inclined to elevate the technological issue to regional attention than they were the economic policy one. Though WARDA was given a general promotional role with respect to rice production, it was only supported by the member states and foreign donors for research and dissemination functions. While WARDA leadership was clearly aware of the economic parameters of the implementation of its rice promotional mandate, the association had its hands more than full sorting out the technological options.

WARDA was formally created in September 1970, with the general objective of qualitatively and quantitatively improving rice production in the member states of the region.¹ The creation of

¹ A more comprehensive treatment of WARDA's history is contained in Appendix B.

WARDA was recommended by a U.S. Department of Agriculture (USDA) fact-finding team in 1968² and formally proposed by a meeting of representatives of concerned West African countries in the same year. The justifications for WARDA included (1) the rapid expansion of per capita consumption of rice within the region resulting in growing reliance on imports and a strong desire by member states to achieve or regain self sufficiency (2) the belief that green revolution-type advances in rice comparable to what had been realized in Asia were possible in West Africa through selective utilization and adaptation of improved rice varieties and production and processing techniques, and (3) the view that regional coordination of rice research and development efforts would significantly improve the effectiveness of efforts to promote rice production.

The accomplishments of the International Rice Research Institute (IRRI) in Asia as well as green revolution-type advances elsewhere in the developing world gave great impetus to the concept that regional and international agricultural research efforts could produce significant results and were a vital complement to national agricultural research and development programs. However, WARDA's mandate carried this concept considerably further than any of its sister institutions in the network of international agricultural research centers. Like IRRI, WARDA's efforts were focused on one commodity, rice, but WARDA differed from IRRI and other international centers in several important ways: (1) WARDA is controlled by a governing council consisting of representatives of member states and draws most of its staff, including virtually all the leadership positions, from member countries--it is a truly regional organization staffed by West Africans and directed by the governments of the member states; (2) WARDA's mandate encompasses virtually the entire spectrum of issues and activities related to rice production and consumption in the region, including but definitely not limited to research; and (3) WARDA's research role in developing and extending improved varieties and practices is primarily that of an intermediary among the national programs of the member states and between national programs and regional international research organizations.

B. WARDA Organization and Activities

In 1970 the Institute for Tropical Crops Research (IRAT) and the International Institute of Tropical Agriculture (IITA) were working on the application of certain rice strains to diverse West African rice growing environments: IRAT was concentrating on the rain-fed savanna, IITA on upland hydromorphic/swamp conditions. Meanwhile, several national rice development systems were in direct, if unsystematic, communication with IRRI, mostly in quest of high-yielding varietal strains.

² James Reese et al., Rice in West Africa, USDA/AID, December 1968.

From the beginning, member governments and donor agencies envisaged that WARDA would complement existing rice research and development programs, rather than undertake the entire range of activities implied by its mandate. Although WARDA developed proposals which were rather broad in scope, subsequent negotiations with donor agencies resulted in significant reduction or elimination of various activities. Not unsurprisingly, the mixture of activities that did emerge represented the list of special concerns of the donor agencies which it was felt were not adequately dealt with by other institutions.

Initially, WARDA consisted of two divisions, research and training. Research was largely limited to a series of trials covering varieties and agronomic practices for the major types of rice grown in the region.³ Subsequently, WARDA embarked on a series of special projects which covered a more comprehensive range of research activities for mangrove swamp rice, floating rice, and irrigated rice. WARDA's involvement in research on upland rice, which is the most important in the region in terms of total production and number of farmers, has remained very limited since research by IRAT in the Ivory Coast included a significant amount of work on this type.

The training program was initially limited to a six-month rice production course but has subsequently expanded to include a series of short courses dealing with a range of rice research, extension, and processing subjects.⁴ Although the initial rice production course was patterned after a similar course at IRRI, there was very little available in the region which was comparable. Thus, in the area of training, WARDA fulfilled a more general need, namely providing specialized training in various aspects of rice production and research for staff from member countries rather than filling in the particular gaps found in each of their research programs.

At a later stage (1975), the development department came into being, first as a special project and subsequently as an equal partner with research and training in WARDA's structure. In the early years, the development department staff carried out a number of special studies of rice development conditions and prospects in several areas in the region; increasingly, staff members were invited by the governments of member states and external assistance agencies such as the World Bank to participate in missions to identify, prepare, monitor, and evaluate rice projects. By 1976, WARDA and the Stanford Food Research Institute were collaborating to produce a major study Rice in West Africa: Policy and Economics⁵.

³ See Appendix D for a more comprehensive discussion of the research program.

⁴ See Appendix E for a more comprehensive discussion of the training program.

⁵ Rice in West Africa: Policy and Economics, Scott R. Pearson, et al., Stanford University Press, Stanford, California, 1981.

More recently, the development department has initiated a series of farming systems research and extension activities (Technology Assessment and Transfer as part of the special research projects which are being funded by the second USAID/WARDA project (698-0429), now over one year into implementation.

C. WARDA Geography

The decision to locate the WARDA headquarters in an office building in Monrovia, Liberia has been the source of a number of difficulties. Although rice is the major staple food of Liberia, Monrovia is located some distance from the principal rice-producing areas of the country. Most of the training activities take place at the Fendel Training Center, adjacent to the Liberian College of Agriculture just outside Monrovia, a 30 minute drive from headquarters but well outside the major rice-producing areas. Most significantly, WARDA scientists at the headquarters are a good three hours drive from the nearest rice research facility, the Central Agricultural Research Institute at Suakoko. The WARDA-operated research facilities that do exist form part of the special projects located at Mopti in Mali (for deepwater/floating rice), Rokupr in Sierra Leone (for mangrove swamp rice), and Richard Toll in Senegal (for irrigated rice), all of which are realistically a full day's journey from Monrovia by air and road. Within the past two years, WARDA has also established small regional offices in Niger, Upper Volta, Guinea, Ghana, and the Gambia. Thus, WARDA staff and facilities are scattered rather broadly throughout the West African region. This fact, plus the somewhat disjointed nature of WARDA's activities, divided as they are among the three departments and a number of special projects, has seriously complicated the administrative and management tasks. Communications and logistics are often as important a part of the normal workday as are research, training, and development related activities.

D. WARDA and AID

WARDA has found support from several donor agencies including USAID, British Aid, French Aid, Dutch Aid, Canadian Aid, The United Nations (FAO/UNDP), the Consultative Group on International Agricultural Research (CGIAR), in addition to the contributions of the governments of member states. Initial support from USAID was a grant of \$500,000 in 1971 for national staff training, equipment, furniture, and certain administrative expenses as well as the coordinated trials. A further \$125,000 was provided in 1973 to cover the cost of technicians and a Monrovia-based project manager. USAID carried out an administrative review of WARDA in 1973 which generally endorsed the theory and practice of WARDA as it existed at that time. However, in the 1974 Project Paper, AID chose to target its assistance rather than provide general support for the organization. The Project Paper for project 698-0382, West Africa Rice Research and Production, states:

"The [evaluation] mission made a broad assessment of WARDA's institutional capability and program, within the context of AID assistance, and its conclusions were very favorable overall. However, the team's conclusions reinforced AID's interest in providing specific support to a project or activity rather than general budgetary support. The reasons were: 1) WARDA had established its basic institutional capacity and needed to move quickly into the more complex research and development activities needed to address West African rice problems. 2) AID preferred to support specific activities most directly related to its own small farmer oriented food production and income distribution priorities.

The original Project Paper of December 1974 requested only \$1.45 million to carry the training and Rokupr activities through FY 1979. Additional funds were appropriated to do feasibility studies of the proposed Richard Toll irrigated rice and/or the Mopti deepwater/floating rice research efforts. By the time that these studies made their recommendation for \$2.46 million for support of the Mopti deepwater/floating rice research, (for which purpose the project assistance completion date had to be extended through FY 1980) the original Project Paper also had to be modified. Modification included funds to add an extension training advisor for three years, to cover increased training center construction costs, to extend training center and Rokupr operating costs, and to fund the Stanford Rice Economics Study, bringing the total project cost up to \$5.17 million. Added to the pre-project AID support to WARDA, this brought the obligated total to \$6.74 million; all but \$358,000 of this was disbursed.

The project documents supporting this finding gave more attention to justifying WARDA's prerogatives and comparative advantage in designing the details of these training and research efforts, than they gave directly to such design details themselves (see Appendix B).

E. Project Design Issues

This impact evaluation is focused on two aspects of this targeted kind of donor approach that seem both to explain its mixed outcome and provide guidance on how generally conceived and broadly based agricultural research institutions might be more effectively assisted.

1. According to what institutional mechanism and scientific methodology have the targets of this support been chosen?

In the case of AID's chosen targets, there were some lucky coincidences. What could be called the IRRI "green revolution mystique" had already led WARDA to encourage previous donors, such as the CGIAR, down the varietal selection path. For similar reasons, Canada had become intrigued with the possibilities for on-station irrigated rice research at Richard Toll (their assistance to that special project is now being wound down). This left AID with the considerably easier job of adapting IRRI training materials to West Africa. For all of the success of this investment (see Appendix E), the policy of following the IRRI model of placing the training center next to the national agricultural college (Fendell, Liberia) had unfortunately, but not disastrously, distanced the trainees from day-to-day contact with rice farming and rice farmers.

The scope of mangrove swamp rice research and the floating rice research (Rokupr, Sierra Leone and Mopti, Mali, respectively) was necessarily quite focused in terms of target farming systems. With the benefit of hindsight, this report concurs with previous WARDA evaluations (see Appendix B) in finding that such a focus on microecological systems is a more appropriate point of departure for rice research in West Africa than coordinated varietal selection.

However, this proper choice of focus was not sufficient to provide for enduring success. A major explanation for the relative success of the mangrove rice research effort was its administrative autonomy from WARDA headquarters, the latter being overly distracted with its endless range of mandated responsibilities. Yet this was a fortuitous independence. It was not part of the AID design at all, but, rather, resulted from the way in which British aid was channeled directly to the Center. Unfortunately, as AID and the Saudis were the only donors involved, the Mopti, Mali deepwater/floating rice research station (into which the bulk of the AID/WARDA project funds went) did not have such administrative independence. Many of the delays and poor choice of research priorities that have plagued this activity (see Appendix D) could have been recognized and addressed had more of the relevant decision-makers been close at hand. An important step toward the achievement of this administrative autonomy could have been taken if AID had channeled its support to this activity through USAID/Mali to WARDA/Mopti, rather than through USAID/Liberia to WARDA headquarters.

2. What sort of administrative attention can donor-targeted activities get from an organization mandated to attend to so many other (incompletely defined) areas of activity?

Steps are being taken by both WARDA "and donors to see to it that the Association rationalizes and prioritizes its mandated activities." As requested by the five-year review of the Technical

Advisory Committee (TAC) to the CGIAR, WARDA prepared a five-year plan for its donor conference in 1980. In 1981, AID/Africa drafted a paper on "Rice Strategy for West Africa..." calling for coordinated actions and analysis by WARDA's donors. Nevertheless, with these and similar efforts, there are many vested administrative habits between certain donors and WARDA, within WARDA, and between WARDA and certain member states to contend with. These habits have developed over a decade in which West African rice research priorities were being vaguely, and perhaps sometimes almost mystically, defined.

II. ANALYSIS OF PROJECT IMPACTS

A. Limiting Factors

WARDA has been in existence for nearly a decade, long enough, it might be argued, for there to be a fair expectation of demonstrable impact upon national rice research and development efforts of member countries. Yet on a regional basis, rice imports have increased dramatically in recent years and the prospects for self-sufficiency in the medium term seem at least as remote as a decade ago. An organization such as WARDA has limited control or influence over most of the underlying factors it must contend with, including the following:

1. Rice is a preferred staple throughout most of the region, especially among urban consumers. Thus demand has expanded more rapidly than population growth, especially in those countries which have registered advances in per capital income and/or nonfarm employment such as Nigeria, Ivory Coast, and Senegal. Much of the rice in West Africa is consumed by the relatively well-to-do, many of them urban dwellers.
2. Wage rates (even at shadow wage⁶ levels); national rice import and pricing policies; ineffective and high-cost input delivery systems, processing, and output marketing problems; and ineffective extension services have, in varying combinations, made rice production in most West African countries a less attractive enterprise compared with the production of other commodities and/or nonfarm employment. Further, domestically produced rice is not competitive with imported rice even at shadow exchange rates and wages in most countries except in inland and rural area markets.

⁶ See Appendix C.

3. Rice is grown in a wide variety of ecosystems throughout the region. In many areas it is only of secondary or tertiary importance in the farming systems. Nearly all production occurs under relatively uncontrolled water conditions. Thus, a single package of improved technology is unlikely to be suitable for more than a small portion of the rice-producing areas. In most instances, technologies developed elsewhere will require major adaptation before they can be successfully introduced in West Africa.

4. Research on rice and food crops in general received relatively little attention in West Africa prior to the 1970s. Partially because of a general paucity of information on farming systems involving rice, to date much of the research and development for rice in the region has followed conventional lines with a focus on improving yields per acre using higher yielding varieties, fertilizers, pesticides, and herbicides. Although resulting recommendations may be both technically and economically feasible, they are often ill-suited to prevailing farming conditions characterized by land surplus, seasonal labor bottlenecks, poor or nonexistent input delivery systems, high risk aversion, limited access to capital, low levels of literacy, and ineffective extension services.

5. Outside of the rice-based farming systems in Sierra Leone, Liberia, Guinea Bissau, and The Gambia, together with portions of Ivory Coast, Senegal, and Guinea, rice is not an important element in the dominant production system compared to other grains and root crops. Yet comparable regional research organizations do not exist for other, more important, staple foods.⁷

6. Existing agricultural research institutions, notably ITTA, IRRI, and IRAT are at least as well equipped as WARDA to carry out basic applied research on rice for the region. WARDA has difficulty in competing for quality staff with these institutions. WARDA is not assured of the continuity of funding necessary to carry out effective research programs. IITA and IRAT already have direct contact with selected national rice research programs via cooperative country programs. Thus there is an element of redundancy in the theory and practice of WARDA.

⁷ The Semi-Arid Food Grain Research and Development project (SAFGRAD-JP31) is a qualified exception. However, SAFGRAD covers several commodities (sorghum, millet, maize, and cowpeas) and in theory extends over 26 countries in Africa from Mauritania to Botswana. In practice, SAFGRAD research activities have to date been very heavily concentrated in one country--Upper Volta.

7. Effective rice research and development in the region requires a strengthening of research and extension capacities at the national level because national-level institutions form the link to farmers. Most WARDA staff members have come out of West African national research and development programs to the detriment of these program institutions.

Many of the above factors appear not to have been adequately taken into consideration when WARDA was established in 1970, but have now well recognized at least within AID.⁸ Closer attention to the development potential of the existing rice-farming system would have saved WARDA and its donors from several research investments that are likely to have very limited applicability. The hit-or-miss way in which WARDA's departments and activities have developed has not conformed either to the best principles of the scientific method or to the state of knowledge about rice production technology in general or rice farming in West Africa in particular. This seems due more to the nature of the donor-WARDA member state relationship than to scientific ignorance or administrative ineffectiveness at any of these levels.

B. Types of Impact

WARDA impacts can be measured at two levels: (1) diffusion of high agricultural research and development standards and improved techniques to national systems; and (2) increased rice production. The first of these impacts is more easily traced to WARDA. The contribution of WARDA's specialized capabilities (better trained staff; easier access to improved rice varieties and production/processing techniques; and assistance in designing, monitoring, and evaluating rice projects and policies) to rice production is much more problematic. The process is especially complicated by the somewhat fragmentary nature of WARDA's programs.

Effectiveness is as much a question of close working relationships with national research and development agencies, international agricultural research centers (IITA, IRRI), and donor agencies (World Bank, European Development Fund, UNDP/FDF, IDRC, USAID) as it is a matter of having the staff and resources to perform specific tasks. The governing structure of WARDA, including the governing council and the scientific and technical committee, has substantial representation from the array of organizations participating in rice research and development in the region in various capacities at the national and regional levels. Thus, WARDA's activities, since their inception a decade ago, have tended to emphasize linkages with and between existing rice research and development activities. They are filling in the cracks rather than constituting what might be a coherent set of activities to be performed by one organization.

⁸ This judgment is based on the priorities set in the 1981 Project Paper (698-0429) for the second phase of AID support to WARDA and in AID's "Rice Strategy for West Africa" paper of the same year.

C. Rice Production Impacts (Improved Varieties and Practices)

In terms of major impact upon rice production, WARDA appears to have had little effect to date.⁹ With the qualified exception of those in Guinea Bissau, the vast majority of farmers in WARDA countries are still using traditional practices or, as in the case of the Ivory Coast, practices which have been introduced through channels which do not involve WARDA to any significant degree.

Initially WARDA's role in the development of improved technologies was to serve as a transmitter of research results, most notably development of improved varieties, between research organizations at the national, regional, and international levels. WARDA has been operating a mail-order house for national agricultural research programs in the region and pays participating countries to try the samples. This service makes the tasks of the international centers (IITA and IRRI) much easier by having only one institution with which to deal in order to get varieties and associated practices out to the 15 countries in the region. In addition, WARDA provided a vehicle by which research results in one country or region could be readily transferred to other countries with similar ecological conditions. However, much of this work has been performed somewhat mechanically, with trial packages being sent out every year to participating institutions and results being sent back for analysis; there is little evidence that the whole process is having any profound effect on the direction of research efforts at the national, regional, or international level.

Other channels, notably direct contacts among national programs and between national programs and international centers (IITA cooperative programs in Sierra Leone and Liberia; IRAT operations in several countries), have been at least as important in some countries. Evidence is very incomplete at present, but it appears that only in Sierra Leone, The Gambia, Guinea Bissau, and Niger is there clear evidence that the varieties being utilized in extension programs came to the country as a consequence of the WARDA trials.¹⁰

⁹ It is the distinct impression of this evaluation team that most of the disseminated varieties listed by WARDA (see Appendix F) have not been widely adopted. The team and WARDA agree that better statistical data on their adoption and diffusion, if any, should be maintained.

¹⁰ The 1978 UNDP/FAO/WARDA Review (see Appendix B) cites seven varieties the extension of which in West Africa can be traced to the WARDA coordinated trials: IR442, IRAT 10, Rok 5, Se 302G, IR 1529-680-3, I kong Pao, and Phar Com En. Our findings suggest that WARDA may have been the deciding factor in the West African success of only three of these varieties: Rok 5, Se 302G, and IR 1529-680-3 (see Appendix D for our findings and Appendix F for WARDA's response).

The fact that certain varieties that were first made available to a country via the coordinated trials have not only outperformed local varieties in the trials, but also proved to be acceptable to the farmers themselves strikes one more as fortuitous than as the result of any integrated iterative process by which research results are progressively tailored to specific farming systems.

It is perhaps too early to expect WARDA to have developed a complete, extendable production package for any one of West Africa's rice microecologies. The question to be addressed is whether it appears as if, judging from WARDA's research and development methodology, the association is headed towards this sort of impact.

In discussing improved packages, varietal selection is generally given more prominence, relative to research on agronomic practices, than the coefficients of variation of the varietal trials would seem to justify. West African microecological conditions are so different from one rice growing area to the next that it is difficult to breed for more than one of them at a time and costly to breed a varietal package for each one. Furthermore, climatic conditions for most of these environments are rarely stable from one year to the next. In the near and possibly medium term, returns to research on alternative cultural practices might be higher than returns to varietal research.¹¹

D. Impacts of The Special Projects

With the initiation of the special projects at Mopti, Rokupr, and Richard Toll, WARDA was given (with substantial support from AID in the case of the first two and from the Canadians in the case of the latter) a slightly larger and more substantive piece of the research action. However, with the qualified exception of the work on irrigated rice at Richard Toll, WARDA was assigned tasks (research on mangrove swamp rice and floating rice) that were not receiving priority attention at either the national level or the international centers. WARDA was filling in some of the gaps. The experiences of the special projects to date are so different as to be of only qualified assistance in the process of assessing WARDA's competence in this area.

Rokupr appears to be at least a qualified success, although final judgments must await the initiation of the North West Agricultural Development Project in Sierra Leone which incorporates some of the principal research results from Rokupr. Rokupr's progress to date is in large part a result of the quality and continuity of its staff; ingenuity in remedying shortcomings in cash flow, electricity, etc.; local autonomy on most matters (except policy), which is probably an essential ingredient of success given the poor state of communications between Monrovia and Rokupr; and reasonably good working relationships with national research and extension programs. Within the last year Rokupr has added to its

¹¹ See footnote 10.

staff an agricultural economist who, it is expected, will be joined by an extension agronomist in the near future.

The preliminary results of the farmer tests and the socioeconomic surveys to date have suggested that the instincts of the research staffs as to the most productive research approaches may have been largely correct. Farmers like the results. Furthermore, the technical research staff have welcomed the addition of an agricultural economist and the extension agronomist as a way of more systematically defining research priorities that reflect the constraints and areas of flexibility in the existing farming systems as well as of designing and testing improvements under farm conditions with farmer participation. The latter activity will further provide a much needed linkage with extension efforts such as the North West Province Agricultural Development Project in Sierra Leone.

Mopti, on the other hand, has yet to achieve this decentralized autonomy because of (i) staffing difficulties, (ii) lack of coordinated priorities in the national systems, and (iii) lack of independent funds that would give it some freedom of action when procurement from the WARDA center is inordinately delayed. These problems are only beginning to be addressed, perhaps because so much WARDA and USAID staff time was taken up with the complex arrangements for the elaborate perimeter and housing constructions put into Mopti. It is to be hoped that the logistical complications of the 15-20 minute commute between this housing and the research perimeters will not perpetuate any of these delays.

Linkages with the national rice development efforts (Operation Riz Mopti) appear limited and there is considerable skepticism about the improvements which are the focus of the research efforts to date. Unlike Rokupr, there is limited communication between the socioeconomic and the technical research components of the WARDA operations there.¹²

Even assuming that all the existing special projects can be made to function as effectively as Rokupr has functioned to date, it seems unlikely that, without complementary actions by WARDA or others, WARDA's impact will extend far beyond the periphery of the areas in which the special projects are located and perhaps closely similar ecosystems in other parts of the region (as for example,

¹² Although the irrigated rice special project at Richard Toll, Senegal, was briefly visited by the team (see Appendix D), it is not subject to evaluation here as it did not form part of the AID-funded project. Dr. Robert Chandler has twice evaluated the program there on behalf of the Canadians who have been supporting it until recently (see Appendix B). In addition to many useful administrative and methodological suggestions, which are equally relevant to the Mopti special project, Dr. Chandler questions the utility of some of the salt-tolerant varieties that succeed at Richard Toll for other irrigated sites in the West Africa region.

Guinea Bissau in the case of mangrove swamp rice). Even if farmer acceptance of improved practices for these types of rice cultures surpasses expectations, their impact on rice production outside Mali, Sierra Leone, and Guinea Bissau is likely to be limited. Capital limitations are likely to curtail the spread of large-scale irrigation schemes that might make use of the results of the work at Richard Toll (see Appendix C).

AID chose to support mangrove and deepwater/floating rice because they were considered small farmer cropping systems par excellence. However, there is a major difference between them. The former is more labor intensive. The latter, on the other hand, with minimal hydraulic and agronomic improvements, becomes, on account of its lower labor costs, more interesting for the urban-based absentee tenant. The more floating rice agriculture around Mopti is improved, the fewer small farmers are able to hang on to the land within the dikes. This appears to have been less true of more labor-intensive mangrove cultivation near Ziguinchor in Senegal and pump-irrigation activities around Niamey in Niger. AID, in fact, might have done more for small farmers (as well as small herders) by encouraging the development of more labor-intensive irrigated as opposed to the labor extensive floating rice systems, for as soon as risks in the latter systems are reduced and the profitability increased, then small farmers (or herders) cannot always compete for the land involved.

The questions of returns to research in floating vs. irrigated rice could also bear further investigation. But with so much staff time tied down in making construction arrangements for the Mopti station, this and other larger issues did not get the attention they deserved.

The proposed involvement (under the second phase AID/WARDA project, 698-0492) of WARDA with the Ivorian research organization and IRAT at Bouake may provide WARDA with a more substantive entry into the "core" research activities on upland rice, which is the major rice culture in the WARDA region in terms of acreage, production, and above all, number of farmers. We do not know at this stage how the proposed division of labor between IRAT and WARDA might function at Bouake; however, there appears, on paper at least, to be some compelling advantages to such cooperation. It will give WARDA an entry into work on upland rice of a more substantive nature than has been possible through the trials program. Without involvement in upland rice, WARDA's impact in terms of making significant progress toward self-sufficiency in rice production in the region is unlikely to be realized. Ivory Coast stands to be the principal beneficiary of the Bouake connection in terms of expanded research capacity with a technology assessment and transfer component which will operate in the Ivory Coast among Ivorian farmers. In addition, the scope of the work at Bouake on upland rice will be expanded to include work of relevance to the more humid, high rainfall upland rice areas such as Sierra Leone, Liberia and portions of Guinea and the Ivory Coast. It is likely that close

linkages with national research organizations in Liberia, and Sierra Leone in particular will be required to give substance to this expanded coverage of upland rice in Bouake. Existing WARDA connections can facilitate these linkages and indeed the linkages should answer concerns by national organizations in these countries (notably in Liberia) that WARDA has not done very much to assist rice production among the mass of the farmers there (who rely primarily on upland rice production).

E. Training Impacts (see also Appendix D)

WARDA efforts in training participants from member countries have had the most visible and widespread impact. Over 600 participants from member countries have gone through WARDA courses since 1973. The courses cover a variety of specializations including general rice production, research assistants, seed multiplication, rice milling project management, and water management. In some instances, particularly with smaller member states such as Guinea Bissau and the Gambia, the WARDA training program has had a major impact on the availability of national staff with specific skills to carry out rice research and development activities. At the same time, the multiplier effect whereby WARDA would be training the trainers who would then go back to their own countries to train people at the national level seems not to have taken place in most countries visited. There was use of former WARDA participants in seed multiplication courses as trainers in the case of Sierra Leone.

At the same time, the overwhelming majority of former trainees in the countries visited are currently working primarily or exclusively on rice. This is particularly true in countries where rice is of major importance in national rice research and development efforts. Former students and supervisors alike feel that the training has been quite valuable and that the quality of their work has improved as a consequence. However, some students feel that courses on specialized subjects such as seed multiplication are too short and concentrated unless one already has a reasonable foundation in the subject. There appears to be considerable unevenness in the qualifications of participants sent to the WARDA courses, undoubtedly related to differences in the size of the pool of potential participants within member countries. The location of the training center at Monrovia is also a problem since the area is not good for rice production and there are few farmers in the vicinity.

F. Project Design Impacts: Research-Extension Linkages

WARDA's project identification and definition service for donors is perhaps the association's fastest growing type of impact. WARDA's development department has been active in designing project frameworks through which outside resources can be invested in rice production in Guinea Bissau (USAID, Agricultural Development), Sierra Leone (FED, northwest province), Gambia (British Aid, McCarthy Island), Upper Volta (French Aid, Vallee du Kou), and

Senegal (World Bank, Lampsar). The technology assessment and transfer activities needed for more effective execution of this function are receiving support under the second phase of USAID's WARDA rice research and production project. The first phase of that project, under evaluation here, only indirectly supported this function. Nevertheless, that support can take some credit for its accelerating impact inasmuch as the training, Rokupr/Mopti facilities, and the Stanford Study each provided a basis for this development work.

Technology assessment and transfer activities are already in operation at Rokupr and appear to be functioning well. The soon-to-be launched North Western Agricultural Development Project will provide further scope for the utilization of both the technical and socioeconomic research results of the Rokupr station. Rokupr is likely, in effect, to serve as the adaptive research component of the mangrove swamp portion of that project. However, if Rokupr is a demonstration that the system can work, Mopti is a cautionary tale of its problems. Abstracting all the specifics of personality difference (although an integrated multidisciplinary approach does require a reasonably good synchronization of personalities), one still finds that Mopti demonstrates the problems that can arise from lack of coordination between the research and development branches of WARDA. Close coordination, even active collaboration between the socioeconomic and extension agronomist on the one hand and the technical scientists on the other, is required if the program is to have any reasonable chance of success.

G. Policy Impacts

WARDA and AID, both of which represent political entities, are as appreciative of the Stanford Rice Policy Study as they are skeptical about the implications of its conclusions. If support to rice production cannot be economically justified in most West African countries, it can be politically justified, and should be studied (now that the economics work is launched) with a methodology that can take these political variables into account.

The Stanford Study is an analysis of rice economics and policies in West Africa of high professional quality. The impact of the results is very limited in large part because most if not all of the parties involved--member countries, donor agencies, and research organizations, including WARDA--are reluctant or unwilling to accept the implications of the study, namely that West Africa is unlikely in the near term to make significant progress in achieving regional self-sufficiency and is probably ill advised in attempting it in most countries.

The somewhat pessimistic results of the Stanford Study notwithstanding, it is estimated that there are currently some 150 projects in West Africa in which rice is a primary or significant component. West African governments are generally committed to the concept of obtaining and preserving self-sufficiency in rice.

Government officials commonly reject the conclusion that their countries do not have a comparative advantage in rice production, particularly in those countries such as Liberia where the majority of farmers grow rice. Government support for rice production, including projects, import restrictions, price supports, and input subsidies, tends to exceed that for other staple foods.

Donor agencies supporting rice projects in West Africa agree in principle with the results of the Stanford Study, but continue to support such projects on the grounds that (i) recipient countries want them; (ii) rice development projects can reduce the negative net social profitability¹³ of rice production which will take place in any event; (iii) certain improved practices can free resources, namely labor and land, for more profitable activities while maintaining levels of rice production; (iv) rice production from a number of projects is primarily for consumption in the areas of production; (v) changes since the Stanford Study have favored rice production in certain areas (although not in others); and (vi) there is considerable room for improvement in production and processing efficiency utilizing readily available techniques, and research is likely to produce further improvements in the future.

Given the reactions of many government officials to comparative advantage arguments, it is not surprising that few major changes in West African rice policy have occurred. WARDA countries generally continue to provide some form of input subsidy to rice producers and use trade policy to restrict imports and raise the domestic market price of rice. Most governments set official producer prices for paddy and many also attempt to control retail prices, with varying degrees of success.

H. Networking Relations with Member States and Their Scientists

Despite the lack of progress in rice production, virtually all countries visited are supportive of WARDA. This appears true both with respect to officials in the Ministries of Agriculture (extension services) as well as the national agricultural research organizations. They see in WARDA a pool of expertise which is sympathetic and understanding of the problems and limitations of West African agricultural development institutions since most WARDA staff come out of this tradition. They feel that WARDA will be supportive of their viewpoints and perspectives in the context of discussions and interaction with external agencies (donor agencies and international agricultural research and development organizations) which in virtually all instances are dominated by non-West Africans. At the same time they are critical of WARDA on some counts, particularly of the fact that the staff of the research department of WARDA is concentrated at headquarters in Monrovia. They would prefer that the research staff and the subregional coordinators be more directly involved in rice research and development efforts at the national level.

¹³ See Appendix C.

By developing contacts and gaining considerable experience via its training program, WARDA has, in effect, been developing a network on various aspects of rice research and development within national organizations. Former WARDA trainees numbering over 400 fill a fair percentage of middle- and upper middle-level positions in national rice research and development programs. This is particularly true in the case of national seed multiplication programs. Although this group of former trainees is heterogenous in terms of levels, jobs, and type of training they received, they all know WARDA and perhaps have ideas as to how its services might be better utilized. As time goes on more and more senior people in national rice programs will come from the pool of WARDA trainees. This should facilitate better utilization of WARDA services by and direct communications among staff concerned with rice in different WARDA countries.

The existence of a growing WARDA network will reinforce the sympathetic and supportive attitudes which WARDA already enjoys among member governments. In most instances the evaluators listened to accounts by representatives of national organizations of how they felt WARDA was assisting national programs. Aside from specific WARDA contributions in the areas of training, research, and project development (the extent of which varied considerably by country and type of rice culture), national officials made it clear that they considered WARDA to be "on their side of the table" with reference to dealing with a formidable array of donor agencies, international agricultural research centers (IITA, IRAT, IRRI), and technical assistance agencies/consultancy firms. WARDA understands their problems, constraints, and objectives and at the same time represents a pool of expertise on various aspects of rice in the region. The activities of the development department to date have been particularly responsible for fostering this image. WARDA's ability to build on this goodwill and increase its impact on rice development in the region will depend on the extent to which all concerned (WARDA, member governments, and donors) recognize WARDA's areas of comparative advantage and encourage and enable WARDA to (i) focus in terms of staffing and activities upon those areas; (ii) achieve greater internal coherence administratively and technically in their activities, notably in the operational linkages among the training, research, development, and administrative departments, and among headquarters, subregional coordinators, and special projects; (iii) further evolve a collaborative mode of operation with national and international agencies concerned with rice development, in which growing recognition is given to WARDA's designated areas of comparative advantage; and (iv) channel donor support in ways that focus on, rather than distract from WARDA's chosen role.

III. CONCLUSIONS AND RECOMMENDATIONS

A. Spread too thin

WARDA's activities have had very limited impacts on rice production in the region. WARDA's mandate is very broad and its activities include a wide range of research, training, and development functions. The limited impact to date is due in part to factors beyond WARDA's control, namely the very heterogenous nature of rice production in the region which seriously complicates the process of designing improved practices which will have significant production effects. In addition, most countries in the region do not have a comparative advantage in rice production (see Appendix C). The geographic and functional diffusion of WARDA activities has seriously complicated administrative and management tasks. Donors and member governments have looked to WARDA to perform a variety of tasks which were not in their view being adequately handled by other agencies at the national, regional or international level. Thus WARDA's programs can be characterized more as filling in gaps rather than as a coherent set of activities that might be effectively performed by one institution.

Recommendation 1: WARDA member governments and donors should continue efforts to identify a coherent set of activities for WARDA which both have a prospect of significant impact on rice production in the region and reflect WARDA's areas of comparative advantage.¹⁴ These activities might include training; monitoring of trade, price movements, and policy developments concerned with rice and advising national governments on same; identification of promising (and unpromising) rice development areas, based on analysis of socioeconomic and technical factors; assistance to national programs in defining rice research priorities in terms of areas and types of research (possibly through utilization of a farming systems type approach); and selective participation in research activities as defined by the above activities. (Note: WARDA is either already engaged in most of the above activities or has made plans to be involved in them in the future.)

B. No Magic Variety

WARDA is serving as a major conduit for the distributions of varieties throughout the region, but this task has been performed somewhat mechanically. With a few exceptions, this has not resulted in the identification of new varieties which have subsequently proved to represent significant improvements over local varieties in the view of most producers (see Appendix D). Given the problems of identifying and developing suitable varieties for the numerous rice ecosystems in the region, there might be greater returns in working on agronomic practices in the short and medium term. Again, farming

¹⁴ See AID's 1982 "Rice Strategy for West Africe."

systems research approaches can be useful in identifying the potentially most effective research approaches on an area-by-area basis.

Recommendation 2: WARDA should consider reducing the current emphasis on varietal improvement and selectively place more emphasis on agronomic practices, as indicated by the results of farming systems research (TAT) investigations on an area-by-area basis.¹⁵ WARDA should assist national programs in developing farming systems research capacities.

C. Upland Rice Neglected, Though It Has the Greatest Potential

WARDA's potential impact on rice production in the region will necessarily remain very limited if it is not allowed to play a more active role in the improvement of upland rice production, the major rice culture of the region.

Recommendation 3: WARDA should become a full partner in work on upland rice production in a fashion that would complement, but not duplicate the activities on other agencies, notably national programs, IRAT and IITA. The program supported at Bouake under the current AID project represents an important positive step in this direction.

D. Special Projects Need Greater Administrative Independence

Among the special projects, the mangrove swamp rice research activities at Rokupr can be considered at least a qualified success, whereas the research on floating rice at Mopti in Mali has as yet failed to produce any significant results. The success of Rokupr is traceable at least in part to the following factors:

- Strong qualified project leadership with direct, in-country access to supplementary project funds;
- WARDA Research and Development department representatives who were either willing to or allowed to follow the supervisory guidance of the in-place project leader over that of their department chief in Monrovia;
- A national system with a specific set of appropriately defined research and extension priorities that were to be sought from the WARDA input to their station.

Recommendation 4: The first two of these preconditions for success could very easily be brought to bear on the Mopti Research Center:

- AID funds would be channeled directly through and monitored directly from USAID/Bamako;

¹⁵ This recommendation echoes that of the 1979 TAC/CGIAR 5 year review of WARDA. See Appendix B.

- A solution to getting a senior, interdisciplinary research supervisor out on the Mopti Station needs to be found. Perhaps if this individual were to be given more supervisory authority, the job would have had more appeal to the senior scientists who considered it. If less money were put into comfortable housing at Sevarse (a 15 minute commute from the research station when a vehicle is available) and more into travel, senior scientists could be placed at Mopti for short visits at relevant times of the year¹⁶;

- WARDA can do perhaps less than AID in improving the Malian national research and extension system. The unfortunate separation between research and extension administrations in that country has frustrated WARDA's attempts to do more on-farm trials. However, WARDA should be encouraged to set an alternative example in this respect rather than resign itself to an inadequate set of linkages operating in the national system.

E. Headquarters Scientists Too Remote From Field

The effectiveness and credibility of the senior scientists in the Research Department is reduced by the fact that they are grouped in Monrovia at the WARDA headquarters.

Recommendation 5: At least some of the senior scientists, particularly those responsible for the trials, should be physically located where they can participate in research themselves, presumably in close collaboration with one or more national programs. The Research Institute at Suakoko in Liberia is an obvious possibility. If it is difficult to get senior scientists to locate, with their families, in remote areas, then greater use should be made of their graduate students. Unlike subordinates in an administrative system, graduate students are under greater disciplinary pressure to reproduce the scientific standards of their supervisor.

F. High-Impact Opportunity for Training Follow-up Neglected

The training programs are generally useful in filling a need for specialized training in various aspects of rice production, processing, and research. The training has served to upgrade and increase the staff working on rice in the region. However, the impact of the training is reduced through (i) limited use of WARDA trainees in mounting courses at the national level (little training of the trainers); and (ii) limited follow-up with the extensive

¹⁶ Even so, an inadequate travel budget does not explain the infrequency of visits to Mopti by senior scientists from WARDA Headquarters. These same individuals did extensive traveling, particularly to conferences, during the life of the project.

network of former trainees, particularly of middle-level staff, to assist them in applying what they have learned or in using them to promote improved rice production and research practices throughout the region.

Recommendation 6: WARDA should maintain contact with former trainees, possibly through the regional coordinators and special projects, and where appropriate involve them in WARDA activities on an on-going basis. WARDA, AID, and member states should examine ways of using former WARDA trainees as trainers at the national level.

G. Constrained Access of Training Program to Rice Farms

The location of the training activities at the Fendel Center, away from the major rice-producing regions of Liberia, detracts from the quality of the training programs. Contacts with field conditions are limited, time consuming, and expensive.

Recommendation 7: The feasibility of moving the training activities to an important rice-producing region, possibly Suakoko,¹⁷ should be examined. It is appreciated that this may not be feasible because of cost considerations, and critical improvements to the Fendel Center such as the construction of a kitchen, which are vital to the on-going training programs, should not be held up as a consequence.

H. Potential for Further Policy Analysis

The Stanford/WARDA Study of Rice in West Africa is a high quality report which delineates, largely from an economic perspective, the prospects and problems with improving rice production in selected countries in the region. It appears that the Stanford Study has had very limited impact on either rice policies at the national level or the design of rice projects. The coverage of the Stanford Study is limited and the results may now be somewhat out of date.

Recommendation 8: WARDA should monitor price and policy developments in the region and thus continuously update as well as extend the coverage of the Stanford Study. The results of this effort should provide guidance for WARDA's own activities in research and development as well as be communicated to member states and donor agencies supporting rice projects in the region.

¹⁷ The rice farmers concentrated around Suakoko may not be typical of West Africa, but they are as typical as any other type of rice farmer there. Their mode of humid upland rice cultivation is as widespread as any other in West Africa. But for training purposes, their importance lies in the fact that they run functioning rice farms and, therefore, deal, everyday, with the full array of variables affecting rice production--some of which researchers neglect from time to time in formulating their protocol.

IV. LESSONS LEARNED

A. The Applicability of International Agricultural Research Models for West Africa

Although WARDA's mandate extends far beyond agricultural research, the models and accomplishments of the international agricultural research centers, notably IRRI, had a strong influence on the decision to create WARDA. WARDA's inclusion in the Consultative Group for International Agricultural Research (CGIAR) underscores this point, despite the existence of a considerable body of opinion that views WARDA as very different in several important ways from the other international centers.

Since 1970 when WARDA was created, there has been a growing appreciation of the difficulties involved in developing and disseminating improved packages of agricultural practices acceptable to farmers, particularly in West Africa which is characterized by a very heterogenous mixture of farming systems. The heavy emphasis on improved varieties, a cornerstone of the IRRI/CIMMYT "green revolution" models, was given prominence in WARDA's program, especially in the early years.

In retrospect this focus may have been particularly ill-suited for effectively and efficiently identifying means of improving rice production across the impressive range of rice types and micro-climates in the region. The experience of WARDA demonstrates anew that "improved" varieties designed for intensive, high-input systems often do not outperform local varieties under the more extensive, low-input conditions that characterize most rice farming in the region. The costs of developing improved varieties which are "fine tuned" to specific farming systems and microclimates may not compare favorably with the potential benefits. Improvement in agronomic practices, especially those aimed at easing seasonal labor bottlenecks, may offer far more promise of production increases in the short term than improved varieties.

A further aspect of the international agricultural research model is the prominence given to the commodity improvement program. Organization of research efforts along commodity lines involving many disciplines, but often heavily weighted toward technical and biological scientists, was viewed as the most efficient approach to developing improved packages. WARDA's existence reflects this belief and carries it considerably further by giving WARDA responsibility for the entire range of rice research and development activities in the region. This "vertical integration" of research and development activities for specific commodities has successful precedence in West Africa (notably with cotton and groundnuts).

Critics feel that the model becomes increasingly inappropriate as the heterogeneity of the farming systems involved increases and the number of farm enterprises increases within those systems.

Further, the commodity focus may be particularly limiting when dealing with farming systems where the target commodity is of only secondary or tertiary importance in the farming systems, as is true of perhaps most West African farmers growing rice. The relationships between rice production and other farm enterprises in terms of allocation of resources often become of critical importance in determining the acceptability of improved practices. The commodity focus appears most effective for farming systems where the target commodity is both dominant and sole cropped. The prospective significant impact of the Rokupr special project on rice production in the Scarries River area of Sierra Leone and in Guinea Bissau may be related to the fact that mangrove swamp rice cultivation is an extremely important component of the farming systems in these areas.

Finally, the commodity improvement programs of the international centers are assumed to be designing and promoting improved practices for specific commodities in systems and regions which have a comparative advantage in at least meeting their own needs for those commodities. WARDA was created similarly, with the assumption that West African countries, individually or at least collectively, had a comparative advantage in meeting their own rice requirements, if not by using traditional techniques, certainly with the improved techniques which would be developed and disseminated with the involvement of WARDA. The Stanford/WARDA Study has now cast serious doubt on the validity of this assumption, raising further questions about the ability of WARDA to make a significant impact on rice production in the future.

B. The Applicability of the WARDA Experience for Regional Research and Development Organizations in the Third World

WARDA's broad mandate has been a mixed blessing. On the one hand it has made WARDA the depository of a mixed assortment of activity programs somewhat vaguely connected (other than the fact that they all involve rice). WARDA was filling in voids between other programs at the national and international levels to the detriment of being able to develop a reasonable, cohesive set of activities which might provide a healthy focus for a single organization.

On the other hand, the breadth of WARDA's mandate has allowed it to progressively redefine its role, notably to considerably modify the international agricultural research model which represented one of its most important starting points and, in the process, to identify its strengths and weaknesses.

WARDA is moving away from being a somewhat mechanical conduit for coordinated and varietal trials and becoming more concerned with agronomic practices, socioeconomic factors and policy/macroeconomic issues affecting rice production. While WARDA has demonstrated that it can successfully mount agricultural research efforts involving the conventional range of activities as in the case of Rokupr, the

evaluation team is not convinced that WARDA's comparative advantage lies here. The factors which contributed to the success of Rokupr include (1) strength and continuity in leadership and staffing, (2) a high degree of local autonomy, (3) generally good relations with the national system, and (4) a focus on farming systems in which the target commodity (mangrove swamp rice) was dominant and generally sole cropped. If anything, other organizations such as international centers probably have the edge over WARDA in being able to attract and retain qualified staff, perhaps the most critical factor in explaining both the success of Rokupr (where British Aid recruited the research director directly) and the failure of Mopti (where WARDA was charged with hiring the technical assistance).

WARDA is effectively performing a useful training function in providing a series of specialized, non-degree courses on various aspects of rice production, research, and processing. This is a task which in most cases does not make sense on a regular basis at the national level (because of the numbers involved) and receives higher priority at WARDA than might be the case at an international center.

WARDA enjoys a special relationship with member countries, in part because many of its senior officers are drawn from these systems. WARDA represents a concentration or critical mass of skills drawn from several countries within and outside the region. The conditions of service at WARDA compare favorably with those found in most if not all of the member states. The drawing off of top people to work on rice at the regional level represents an important, if not the most important, cost to the member states. Since strong national agricultural research and development systems are critical to the impact of regional organizations such as WARDA as well as the international centers, one should take these "costs" into consideration in establishing regional research and development organizations.

At the same time, WARDA and comparable organizations are in a position to understand and influence the direction of policy, projects, and programs in ways which are not easily open to donor agencies and other international research centers. WARDA's broad mandate legitimizes the bringing of a full range of perspectives and considerations to bear in identifying, designing, and implementing rice research and production activities throughout the region. Its mandate is broader in that regard than either of the other centers or national institutions. The multiple perspectives can be utilized in defining the most promising foci of research and development activities geographically and functionally. WARDA's close relationships with member states enable it to translate the results into acceptable policies, programs, and projects.

The dilemma for WARDA in pursuing this course is twofold. First, member states, donor agencies, and other research and developing organizations operating at the regional level may continue to see WARDA basically as an organization which fills gaps

rather than one which identifies and pursues the most promising opportunities. Secondly, these same most promising opportunities to improve rice production in the region may be very geographically concentrated, thus implying that those concerned with regional self sufficiency might best focus their efforts on a few countries. Such a focus may be unacceptable to the majority of WARDA's member states.

A regional commodity research and development organization such as WARDA has a significant role to play to the extent that there is a pool of research results, which can with minor modifications be extended to farmers. In the case of rice in West Africa, some research results appear to be on target. However, as elaborated in Appendix D on the status of research on rice in the region, there are other areas, such as upland rice in general, where results are few and scattered and much basic work remains to be done.

Furthermore, a significant portion of the research plan may be off target--may have focused excessively on increasingly yields per acre thus rendering results of limited relevance in land surplus, labor scarcity situations, such as in the home of WARDA, Liberia.

If researchers must go back to the drawing board to a major degree (as WARDA seems to be suggesting they should by encouraging IITA and IRRI to make wide crosses), then it may be some years before significant results will be ready for extension to national programs. Thus the rationale for a WARDA-type organization in the short run is reduced.

C. The Suitability Of A Regional Organization With A Broad Mandate, Like WARDA, For Implementing A More Limited Set Of Agricultural Development Objectives To Which A Single Donor, Like AID, Might Want To Confine Its Limited Funds

Given the constraints and ambiguities, was AID making a strategic disposition of its funds in dealing with West Africa's rice problem by channeling them through WARDA? Possibly, reinforcing WARDA was the best way of stimulating rice production in the region. But the project purpose (see Appendix B) was to improve the quality of life of small rice farmers, particularly those dependent on mangrove or floating rice. As of now, the project cannot be said to have achieved its purpose, although important steps have been made in its direction, especially in the mangrove areas.

However, AID might not have gotten any closer to small rice farmers by funding research and extension activities in the countries where they are found. In fact, WARDA is beginning to show more flexibility in targeting its efforts on particular farming locales than are many of the national systems directly responsible for them. But WARDA can only go so far in this direction without bringing the national system along with it. Thus, AID cannot meet its project objectives through WARDA unless the latter can prepare the way at the national level.

This is something that, in the context of this project, WARDA has not been able or has not chosen to do. The receptivity of the Sierra Leone system to Rokupr research can be traced to its own strengths rather than WARDA's influence on it. Likewise, the indifference of the Malian system to the research (if not the construction) protocol at Mopti was unalterable.

Might AID have more strategically placed the weight of its own funds directly on these national systems? What would be lost by not passing through WARDA? These questions are answered throughout this evaluation. The key lesson, however, is that they are best asked and answered in the project identification and design documents rather than in subsequent evaluations.

APPENDIX A

EVALUATION METHODOLOGY AND TEAM ITINERARY

by

John Van Dusen Lewis

I. INTRODUCTION

The next appendix, Appendix B, reviews the reports resulting from a series of evaluation missions that descended on WARDA in one year, 1978. One of those evaluations (TAC/CGIAR) requested that donors coordinate these missions. It was felt that having each donor institution undertake its own review made it difficult for the West Africa Rice Development Association (WARDA) staff to get any work done. Another report (AID/WARDA) pointed out that in the future, WARDA might be best evaluated by measuring its impact on rice farming in the region rather than through another inspection of its research stations.

Nevertheless, donors have continued to pursue their relations with WARDA separately, and evaluators have spent more time looking at WARDA facilities than with rice farmers. AID, which was increasing its support to certain WARDA activities, was becoming increasingly concerned about this lack of coordination. A condition of the approval of the second phase AID/WARDA project (698-0429) was that a plan be developed for rationalizing (1) AID support to rice development in West Africa and (2) AID's relationship to the other donors supporting WARDA. This plan was well underway by the time the terms of reference for this impact evaluation were elaborated.

For AID to have pursued, on its own, yet another evaluation of WARDA would have contradicted the objectives of this rice strategy planning exercise. Therefore, the emphasis in this AID review is on impact; that is to say, the impact on WARDA's milieu, how WARDA might have changed that milieu, and how that milieu might have affected WARDA's pursuit of its and its supporters' objectives.

II. MEASURES OF IMPACT

One could list the intended impacts of agricultural research and development investments in the following order of priority:

1. Increased production
2. Increased food consumption
3. Increased farmer income
4. Increased rural welfare

5. Accelerated identification of suitable food production technologies
6. A more effective extension dialogue leading to the adoption of suitable technologies
7. A higher and more widely diffused level of consciousness of the proper technological and economic preconditions for the above
8. A reliable information network permitting an optimal rate of scientific interchange and administrative efficiency

Of course, we would have liked to measure WARDA's impact on priorities 1 to 4 above, but found that a concentration on levels 5 to 8 was more appropriate--not only to WARDA's achievements but also to WARDA's mandate. WARDA's impact was designed to be on national systems, which are then supposed to carry the impact to the farmer.

To the extent that they could be separated for evaluative purposes, the team was primarily concerned with those components of WARDA's program funded by AID: training and the two special projects at Rokupr and Mopti.

A. The Trainee Sample

Tracing the impacts of the training investments proved to be a useful way of monitoring WARDA's influence at impact levels 5 to 8. A questionnaire was developed by the team and the Training Department at WARDA headquarters and was administered to every former trainee who could be tracked down in the 10 countries visited. Such was the success and appropriateness of the training program that most of these former trainees proved easy to find. They were, for the most part, still working in the area of rice, and generally were responsible for related activities (see Appendix E).

B. Innovation Tracking

The special projects are sufficiently focused on agronomics that we felt we could trace technical packages emanating from these projects out into the farming milieu. Taking our lead from WARDA's own 5-year plan, we assumed that these packages could best be identified by the improved and selected variety constituting their centerpiece. What we found, however, was that a varietal innovation was rarely the key feature

of the most successful agronomic innovations of the special projects. That Rokupr was scientifically and administratively in a position to recognize this fact, against the conventional wisdom of WARDA's research department (with its emphasis on the W-1 coordinated trials), enabled it to pursue the identification of appropriate agronomic packages to successful conclusions. Inasmuch as it retained WARDA's overall interest in varietal solutions, Mopti missed some opportunities to have the same sort of agronomic impact on its milieu (see Appendix D).

To the extent that we used varieties as labels to track successful innovations, as suggested in the WARDA research literature, we were less able to identify real WARDA impacts than after our Rokupr visit, when we began to focus more directly on the dissemination of agronomic practices, inputs, and equipment. As noted throughout this evaluation, WARDA also missed some opportunities to facilitate innovations by cataloging and testing material and techniques from elsewhere before beginning to experiment with the local farming system in question.

III. FARMER REACTIONS

Given that WARDA's mandate leaves it once removed from direct contact with the farmers (national systems are responsible for on-farm trials as well as extension), we were surprised to find farmers as well informed about local WARDA research activities as they were. Local farmers appeared to be aware of new varieties and practices that did well on WARDA plots, whether or not the farmers had good (Sierra Leone) or tense (Liberia, Mali) relations with extension workers in the area. Thanks to the work of WARDA's development department representatives in Mopti, farmers are often better informed about WARDA research there than the Operation Riz extension workers in their villages. This evaluation team found that working through WARDA personnel, it was easier to have a frank and penetrating interview with groups of farmers than it often is when national personnel assigned to local projects are presiding.

IV. RICE ECONOMICS

Because the WARDA rice economics study of the Stanford Food Research Institute was funded through this project, we took the opportunity of evaluating it to update some of its key macro- and micro-economic determinations (see Appendix C). This involved a relatively thorough compilation of farm-level and national-level rice production and distribution data.

These data were sought at the project level, at the ministry level, at WARDA, and at the World Bank.

V. ITINERARY

In order to cover a significant number of WARDA countries and research sites, we tried to have no more than two of our members in the same place at the same time except, of course, at team meetings. The itinerary resulting from this approach is shown in Table A-1.

Table A-1. Evaluation Team Itinerary

Date	John Lewis, Team Leader	Elon Gilbert, Agricultural Administration Specialist	Bob Jackson, Rice Agronomist	Bill Scott, Agricultural Economist	Sid Bowers, Soil Agronomist
Oct 1	Monrovia, Liberia ¹	Monrovia, Liberia	Monrovia, Liberia		
Oct 2	Fendell, Liberia ²	Fendell, Liberia	Fendell, Liberia		Monrovia, Liberia
Oct 3	Monrovia, Liberia	Monrovia, Liberia	Monrovia, Liberia		Monrovia, Liberia
Oct 4	Abidjan, Ivory Coast ³	Monrovia, Liberia	Monrovia, Liberia		Abidjan, Ivory Coast
Oct 5	Abidjan, Ivory Coast	Monrovia, Liberia	Monrovia, Liberia	Bamako, Mali	Abidjan, Ivory Coast
Oct 6	Bamako, Mali ⁴	Suakoko, Liberia ⁵	Suakoko, Liberia	Bamako, Mali	Bamako, Mali
Oct 7	Segou, Mali ⁶	Suakoko, Liberia	Suakoko, Liberia	Segou, Mali	Mopti, Mali
Oct 8	Mopti, Mali ⁷	Monrovia, Liberia	Monrovia, Liberia	Mopti, Mali	Mopti, Mali
Oct 9	Mopti, Mali	Monrovia, Liberia	Monrovia, Liberia	Mopti, Mali	Mopti, Mali
Oct 10	Mopti, Mali	Monrovia, Liberia	Monrovia, Liberia	Mopti, Mali	Mopti, Mali
Oct 11	Mopti, Mali	Rokupr, Sierra Leone ⁸	Rokupr, Sierra Leone	Mopti, Mali	Bamako, Mali
Oct 12	Segou, Mali	Rokupr, Sierra Leone	Rokupr, Sierra Leone	Segou, Mali	Monrovia, Liberia
Oct 13	Bamako, Mali	Rokupr, Sierra Leone	Rokupr, Sierra Leone	Bamako, Mali	Monrovia, Liberia
Oct 14	Niamey, Niger ⁹	Freetown, Sierra Leone ¹⁰	Freetown, Sierra Leone	Niamey, Niger	Monrovia, Liberia
Oct 15	Niamey, Niger	Banjul, Gambia ¹¹	Banjul, Gambia	Niamey, Niger	Monrovia, Liberia
Oct 16	Niamey, Niger	Sapu, Gambia ¹²	Sapu, Gambia	Niamey, Niger	Monrovia, Liberia
Oct 17	Dakar, Senegal	Banjul, Gambia	Banjul, Gambia	Dakar, Senegal	Monrovia, Liberia
Oct 18	Ziguinchor, Senegal ¹³	Ziguinchor, Senegal	Ziguinchor, Senegal	Ziguinchor, Senegal	Monrovia, Liberia
Oct 19	Ziguinchor, Senegal	Ziguinchor, Senegal	Dakar, Senegal	Dakar, Senegal	Monrovia, Liberia
Oct 20	Dakar, Senegal ¹⁴	Dakar, Senegal	Richard Toll, Senegal ¹⁵	Richard Toll, Senegal	Monrovia, Liberia
Oct 21	Dakar, Senegal	Dakar, Senegal	Richard Toll, Senegal	Richard Toll, Senegal	Monrovia, Liberia
Oct 22	Dakar, Senegal	Dakar, Senegal	Dakar, Senegal	Dakar, Senegal	Monrovia, Liberia
Oct 23	Monrovia, Liberia	Monrovia, Liberia	Return	Return	Monrovia, Liberia
Oct 24	Monrovia, Liberia	Monrovia, Liberia			Monrovia, Liberia
Oct 25	Monrovia, Liberia	Abidjan, Ivory Coast			Monrovia, Liberia
Oct 26	Monrovia, Liberia	Abidjan, Ivory Coast			Monrovia, Liberia
Oct 27	Return	Abidjan, Ivory Coast			Monrovia, Liberia
Oct 28		Ouagadougou, Upper Volta ¹⁶			Monrovia, Liberia
Oct 29		Ouagadougou, Upper Volta			Monrovia, Liberia
Oct 30		Ouagadougou, Upper Volta			Monrovia, Liberia
Oct 31		Bobo-Julasso, Upper Volta ¹⁷			Monrovia, Liberia

¹WARDA Headquarters²WARDA Training Center³AID/REDSO/WA office⁴WARDA seed multiplication and quarantine center;
also, Liberian National Research Station⁵National Capital⁶Office du Niger, Operation Riz Headquarters⁷WARDA deepwater/floating rice special project⁸WARDA mangrove swamp rice special project⁹WARDA Regional Coordinator¹⁰National Capital¹¹WARDA Regional Coordinator¹²National Rice Research Station¹³Headquarters of AID-funded Casamance Rice Project¹⁴National Capital¹⁵WARDA Irrigation rice special project¹⁶National Capital¹⁷WARDA Regional Coordinator

APPENDIX B

THE PROJECT DOCUMENTS
AND PREVIOUS EVALUATIONS

by

John Van Dusen Lewis

I. 1968, THE USDA OVERVIEW

In 1968, as part of their July 28 agreement with the Council of the Entente Mutual Assistance and Guaranty Fund, AID fielded a U.S. Department of Agriculture (USDA) fact-finding team "to gather more comprehensive and up-to-date information than was previously available on the nature of obstacles inhibiting increased rice production and marketing in West Africa."¹ The study noted that for West African rice:

1. There were "ample areas well suited to. . .substantially improved. . .yields."
2. Though "not competitive on the world market" nor "with imported rice in most of West Africa," better production and marketing techniques "might give West Africa a comparative advantage. . .for its own needs."
3. Consumption, particularly in cities, is growing rapidly.
4. A "modest effort. . .to enable local production to compete in price and product acceptability with imported rice" was justified, based on sizable foreign exchange losses and "evident opportunities to apply proven technology."
5. Of these development actions, research, technical advisory services, training, and seed multiplication were particularly "amenable to regional approaches," and therefore
6. A "regional rice center should be established."

To this list, the USDA team adds that:

7. Obviously, the fundamental stimulus for increasing rice production must be the provision of an overall incentive to individual farmers that will bring forth the production volumes required by each country.

As this report was being written, members of concerned West African countries met in Monrovia in September 1968 and agreed to establish such a regional association. With Food and Agriculture Organization (FAO) assistance, a constitution was drafted and an interim advisory committee designated so that by

¹James Reese et al., Rice in West Africa, USDA/AID December 1968.

September 1970, a conference of plenipotentiaries, representing 11 West African states, met in Dakar and established the West African Rice Development Association (WARDA). The mandate for this organization, as stated in the agreed-upon constitution, corresponded quite closely with the first six of the above-listed USDA recommendations. However, no specific mention was made of the seventh listed USDA understanding as to the importance of small farmer incentives. While technological objectives received specific mention,² reference to any specific methods for resolving rice marketing problems was limited to the "promotion of storage and processing."

By September 23, 1971, AID had signed a grant agreement with WARDA providing \$500,000 for program support. Among the activities funded (training national staff, some equipment, furniture, and certain administrative expenses), the W-1 coordinated trials stood out. By July 1973, the Consultative Group on International Agricultural Research (CGIAR) had been advised by its Technical Advisory Committee (TAC) panel to assume re-

Previous Page Blank r these trials. Shortly thereafter, the number of donors providing targeted support to WARDA rose to seven. In May, AID had added \$125,000 for the provision of technicians and a Monrovia-based project manager. This last addition, along with the transfer of controller functions to Monrovia (June 1974), "considerably strengthened" project implementation.

II. AID'S 1973 ADMINISTRATIVE REVIEW OF WARDA

At the invitation of the WARDA Executive Secretary, a five-person AID evaluation team was fielded in September 1973. The stated purposes of this evaluation were almost totally opposite those of the present study. The intention then was to learn about WARDA's:

1. Proposed program
2. Institutional capability to use external (specifically AID) assistance
3. Funding for complementary support activities

²"Encouragement of production and use of varieties suited to conditions of the countries in West Africa and to existing and prospective demand; exploration, introduction and extension of rational production methods adapted to the conditions prevailing. . . , promotion and implementation of measures for effective phyto-sanitary controls."

4. Budgeting and accounting adequacy ("specifically to meet AID funding and accounting requirements"), and
5. Financial policies advising on changes that might "simplify grant-funding" in order to
6. "Provide an evaluation and a base from which AID may draw decisions on methods of assistance in the future."

This evaluation reported positively on almost all counts.³ A project design team was fielded a year later.

Before introducing the December 1974 Project Paper that thereby surfaced, we would like to pause and flag some of the pertinent observations made in this 1973 AID evaluation. These observations will be divided into two groups:

1. Those that were incorporated into the logical frameworks of the Project Paper and its amendment:
 - a. "With Project W-1 (co-ordinated trials), the member states can carry on a complete scope of adaptive research in rice at a very low cost."
 - b. "Projects W2, 3, and 4, (special research) propose to fill the gaps in rice research in West Africa utilizing existing member state land and buildings, as well as to provide specialized consultation to the co-operating stations in the W-1 network."
 - c. "The identification of purpose, effort and output is essential to donor agencies, because they must account to their sources for the grant funds. . . . To call on a second donor for supplementary assistance deprives the primary donor of alternative responses."
2. Those that were not incorporated into the Project Paper.
 - a. "WARDA. . . is unique because of its dependency upon a variety of donors, its focus on a specific commodity system, the scale of its international

³Lloyd E. Clyburn et al., October 1973, "A Review of the Organization, Administrative and Financial Management and Programs of the West Africa Rice Development Association," Monrovia, Liberia.

relationships and intercultural constraints. These add to needs for flexibility and special control devices in its management."

- b. "WARDA is well organized and managed. . . . Network planning, communications, personnel, budget, accounts and procurement are examples of processes being systemized and improved. WARDA should continue this approach while guarding against over-extending its program commitments and logistical requirements."
- c. "Soil and water management was a problem at one co-operating station as well as elsewhere in West Africa."

These evaluation findings are somewhat contradictory. If WARDA's research plan (1a, 1b) and organizational set-up (2a, 2b) as recommended in 1c, were consistent internally, then why must donor-funded subactivities also be consistent internally? Or why must separate donors fund designated subactivities for their own auditing convenience (1c), if the program and evaluation logic of the total operation (1a, 1b, 2a, 2b) is used to justify the support?

III. 1974, THE PROJECT PAPER

This contradiction is sustained, perhaps inevitably, in the project design for this project (#698-11-190-382). The Project Paper (3) states:

"The evaluation mission made a broad assessment of WARDA's institutional capability and program, within the context of AID assistance, and its conclusions were very favorable overall. However, the team's conclusions reinforced AID's interest in providing specific support to a project or activity rather than general budgetary support. The reasons were: 1) WARDA had established its basic institutional capacity and needed to move quickly into the more complex research and development activities needed to address West African rice problems. 2) AID preferred to support specific activities most directly related to its own small farmer oriented food production and income distribution priorities."

Thus, the logical framework for this project uses WARDA's goal and WARDA's purposes to justify an input-output sequence tailored to more recognizable AID verification procedures. It is

our finding here that this procedure, rather than giving the project the benefit of the organizational rationales of both the WARDA and the AID institutional frameworks, left the AID-funded activities too free of adequate scrutiny from either side. This is, perhaps, less true of the training activities than of the other AID-supported components, since they were more geographically central and had more participation from the dispersed corners of WARDA's network. Yet, when AID influenced the decision on the placement of the training center at Fendell near Monrovia, in the rubber belt far from the Liberian rice belt, it soon became clear that WARDA on its own might easily have recognized the advantages of having it at Suakoko, which is in the Liberian rice belt.

The AID project design goes on to echo WARDA's goal of increasing the quality and quantity of rice production in West Africa in order to approach regional self-sufficiency. Against this goal, AID listed five assumptions, with only the first three explicitly claimed by WARDA: (1) that WARDA would remain viable, (2) that modern technology acceptable to farmers in member states could be developed, and (3) that the weather would not be abnormally severe. AID goes on to claim that (4) West Africa has a comparative advantage in rice, and that (5) member countries will pursue price policies that offer incentives to farmers.⁴

However desirable these assumptions might have been, WARDA itself had not seen the need to make these claims nor to justify its programming decisions in terms of them. Yet AID was using these assumptions to justify programming decisions intended to dovetail with WARDA's. Were the resultant investments to be evaluated according to criteria that were not and could not be acknowledged by the body responsible for project implementation? Perhaps a more significant question is, Would AID have made these wide claims if it were inserting its project framework into an institutional framework with the same dimensions and scope? In that case, the claims might have had to fit the institution more closely.

One of the stated project purposes, the dissemination of high-yielding varieties and related cultural practices to West African farmers, also goes beyond WARDA's own claim. Such dissemination efforts depend on WARDA's impact on the national agricultural development systems, not on WARDA itself. AID, on

⁴This wishful thinking on price policy persists in the logical framework of the WARDA II Project Paper (1981), although WARDA still has to make such claims for its member countries. The previous assumption (No. 4), debunked by the Stanford FRI/WARDA study, has been dropped.

the other hand, is obliged to make the assumption, by no means justified, that most of these national systems are effective, whereas WARDA has only been claiming that it sought to make them more effective.

AID and WARDA share the other project purpose listed in the logical framework: the development of high-yielding varieties of specified rice types of regional priority. Therefore, they share the assumption that the W-1 coordinated trials will lead to the identification of these varieties. Robert Chandler, in his 1975 evaluation, expressed some reservations about how the coordinated trials were being handled. By the 1978 TAC 5-year review for the CGIAR, the International Institute of Tropical Agriculture (IITA) criticism of the trials' ecological appropriateness was becoming more generally accepted. While consumer preferences may be somewhat uniform across West Africa, varietal performance continued to vary widely between microecological settings in that region. Rarely was the same variety out-performing the others in more than one of these test settings.

Nevertheless, faulty claims for the coordinated trials need not have compromised the research activities that AID did finance (the Rokupr and, later, the Mopti research stations), since these were more geographically and ecologically specific. Yet as these investments were justified in the same terms as WARDA used to justify much of its overall research program (which featured the W-1 coordinated trials), the research stations were slow to define what turned out to be more appropriate: a microecologically focused research agenda.⁵

The input assumption of the 1974 Project Paper, namely that "technical experts are available and can be recruited on schedule at the funding levels indicated to serve at the selected research sites," is already legendary and has been sufficiently debated by the TAC and AID/WARDA evaluations of 1978. Perhaps WARDA let AID stipulate that the director of the Mopti station be a U.S. agronomist since it recognized that West African professionals in its own professional system might not see secondment to the Mopti as the best route to advancement. Either way, the Mopti station still does not have a permanent director. Had AID not insisted on an American scientist, WARDA might have been obliged to reorganize its professional advancement practices or use its headquarters professionals more actively for this outlying research effort.

⁵The WARDA II Project Paper (698-0429) maintains the consumer-oriented language of these two project purposes, but wisely reduces the impact assumptions to the mangrove (Rokupr) and floating rice (Mopti) microenvironments.

Perhaps, seen from inside WARDA as a separate AID-project activity with AID conditions riding on it, it did not get this sort of attention from headquarters.

IV. THE 1978 MOPTI AMENDMENT

The original Project Paper of December 1974 requested only \$1.45 million to carry the training and Rokupr activities through FY 79 and to do feasibility studies of the proposed Richard Toll irrigated rice and/or the Mopti deepwater/floating rice research efforts. By the time that these studies recommended \$2.461 million in support and extension of the project assistance completion date through FY 80 for the Mopti deepwater/floating rice research, the original Project Paper also had to be modified to add an extension training advisor for 3 years, to cover increased training center construction costs, to extend Rokupr operating costs, and to fund the Stanford rice economics study. Together, this brought the total project cost up to \$5,166,000. Added to the preproject AID support to WARDA, this brought the obligated total to \$6,737,000. All but \$358,000 of this was disbursed.

In light of what has already been said about AID setting its own priorities, it may seem curious that AID accepted WARDA's suggestion to support the deepwater/floating rice research when, at the same time, it was placing more African Bureau project funds into irrigated rice development. The most immediate beneficiaries of the floating rice research would be the farmers organized by the World Bank-funded Operation Riz Mopti project. At the same time, the most immediate beneficiaries of the Richard Toll-based irrigated rice research would be the AID-funded perimeters being constructed, planned, and programmed along the Senegal River.⁶

The Project Paper amendment, leading to the authorization of funds (\$2,461,000) for the Mopti activity, justified AID

⁶The level of AID's support to mangrove rice farming in the Casamance seemed to be in better synchronization with their targeted support to the Rokupr mangrove rice research. However, Rokupr findings, which have met with success in Gambia and have implicated almost every rice farm in Guinea-Bissau (thanks to WARDA), have yet to receive extensive testing in the Casamance. We have been told both that the soil is too acidic and too saline for the Rokupr varieties that work in Guinea-Bissau to the south and Gambia to the north. But, we were not able to ascertain to what extent these varieties had actually been tested in the Casamance.

emphasis on deepwater/floating rice research in the same terms as the mangrove rice research was given priority: like mangrove, it is a "rice-type of regional priority which has previously received only diffused and sporadic research attention." We are not told why.

The technical analysis in that amendment concludes that deepwater/floating rice has production potential that will respond to input-outputs that have good prospects for dissemination: "There is no reason to believe that significant increases in floating/deepwater yields cannot be made if sufficient emphasis with scientists and resources is given."

We are not told why organizations like the International Rice Research Institute (IRRI) and IITA have delayed giving it such an emphasis, or why IRAT had withdrawn its emphasis in Mopti itself. The fact that the returns to research in arid land deepwater/floating rice are, perhaps, less than those to research on rice under stabler water conditions may not be unrelated to the fact that deepwater/floating rice is a small farmer crop par excellence. The project analysis recognizes no possible contradictions between single crop, yield-oriented research and the development constraints on this small-farming cropping system. The project analysis states: "Research work has been carried out in several countries on deepwater/floating rice but in every case it has received secondary emphasis and resources. As a result only modest gains have resulted" (p. 29).

Could some of the causality here have also moved in the opposite direction? Had "modest gains" not also led to a "secondary emphasis"? It would have been interesting to know what IRAT's determination had been.

The "project issues" raised in this amendment were pre-scient:

- "1. Scientific leadership and staffing at the Mopti North Station;
2. Means for translating research into production benefits."

Again we find little echo of WARDA's stated organizational objectives in assumptions underlying the project analysis:

- "'Outreach' activities undertaken at Mopti represent only the initial step required to disseminate improved rice varieties and practices to farmers" (p. 16);
- "All scientific disciplines will be integrated at Mopti into a research team approach." (p. 23)

For whatever reason, WARDA itself has never taken this position. Mopti findings, whether in research, development, or extension, were to be processed through the heads of each department in Monrovia before follow-up activities could be specified.

V. MEANS OF VERIFICATION

A cumbersome administrative process is the result. If AID did not want it to happen this way, as their stated objectives in the Project Paper would seem to imply, then more specific end-of-project accomplishments should have been specified as a means of verification. At the time of the original Project Paper review, AID/PPC requested that a more specific evaluation plan be agreed upon prior to the first disbursement. However, it proved difficult to proceed from the project's means of verification to such a plan. The objectively verifiable indicators were set in the following form: "Varieties and practices developed at Mopti and Rokupr are being field tested and demonstrated by cooperating national agencies" (p. 16).

This sort of indicator sets the burden of WARDA's impact as much on the thrust of their administrative relations with the national research and extension systems as it does with the quality of their research results, for nowhere has the latter, on its own, led to a diffusion of optional technologies. Under the circumstances, WARDA had no choice but to give equal attention to both sides of this process. Where and why this was done in a mutually reinforcing fashion, and where and why it was done in a mutually debilitating fashion, is explored throughout the report.

The project design, perhaps more than WARDA's own operational structure, was somewhat naive about the scientific responsibility of national systems. Charged with influencing these national systems, WARDA's own scientific standards had to take a back seat from time to time. Under these circumstances, the recruitment of scientists who saw their future beyond the limits of these national systems inevitably was going to be problematic.

VI. PREVIOUS EVALUATIONS

The West African Rice Development Association (WARDA) was evaluated three times in 1978: by an AID-led team in April, by the United Nations (UNDP/FAO) in July, and by the Consultative Group on International Agricultural Research/Technical Advisory Council (CGIAR/TAC) in December. None of these evaluations was

primarily focused, as is this one, on the AID-supported project as a separate structure. None of them made an attempt to measure results according to criteria resembling the objectively verifiable indicators listed in AID's Project Paper. Yet each of them was seen as perceptive, responsive, and helpful to WARDA. They each looked at the AID-supported elements of WARDA's program, but in terms of its relationship to that program, not in terms of its internal consistency as an AID project.

The main section of this report reviewed the manner in which AID justified the form and content of its support to WARDA; this appendix supplies further details on the results of that support and uses these other evaluations for an independent perspective on that support. Having looked at how AID rationalized a project out of these disparate elements, we will now review how these elements looked, through the implementation period, to evaluators more concerned with the internal consistency of the total WARDA program.

Finally, one of the most important tasks left to subsequent evaluations is the explanation of why certain earlier evaluation recommendations were followed and others were not. Therefore, a review of these earlier findings must accompany our own analysis.

VII. DR. CHANDLER'S CONCERNS, 1975

Several recommendations that continue to reappear in WARDA evaluations were first raised (to our knowledge) by Robert F. Chandler Jr., former director of the International Rice Research Institute (IRRI), in a short "Interim Report on Rice Research and Development Activities in West Africa, with particular reference to WARDA's program," written in 1975 for the Canadian IDRC.

First he laments, as we have, the administrative centralization of WARDA, particularly as it keeps scientists from the field:

The research program certainly is in better shape than it was two years ago. To my mind, it nevertheless suffers from the fact that the work is administered entirely from Monrovia, where the research coordinator, the agronomists, and others involved in the program reside. They are unable to visit the coordinated trials and other special research projects often enough to control the quality of the work. The research coordinator seems to be hampered by excessive administrative and office work and is

unable to visit the cooperating national experiment stations even once a year.... I have not yet seen a good research program administered from a central urban office unless capable scientists were stationed at the locations where the field and laboratory work was taking place. (p. 6)

It was 5 years before WARDA established the subregional coordinators recommended by Dr. Chandler in this report. The research staff remaining in Monrovia is still said to be too isolated from the rice trials. At the time of Dr. Chandler's observations in 1975, the AID project sought to avoid this difficulty by concentrating on the special projects and the training activities; all were removed, if ever so slightly in the case of the training center, from Monrovia headquarters.

Dr. Chandler found USAID/Liberia, then preparing to fund the Mopti deepwater/floating rice research station, equally concerned about the difficulties of directing this research from Monrovia. Unfortunately, in their discussions, insufficient distinction seems to have been made between administrative and scientific direction. Instead of attempting, unsuccessfully, to persuade a senior scientist to reside in Mopti, AID might have used its own country mission structure to facilitate an administrative decentralization of WARDA functions. With administrative tasks moved out of the Monrovia headquarters, the scientists there might have been better able to get away and visit the rice trials.

A second concern of Dr. Chandler's, the trial-to-farmer link, has received explicit attention in the follow-on project (WARDA II) to the one under evaluation here.

The largest gap I noted in West African agriculture was that existing between the results obtained at research stations and the practices being followed by farmers. When I suggested that WARDA try to bridge this gap by conducting applied research trials on farmer's fields, I was told that that was the responsibility of the national governments concerned. Theoretically, that is true for every activity of international organizations with programs in any country in the world. Practically, however, there is a better way. (p. 10)

For purposes of evaluating the first phase of AID's support to WARDA, the rate of field-trial use turned out to be a good indication of the degree to which adaptable agronomic packages were being worked on. Since it may be too early to expect many WARDA-developed packages to be adopted, in spite of the claims of the Project Paper's logical framework, the rate at which they are being tried out in farmer's fields could be

taken as an indication of their potential for such adoption. It was our finding that most national systems will pursue field trials if the material from the WARDA station shows any signs of proving itself.

Nevertheless, it is also true that the division of labor between WARDA and the national systems lies at the crux of the overall effort. As often as the quality of WARDA's work is constrained by it, as in the case of field trials cited by Dr. Chandler, WARDA's deference to these national systems has also facilitated the dissemination of high quality research findings. Because it is a West African organization, WARDA may have an important comparative advantage here vis-a-vis other international centers.

VIII. THE AID/WARDA EVALUATION OF 1978⁷

The recommendations of this evaluation and the follow-up are presented in tabular form in Table H-1, which follows. The recommendations reveal which implementation problems AID was sensitive to and, by omission, those that they ignored. The results of those recommendations, as sought in this evaluation (middle column), reveal the extent to which WARDA and the AID project were able to respond. An explanation for the nature of that response fills the appropriate box in the right column.

The more general recommendations made in this evaluation report could only be adopted, if at all, in the design of the second phase AID/WARDA project, now in its first year of implementation and not under review here.

IX. THE 1978 UNDP/FAO/WARDA REVIEW MISSION⁸

Since WARDA is neither a financing institution nor an executing agency of rice projects, it is impossible to make a direct or precise evaluation of its impact on rice development.... The mission was informed by the Executive Secretary that at the suggestion of a

⁷Robert Adams, Dunstan Spencer, Van Henderson, and Jerry St. Andre, April 1978, "An Evaluation of the West African Rice Development Association."

⁸Kurt Jansson, W. D. McCourtie, and Hadj Oumar Toure, 1978, "Report of the Joint UNDP/FAO/WARDA mission on project RAF 75/027: Assistance to the West Africa Rice Development Association."

Table B-1. Summary of 1978 AID Evaluation Effort

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
I. Training Center		
A. "Training in extension and communication skills be improved and emphasized in the six month Rice Specialist course and its attendant two week presentation to local agricultural extension agents."	This has been done as stated: as a skills-development exercise. No joint problem-solving efforts among researcher, extension agent, and farmer have been programmed.	Insofar as this constitutes a curriculum adjustment, the change could be effected by the training department alone. A problem-solving dialogue, which would require coordination between WARDA departments and some national systems, has not been sought as a training device.
B. "Adequate athletic equipment and radios be made available to the Center for use by the trainees."	Not a priority item for scarce funds. Certain trainees would use the allowance to acquire radios to take home even if they were more available at the Center.	Trainees interviewed did not cite Fendell's entertainment disadvantages as one of its major drawbacks.
C. "Transportation to and from Monrovia City be arranged on a regular basis for trainees, particularly those attending the six month Rice Specialist course."	When the buses were working, this was done.	Trainees interviewed did not rate Fendell's proximity to Monrovia as justifiable compensation for its being so distant from the bulk of Liberia's rice farmers.
D. "Advance translation of course materials be completed prior to commencement of course work, insofar as this is possible."	An extra translator was hired and this has been attempted; however, French-speaking students still find themselves at a disadvantage.	Needed changes internal to the training department; once identified, can be made rapidly and effectively, funds permitting.
E. "Another translator be hired to prepare written translations while the present language staff concentrates on improving their simultaneous translation."	As simultaneous translators learn the technical terminology, improvements have been noted.	Relatively attractive salaries have impeded translator staff turnover.

Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
F. "Followup studies of Center graduates become a regular part of Center programming."	We were told that our evaluation's questionnaire survey was the first effort of this kind.	It is difficult for the Training Department to ask Research Department personnel to check in with former trainees during their travels. WARDA's administrative reward system would have to be changed before this sort of interdepartmental cooperation could be expected.
G. "That the Center publish a regular newsletter for distribution to former trainees."	Planned, but not published yet.	Eagerly awaited by former trainees.
H. "The Center's kitchen and dining facilities be expanded and improved as soon as possible."	Has been attempted within the funding limitations, the latter having been alleviated under the WARDA II project.	
I. "The Center's library be expanded to include a wider selection of relevant material."	Plans for addressing this gap have not been produced as rapidly as were those for the expanded kitchen.	Headquarters holdings, under the Communications Department, are seen as superseding the need for a quality library at the Training Center. Trainers interviewed, however, noted that in spite of Fendell's proximity to Monrovia, it was difficult to get to headquarters Documentation Center during office hours.

Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
<u>II. Deepwater/Floating Rice Research Station, Mopti, Mali</u>		
A. "Efforts to find a Research Director be intensified to the extent necessary to accomplish the task."	A qualified rice agronomist has yet to accept the job.	Regular supervisory visits of senior personnel to more tightly accountable on-station junior personnel might have been a more fruitful focus of the recruitment efforts. However, WARDA does not seem to have challenged AID's insistence on a resident senior scientist, concentrating instead on construction and laboratory procurement.
B. "If efforts fail to obtain a qualified Director (either U.S. citizen or a WARDA member state) by June of this year, we recommend that the stipulation requiring an American or WARDA member Director be waived."	This stipulation has been waived, but recruitment problems persist.	Same as above.
C. "The authority be given to CDO/Bamako to execute construction contracts during the period the Station is under construction."	Too little too late.	If USAID/Mali had issued the funds directly to a WARDA/Bamako representative, without authorizations having to be obtained from Monrovia at so many junctures, costly delays could have been avoided.

Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
D. "Research efforts at the Mopti Station be adaptive and relevant, and that the suggested research program detailed in this report be given consideration."	Appendix E gives details on what is still missing before the Mopti research program could be considered "adaptive and relevant."	Lack of communication between WARDA's Research and Development Department representatives in Mopti, dictated by each of their chains of command leading back to headquarters, frustrated each in dealing with the Operation Rice Mopti Project, the latter having its own problems with farmers (particularly with regard to land-tenure issues).
E. "The extension position at Mopti be strengthened through additional extension training in methodology and local languages while adaptive research is being developed."	Though this position was only temporarily filled, the farm-level research of the Development Department continues to gain a good grasp of local extension needs.	Because of WARDA's vertical scientific organization, these farm-level research findings of the Development Department have not influenced the field trial objectives set, in Monrovia, for the work of the research department in Mopti.
F. "All equipment ordered by Mopti be necessary and relevant to adaptive research."	Not all of the equipment already procured is being utilized. Appendix E questions whether all of it was necessary.	Time, not to mention money, procuring some of this equipment might have been better spent learning the needs and potentials of the target farming system. But this time and money belonged to the Research Department rather than the Development Department, to which such reconnaissance would have been assigned, the Development Department had yet to arrive at Mopti. Before WARDA II, the AID funds were exclusively for the Research Department.

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Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
G. "Delineation of authority and responsibility between the Research Director and Assistant Research Director be made clear and concise."	Even if a Research Director were recruited, delineations between him/her and the Monrovia Research Director require more urgent clarification and modification.	Part of the problem with staff coordination at Mopti has to do with their attentiveness to a reward system emanating from Monrovia, rather than from their own success as a team.
H. "Polder construction start immediately without undue delay so as not to risk losing another year."	The fourth polder was not complete by the end of another year and the rains had returned. The heavy equipment had to be evacuated, therefore, before completion, only to be brought back at much greater expense.	Several delays could have been avoided if USAID/Mali and WARDA/Bamako had had more independence from USAID/Liberia and WARDA/Monrovia, respectively, to decide and act.
I. "Special efforts be made by WARDA to use whatever personnel are necessary to backstop the Mopti operation while the post of Research Director is vacant."	These have been insufficient.	There appear to be more professional rewards to be had from attending conferences than from supervising remote research sites.
J. "Coordination of efforts between CDO/Bamako, USAID/Monrovia, and WARDA be streamlined so as to eliminate unnecessary duplication and confusion."	Although some improvements have been made, this basically remains to be achieved.	A first step in this direction, from AID's point of view, would be a shift in administering the AID-Mopti funds from USAID/Mali. Until this is proposed, WARDA/Monrovia will still remain administratively over-involved with day-to-day matters at Mopti.

Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
<p>K. "The Assistant Research Director be recruited from one of the WARDA member states and that he/she ultimately replace the expatriate Director (if a U.S. or Third Country citizen is selected for the position)."</p>	<p>This recruitment has taken place.</p>	<p>Before this Assistant Director is confirmed as Director, his relationships with his supervisors should be freed of administrative matters so that long overdue scientific supervision can be brought to bear on his work.</p>
<p>L. "The WARDA Sub-Regional Coordinator in charge of overseeing operations in Mali should involve himself with the Mopti project under the direction of the Special Projects Coordinator, presently Dr. Brown Enyi."</p>	<p>The Sub-Regional Coordinator in Bobo-Dioulasso has not become sufficiently involved, but the only other country besides Mali that might be interested in floating rice, Niger, is out of his jurisdiction.</p>	<p>Mopti's supervisory needs are greater than even the best Sub-Regional Coordinator could fulfill. The Sub-Regional Coordinator's role appears to be better designed for guiding the coordinated trials rather than the special projects.</p>

Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
<p>III. Mangrove Swamp Rice Research Station, Rokupr, Sierra Leone</p>		
<p>A. "Planned housing construction be undertaken expeditiously."</p>	<p>Implemented.</p>	<p>Construction investments almost always appear to receive priority attention from WARDA and its member states.</p>
<p>B. "The Station's water system be brought up to acceptable levels of efficiency as quickly as possible."</p>	<p>Implemented.</p>	<p>Construction investments almost always appear to receive priority attention from WARDA and its member states.</p>
<p>C. "Allowance be made for advanced training for research assistants to prepare them for more responsible positions."</p>	<p>Implemented.</p>	<p>WARDA junior staff have been able to take adequate, if not total, advantage of the advanced training opportunities available to it under the project.</p>
<p>D. "Research findings of the station in the course of its activities be shared with the Training Center in Liberia."</p>		<p>Cases of problem-solving for adaptive research are integrated into a technical skills-oriented curriculum with difficulty. Skills training assumes that the problems are known, whereas adaptive research must first identify the problem.</p>
<p>E. "Station staff be made available insofar as it is possible without unduly disrupting station activities."</p>		<p>Cases of problem-solving for adaptive research are integrated into a technical skills-oriented curriculum with difficulty. Skills training assumes that the problems are known, whereas adaptive research must first identify the problem.</p>

Table B-1. Summary of 1978 AID Evaluation Effort (cont.)

1978 AID Evaluation Recommendations	Adjustments Made, 1978-1981	Explanations for the Nature of the Change (if any) or of the Lack of Change (if none)
F. "The Training Center be encouraged to regularly expose its trainees to the Rokupr Station's activities."		Cases of problem-solving for adaptive research are integrated into a technical skills oriented curriculum with difficulty. Skills training assumes that the problems are known, whereas adaptive research must first identify the problem.
G. "The experience gained by the station be taken into account when planning for other research stations."	Mopti was already planned by the time this recommendation was made.	We hope this evaluation will lead to some application of the lessons of Rokupr success to the resolution of constraints at Mopti.
H. "The station should continue and increase its emphasis on field trials and other practical research applications in other WARDA member states that are also concerned with mangrove rice production."	True for Gambia and Guinea Bissau. Not true for Casamance, Senegal.	Either the soil of all of the Casamance is significantly more acidic, as ISRA claimed, or ISRA's heavy, AID-funded agenda at Djibelor leaves too little staff time for experimentation with Rokupr results. However, less experienced staff at Caboxanque, Guinea-Bissau, have made important strides with Rokupr recommendations and material.
I. "A socioeconomic and economic survey of mangrove-swamp rice farmers be undertaken to identify potential constraints to adoption of improved technology and practices."	This has begun at Mopti as well, with UNDP funding initially and AID funding under the WARDA II project.	Had some of this socioeconomic survey work preceded the early buildup of research infrastructure, at Mopti in particular, many unnecessary trials could have been avoided.

recent USAID mission, a methodology for a systematic evaluation of WARDA impact on rice production will be worked out for future use (p. 12).

This suggestion of the 1978 USAID evaluation mission, not listed on the above table but still planned particularly as part of WARDA II, has yet to be realized, perhaps for the reasons quoted in the first statement above. Like our own effort, the UNDP/FAO/WARDA review of 1978 found itself looking far upstream at administrative constraints in order to assess WARDA's ultimate potential for having an impact on rice production. As we did, this review notes the confusion brought on by WARDA's "pathwork" of funding sources:

...bilateral and multilateral donors have different policies, practices and time frames for their aid. This entails a patchwork of projects and funding sources and a dependence on the particular preferences of each donor for one or another aspect of WARDA's work. (p. 20)

It is not certain that the 5-year planning exercise, which by that time was underway, has been able to overcome all of the "difficulties of longer-term planning resulting from the many sources of funding."

As we also did, this review noted some problems of interdisciplinary coordination and cooperation:

Another weakness is the lack of field staff for development and extension work.... The question of their location in relation to the present subregional structure of the research department needs to be studied....As a general observation, the mission sees a need for greater integration of research training and development activities at WARDA's headquarters and at country level (p. 23-24).

It is significant that this evaluation of UNDP/FAO support, almost exclusively at headquarters, should find the same organizational constraints on success as have this and the previous (1978) AID evaluations, even though these latter are primarily concerned with the AID-supported inputs which, before WARDA II, were mostly directed away from headquarters to the subprojects. Much of CGIAR support to WARDA was even more dispersed (the W-1 coordinated trials), yet the findings of their 5-year TAC review picked up some of these same themes.

X. THE 1978 TAC QUINQUENNIAL REVIEW MISSION

As summarized in the cover letter to their report,⁹ the recommendations of CGIAR/TAC carry a steady appeal for decentralization of administrative control in the interests of better scientific coordination between disciplines:

The results of the coordinated variety trials soon revealed that, generally, introduced strains and varieties of rice proved inferior in yield to local varieties which had long histories of rice improvement programs...The necessity of undertaking vigorous rice improvement programs in situ under different ecological conditions became compelling and the relative importance of rice improvement and multidisciplinary research conducted at the subregional centres or Special Research projects progressively increased.

The panel heavily underlined the importance of research in the Special Research projects or subregional centres and recommended their strengthening and inclusion of at least the team leader of each centre in the core budget. The Panel also recommended the consolidation of the number of the coordinated trials at their present level with the view of gradual devolution of full implementation responsibilities to the national systems. It is foreseen that the CGIAR support in the future will gradually shift towards strengthening the subregional research centres. This will meet a greatly felt need and will also conform more closely to CGIAR practice with regard to other IARCS.

The TAC review provides a wealth of detail to support this statement and, to judge from AID's WARDA II Project Paper, donors besides the CGIAR have begun to respond to this call for greater integration of disciplines on-site with great attention being paid to the extension and economic dimensions of the research objectives. However, to judge from WARDA's own 5-year plan submitted to donors in Rome in April 1981, different departments have responded with differing degrees of enthusiasm to the spirit of these recommendations. The plan of the Development Department appears to hold up its end of the called-for integration, while the plan of the Research Department does not.

⁹Hussein Idris, R. Chabrolin, V. Ruttan, S. Risopoulos, and J. Coulter, 1979 "Report of the TAC Quinquennial Review Mission to the West Africa Rice Development Association," TAC Secretariat, Food and Agriculture Organization of the United Nations, Rome.

APPENDIX C

IMPACT OF THE WARDA/STANFORD RICE ECONOMICS STUDY

by

William Scott

I. INTRODUCTION

Much of the progress, or lack thereof, in the development of rice production in West Africa is dependent on a range of economic and policy issues that are largely outside West African Rice Development Association's (WARDA) control. Existing technologies, together with foreseeable improvements, may not provide all member countries with domestic rice production that can economically compete with imports. Yet, most WARDA countries explicitly or implicitly seek self-sufficiency in rice. In order to encourage domestic production, these countries use various measures to improve the private profitability of rice production, including input subsidies, price supports, and import controls. To better understand the economic impact of these measures, the Development Department of WARDA and the Stanford Food Research Institute collaborated on a study of rice economics and policies in a selection of member countries (Coast, Mali, Liberia, and Sierra Leone). The study examines the private and social profitability of different types of rice production (upland, swamp, mangrove, irrigated, floating) under traditional and improved management systems and discusses the factors responsible for the differences between the profitability calculations.¹

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This appendix begins with a brief overview of rice in West Africa and a review of the major conclusions of the Stanford/WARDA study (hereafter referred to as the Stanford study). The next section examines current rice development efforts in the region and the extent to which their underlying assumptions differ from those of the Stanford study. The final sections contain observations on the implications of the Stanford study and current trends in rice policies and development programs as they affect the role of WARDA in the current decade.

II. RICE CULTIVATION IN THE WARDA REGION--A BRIEF OVERVIEW

The cultivation of rice in West Africa is not a new phenomenon. The indigenous African rice, Oryza glaberrina, is thought to have been cultivated some 3,500 years ago in the Niger and Senegal-Gambia river basins. Oryza sativa, Asian rice, was probably introduced into Senegal, Guinea-Bissau, and Sierra Leone about 1500 A.D. Both varieties are grown today,

¹Pearson, Scott R., Dirck J. Stryker, Charles Humphreys, et al., Rice in West Africa: Policy and Economics (Stanford University Press, 1981).

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with rice the dominant staple in Sierra Leone, Liberia, Gambia, Guinea-Bissau, and parts of Guinea and the Ivory Coast.

WARDA estimates that there are some 2.3 million hectares of rice under various types of cultivation in member countries. Some 65 percent of the rice grown in the WARDA region is upland rice (see Figure C-1 and Table C-1). Only 2 percent of the rice is grown under irrigated conditions with full water control, with another 3 percent under partial water control. This compares to a world figure of 44 percent of the total rice area under irrigation, according to the 1978 edition of the International Rice Research Institute's (IRRI) World Rice Statistics. The area under rice cultivation has grown in the WARDA region from 1.5 million hectares in 1960 at an average annual rate of 2.1 percent. Average WARDA yields have grown from 1,044 kg/ha in 1960 to some 1,254 kg/ha in the seventies, an annual average increase of 0.9 percent. Average yield figures for the WARDA region remain well below the world average of 2,376 kg/ha (see Table C-2).

Total paddy production in the WARDA region from 1975 to 1979 averaged 2.8 million metric tons annually. According to Food and Agriculture Organization (FAO) figures, this represented about 0.75 percent of the paddy production throughout the world, and 35 percent of the African production. Production has increased in the WARDA region at an average annual rate of 2.9 percent since 1960. Most of the increased production has probably come about through an increase in cultivated hectareage rather than through yield increases. Production varies considerably from one year to the next, since much of the rice is upland and particularly vulnerable to the vagaries of weather (see Table C-3).

Consumption of rice in the WARDA countries increased from an average of 1.18 million tons annually in the early sixties to an average 2.32 million tons in the late seventies, a growth rate of 3.8 percent annually (see Table C-4). The growth in demand can largely be attributed to a growing population and rising incomes in urban areas where rice is often a preferred staple. Annual per capita consumption of rice varies widely in the region, ranging from 122.4 kg in Sierra Leone to 4.0 kg in Nigeria in 1978 (see Table C-5).

Demand for rice has grown more rapidly than domestic supplies in WARDA countries, and governments have had to rely on imports to fill the gap. Imports have generally increased in the region, although some countries have occasionally been able to export small quantities of rice (see Table C-6). Increasing rice imports have, of course, meant rising expenditures of scarce foreign exchange. The value of net rice imports into WARDA countries reached \$542 million in 1978, declining to \$375 million in 1979. According to FAO figures for 1979, the value

Figure C-1. Map of West Africa Detailing Categories of Rice Cultivation and Areas Covered

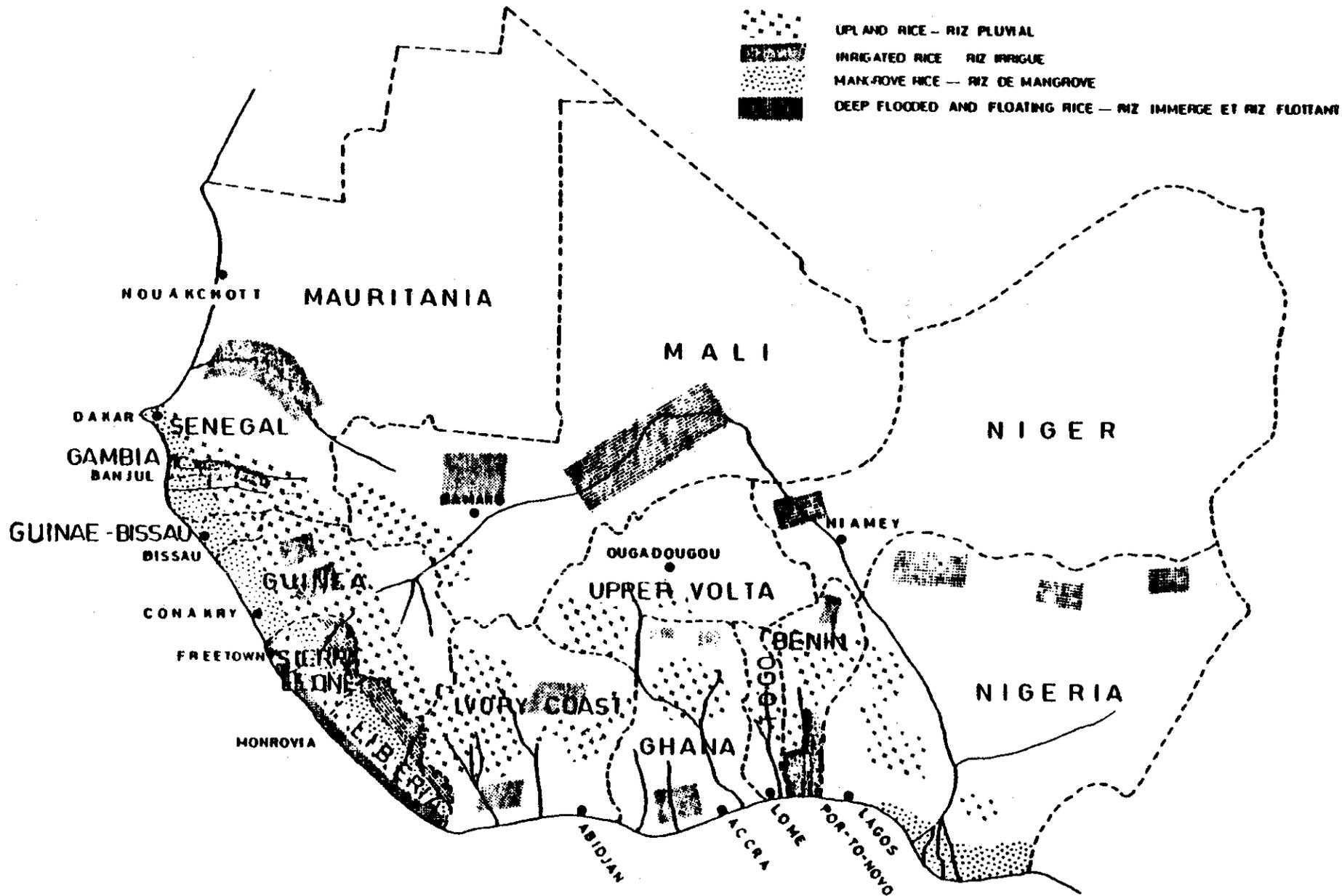


Table C-1. Classification and Inventory of Rice Cultivation Types in WARDA Member Countries

I. Classification/Types of Rice Cultivation	
1. Upland Rice Cultivation	65%
including,	(a) strictly upland--62.5% of which,
	hill rice -- 5%
	flatland rice -- 57.5%
	(b) groundwater cultivation--2.5%
	With Rains -- 2%
	without rains -- 0.5%
2. Lowland Rice Cultivation	-- 35%
including,	(a) Mangrove Rice--8% of which,
	Without Tidal Control-- 2%
	With Tidal Control -- 6%
	(b) Freshwater Cult.--27% of which,
	Without Water Control-- 22%
	With Partial Water Control-- 3%
	With Complete Water Control-- 2%
TOTAL	100%

Source: adapted from WARDA, Types of Rice Cultivation in West Africa, Occasional Paper No. 2

Table C-2. Paddy Yield of WARDA Region Compared to World's Total and Selected Countries (Average 1970-1974 in hg/ha)

Country/Region	Yield
WARDA Region	1 254
World	2 376
P.R. of China	3 401
India	1 666
Thailand	1 833
Egypt	5 350
Malagasy Rep.	1 852
USA	5 098
Oceania	6 564

Sources: WARDA, Rice Statistics Yearbook Abstracts, 1978 (for WARDA Region); IRRI, World Rice Statistics, 1978 (for other countries and world).

Table C-3. Paddy Production
(in thousands of tons)

Country	Average 1960-1964	Average 1965-1969	Average 1970-1974	1975	1976	1977	1978	1979 ¹	1980 ¹
Benin	1.1	1.6	6.5	12.7	18.4	23.5	22.4	10.0	12.0
Gambia	31.8	34.2	32.8	36.4	34.6	22.1	25.0	21.0	28.0
Ghana	35.8	41.0	61.8	70.5	88.8	65.4	51.9	55.0	62.0
Guinea	274.4	320.6	380.6	421.0	432.0	414.0	418.0	348.0	250.0
Guinea-Bissau	114.5	51.6	33.0	67.0	80.0	40.0	100.0	35.0	23.0
Ivory Coast	202.0	308.0	352.0	496.0	460.0	477.0	460.0	534.0	550.0
Liberia	117.0	148.0	214.8	229.0	245.0	256.0	250.8	249.0	243.0
Mali	176.6	156.2	156.2	259.0	227.0	199.0	209.0	177.0	200.0
Mauritania	0.6	0.9	2.6	3.9	4.4	6.8	9.8	4.0	4.0
Niger	10.9	33.6	29.8	29.3	28.7	26.6	33.5	24.0	32.0
Nigeria	197.0	299.0	452.6	643.0	232.0	400.0	417.0	600.0	125.0
Senegal	94.0	112.0	86.5	130.5	118.2	61.2	140.3	22.6	130.0
Sierra Leone	312.0	442.0	580.4	609.0	642.0	624.0	633.1	?	565.0
Togo	16.0	20.2	16.7	20.5	15.3	15.5	17.0	?	23.0
Upper Volta	33.0	37.2	35.4	38.8	36.4	32.4	11.5	?	40.0
WARDA	1,616.7	2,006.1	2,442.1	3,066.6	2,662.8	2,668.5	2,819.3	2,---	2,979.0

Source: WARDA, Rice Statistics Yearbook (Abstracts), 1979

¹Figures for 1979 and 1980 are taken from the FAO Production Yearbook, 1980. They may not be strictly comparable to WARDA's as 1978 figures from both forces differed by more than 20 percent in some cases.

Table C-4. Estimated Total Rice Consumption
(in thousands of tons)

Country	Average 1960-1964	Average 1965-1969	Average 1970-1974	1975	1976	1977	1978	Average 1975-1978
Benin	5.3	7.2	10.9	10.1	15.1	27.0	27.0	14.8
Gambia	25.2	27.2	36.4	44.0	43.8	52.1	39.2	42.9
Ghana	64.4	56.4	69.1	70.7	39.3	94.1	166.4	85.1
Guinea	192.2	232.1	227.1	168.0	277.7	245.8	279.6	255.9
Guinea-Bissau	71.8	48.6	42.7	30.2	47.3	59.1	47.1	36.4
Ivory Coast	138.6	210.6	256.1	204.0	350.5	386.1	317.8	319.5
Liberia	89.3	109.5	156.1	171.8	166.2	198.0	193.2	182.3
Mali	86.8	84.0	109.6	115.2	142.1	141.3	121.4	130.0
Mauritania	5.3	10.6	23.3	9.2	45.2	27.4	80.7	40.6
Niger	6.2	16.8	19.6	19.2	22.0	27.3	21.0	23.4
Nigeria	105.7	154.5	203.1	456.9	418.2	466.5	680.8	504.6
Senegal	177.5	224.8	212.7	225.6	312.3	256.8	241.9	264.9
Sierra Leone	179.1	246.1	336.9	328.9	358.4	383.6	363.9	356.1
Togo	12.4	14.2	12.2	9.3	23.2	21.4	10.5	14.6
Upper Volta	18.1	22.4	26.1	38.7	42.5	47.9	43.3	34.7
WARDA	1,177.9	1,465.0	1,741.9	1,901.8	2,303.8	2,434.4	2,633.8	2,315.8

Source: WARDA, Rice Statistics Yearbook, (Abstracts), 1979.

Table C-5. Estimated Rice Consumption Per Capita
(In kilograms)

Country	Average 1960-1964	Average 1965-1969	Average 1970-1974	1975	1976	1977	1978	Average 1975-1978
Benin	2.4	2.9	3.8	3.3	4.7	8.3	8.0	6.1
Gambia	67.9	64.8	75.5	84.0	81.1	94.2	69.0	82.1
Ghana	9.0	7.1	7.6	7.0	3.8	8.8	15.1	8.7
Guinea	48.7	51.8	44.1	30.0	48.7	41.6	45.8	41.5
Guinea-Bissau	124.4	77.4	61.2	40.8	62.8	76.9	60.1	60.2
Ivory Coast	34.3	43.0	44.7	30.3	50.1	52.9	41.8	43.7
Liberia	86.3	89.8	109.6	109.4	102.5	118.1	111.5	110.4
Mali	19.6	17.0	19.6	19.7	22.9	22.4	18.7	20.9
Mauritania	6.2	7.9	18.2	6.8	19.3	19.3	55.5	25.2
Niger	1.8	4.4	4.6	4.0	4.4	5.4	4.0	4.4
Nigeria	2.0	2.5	2.9	6.1	5.5	5.9	8.5	6.5
Senegal	47.5	54.5	45.6	45.1	61.0	49.4	44.8	50.0
Sierra Leone	82.9	103.7	128.5	117.5	125.1	132.3	122.9	124.4
Togo	7.0	7.8	5.9	4.2	10.2	9.1	4.4	6.9
Upper Volta	4.2	4.5	4.5	6.9	7.5	8.3	7.3	7.5
WARDA	12.6	13.8	14.4	14.5	17.2	17.7	18.6	17.0

Source: WARDA, Rice Statistics Yearbook, (Abstracts), 1979.

Table C-6. Net Imports of Rice by Quantity, Including Food Aid
(in thousands of tons)

Country	Average 1960-1964	Average 1965-1969	Average 1970-1974	1975	1976	1977	1978	1979 ¹	Average 1975-1979
Benin	4.6	6.5	7.4	5.3	10.5	17.0	18.0	23.0	14.8
Gambia	9.1	9.1	17.6	25.7	34.4	34.0	17.8	24.9	27.4
Ghana	42.1	35.1	41.0	0.4	0.5	43.0	129.0	30.0	46.5
Guinea	31.9	35.4	25.8	-	44.7	26.5	47.8	60.0	44.8
Guinea-Bissau	3.9	10.7	24.6	14.3	10.9	13.3	28.1	38.2	21.0
Ivory Coast	39.4	57.6	94.7	1.6	-30.4	144.4	141.5	97.5	70.9
Liberia	32.1	37.4	45.2	30.6	37.5	59.9	48.3	76.0	50.5
Mali	-8.5	3.3	38.7	20.1	-13.2	13.8	8.7	20.0	9.8
Mauritania	6.3	9.0	25.6	8.0	27.9	39.5	63.7	50.0	37.8
Niger	1.4	1.1	3.1	1.0	5.8	11.2	19.0	26.4	12.7
Nigeria	1.2	1.0	2.8	6.7	45.4	341.6	456.5	245.0	219.0
Senegal	119.0	165.0	177.9	102.0	236.2	201.2	237.5	261.0	207.6
Sierra Leone	16.2	21.3	34.3	-	3.5	16.5	18.2	24.5	15.8
Togo	3.0	2.6	3.7	6.6	5.5	17.7	2.0	10.0	8.4
Upper Volta	3.2	3.5	6.8	16.5	20.4	28.4	27.7	6.6	19.9
WARDA	304.9	398.6	549.2	238.8	439.4	1,008.0	1,263.8	993.1	800.9

Source: WARDA, Rice Statistics Yearbook, (Abstracts), 1979.

¹Figures for 1979 are from FAO Trade Yearbook, 1979 and are not strictly comparable to WARDA statistics.

of rice imports to WARDA countries represented 8.7 percent of total world imports, and 52 percent of total African imports. Asian countries supply WARDA countries with much of the latter's imported rice, although the United States exports commercially to Nigeria, Liberia, Senegal, and the Ivory Coast. These four countries receive 10 to 15 percent of our commercial rice exports.² The United States also supplies Sierra Leone, Senegal, Liberia, and Ghana with PL 480 rice. Average self-sufficiency ratios (domestic production divided by total rice consumption) for the WARDA region have declined in recent years, although there is wide variation between countries (see Table C-7).

WARDA has made projections of supply and demand for the region for 1990, which show a total demand of over 4 million metric tons, with domestic production of some 2.9 million metric tons (see Table C-8). The projected import figure of 1.3 million tons is close to the 1978 record high, with the self-sufficiency ratio of 0.69 close to the average in the late seventies. These projections assume the following:

1. The world price of rice will be between U.S.\$300 and \$350 (Thai rice, 5 percent broken, f.o.b. Bangkok, constant 1976 dollars) in 1990.
2. Climatic conditions in West Africa will be normal throughout the period.
3. No basic changes will occur in West African government policies affecting
 - The price of rice relative to the prices of substitute crops and other foodcrops
 - The domestic price of rice relative to its international price
 - Recent plans to invest in projects that will increase local supplies³

²In 1979, these four countries imported 295,000 mt (183,000 mt went to Nigeria alone) of the 2,055,000 mt of milled rice commercially exported by the United States that year (USDA Rice Market News, August 8, 1981).

³"The Prospects of Achieving Self-Sufficiency in Rice Production," WARDA Occasional Paper No. 1, p. 7, July 1981.

Table C-7. Rice Self-Sufficiency
(percentages)

Country	Average 1960-1964	Average 1965-1969	Average 1970-1974	1975	1976	1977	1978	Average 1975-1978
Benin	13.2	8.4	28.0	47.5	47.0	38.9	50.0	45.8
Gambia	67.2	68.6	53.1	36.6	47.7	38.7	31.4	38.6
Ghana	32.2	37.4	52.5	57.0	99.2	54.3	22.5	58.2
Guinea	81.3	75.7	85.2	94.6	83.9	89.2	82.9	87.6
Guinea-Bissau	95.7	77.9	43.5	52.6	77.0	77.5	40.3	61.8
Ivory Coast	66.3	74.1	73.5	110.0	78.9	65.9	44.6	74.8
Liberia	64.3	66.0	71.0	82.2	77.4	69.8	75.0	76.1
Mali	100.0	95.5	69.2	102.3	101.5	88.5	88.7	95.2
Mauritania	24.2	15.5	5.9	23.9	9.1	9.2	47.1	22.3
Niger	84.9	90.1	87.2	90.6	75.0	59.0	70.0	73.6
Nigeria	98.7	99.1	98.6	98.5	89.1	26.7	32.9	61.8
Senegal	28.4	26.3	22.8	30.1	23.3	26.1	12.7	23.0
Sierra Leone	93.0	90.8	91.6	98.8	94.1	93.7	95.0	95.4
Togo	71.1	82.5	70.6	111.8	49.1	38.3	81.0	70.0
Upper Volta	84.3	84.5	80.7	54.3	49.2	40.7	39.4	45.9
WARDA	71.8	70.1	71.2	84.8	74.7	60.1	51.4	67.7

Source: WARDA, Rice Statistics Yearbook, (Abstracts), 1979.

Table C-8. Projections of Demand for, Supply of, and Trade Position of Rice in WARDA Member Countries and Self-Sufficiency Ratio for 1990

Country	Thousand Metric Tons			Self-Sufficiency
	Demand	Supply	1990 Trade Position	
Benin	28.8	32.1	-3.3	1.12
Gambia	78.4	50.0	28.4	0.64
Ghana	134.0	75.0	59.0	0.56
Guinea	366.4	339.9	26.5	0.92
Guinea-Bissau	52.1	51.6	0.5	0.99
Ivory Coast	599.7	394.0	205.7	0.66
Liberia	299.2	224.0	75.2	0.75
Mali	196.7	291.0	-94.3	1.48
Mauritania	74.2	35.0	39.2	0.47
Niger	37.3	41.4	-4.1	1.11
Nigeria	1301.4	513.8	787.6	0.40
Senegal	400.8	211.3	189.5	0.53
Sierra Leone	496.4	541.0	-44.6	1.09
Togo	33.9	10.7	23.2	0.32
Upper Volta	<u>49.7</u>	<u>53.7</u>	<u>-4.0</u>	<u>1.08</u>
	4,149.0	2,864.5	1,284.5	0.69

Source: WARDA, The Prospect of Achieving Self-Sufficiency in Rice Production, Occasional Paper No. 1, July 1980, p. 12.

The figures in Table C-7 suggest that only Mali and Sierra Leone will be significant exporters of rice in 1990, while Benin, Guinea-Bissau, Niger, and Upper Volta will be roughly self-sufficient. Major importers are projected to include Gambia, Ghana, Ivory Coast, Liberia, Mauritania, Nigeria, Senegal, and Togo. Nigeria alone is projected to account for 61 percent of the imports.

It is certainly possible to argue with the above projections and assumptions. It was adverse climatic conditions in the Sahel and throughout the world that pushed rice prices to record highs in 1973-1974, causing great concern among West African governments. The problems of climatic variation and food security are of greatest importance to Sahelian countries such as Senegal. Will the price of rice (Thai, 5 percent broken) be between \$300 and \$350 in 1990? Food Research Institute projections suggest that the real price of rice measured in constant 1976 dollars will rise from the \$300/mt price that prevailed in the 1960s and 1970s to a level of \$350/mt. This assessment is based on several factors affecting production and consumption:

Demand pressures stemming from growing populations and new demands for grain (usually for livestock feeding) in low-income and middle-income countries such as China, Korea, Nigeria, and the Eastern European countries, and rising real costs of production will generate upward pressures on the future level of rice prices. But the prospects for new rice production technologies, production and consumption opportunities in other staple food crops, and investments in production by a number of major importers may help to mediate substantial real price increases.⁴

The World Bank forecasts suggest a similar increase in the real price of rice, shown as follows:

	U.S.\$/mt					
	<u>1976</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1985</u>	<u>1990</u>
Current Prices	260	484	510	562	779	1,100
Constant Prices (1980=100)	427	484	478	487	557	575
Inflation Index	60.8	100	106.6	115.1	143.0	191.3

⁴Walter P. Falcon and Eric A. Monke, "International Trade in Rice," Food Research Institute Studies, Vol. XVII, No. 3, 1979-1980, p. 301.

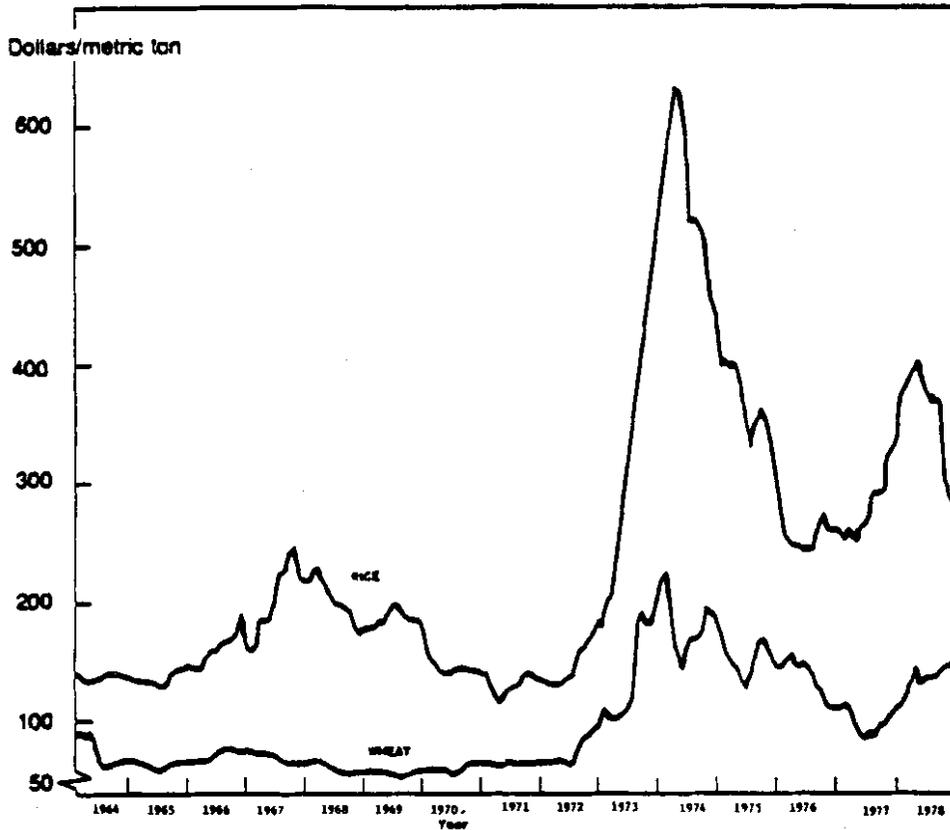
Bank officials cite growing demand from lesser developed countries as the primary cause for the increase. It should be noted that the \$575/mt figure in 1980 dollars is equal to \$350/mt in 1976 dollars. Publications of the International Food Policy Research Institute (IFPRI) suggest a more substantial increase in the real price of food staples during the 1980s, although the Institute does not make actual forecasts in dollars.⁵ Certainly the long-run price of rice is an important variable in determining the optimal use of resources in West African economies. As we shall see from the results of the Stanford study, if the real price of rice goes above a certain level, it becomes economic to produce rice in West Africa. Below that level, it may well be a more economically efficient use of domestic resources to import rice. Policy-makers implicitly or explicitly make a prediction about the long-run price of rice as they attempt to make a decision about investment in increased rice production.

One of the reasons it is particularly difficult to determine an optimal rice strategy is the variability of rice prices on the international market (see Figure C-2). There are several major reasons for this variability. First, only a small portion of total world production--about 4 percent--enters world trade, and the international market, therefore, is highly susceptible to fluctuations in production. Second, 90 percent of the world's rice is grown in Asia, where monsoon conditions affect major exporting and importing countries simultaneously. Thus, periods of strong export demand coincide with periods of reduced export availability. Government policy magnifies short-run price variations in the international market, given the desire of most key trading countries to assure domestic per capita availabilities of rice at stable internal prices. It is unlikely that there will soon be a substantial reduction in year-to-year price variation, although:

Increases in irrigated area and the spread of new rice varieties more adaptable to fluctuations in day length and length of growing season may help to off-set some of the short-run effects of weather on production, but these compensations are likely to be rather small. On the consumption side, increased substitution of wheat (or other grains) for rice might reduce rice price variability. The conventional wisdom that rice eaters will eat only rice, irrespective of price, is being proven wrong by an accumulation of cross-price elasticities at the national level, and also in more aggregate data (Falcon and Monke, op. cit., 1979-1980: 298).

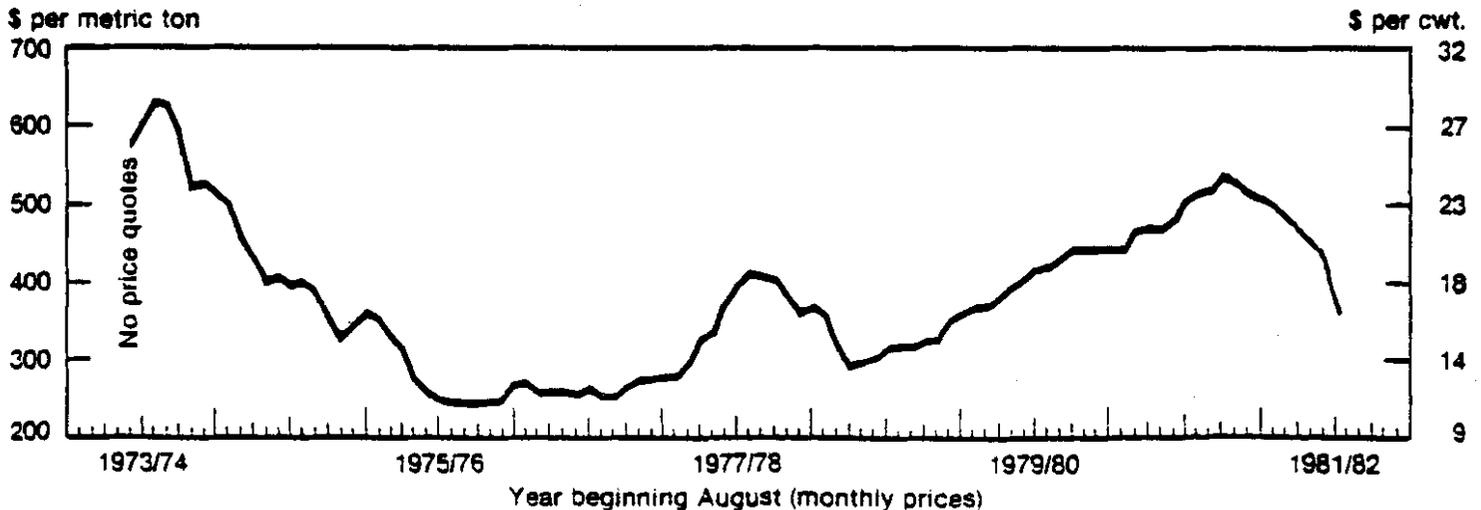
⁵See International Food Policy Research Institute, IFPRI Report, 1980.

Figure C-2. Export Prices of Rice and Wheat, 1964-1978



Source: A. C. Palacpac, World Rice Statistics, Department of Agricultural Economics, International Rice Research Institute, Los Banos, 1980.

Figure C-3. Milled Rice: Thailand Export Prices, 1973/1974-1981/1982



*White 5% broken, F.O.B. Bangkok.

Source: U.S. Department of Agriculture, Rice Outlook and Situation, September 1981, p. 7.

Substitution seems particularly relevant for some WARDA countries, which have generally attempted to shield national markets from price variation, sometimes at great expense. This can obviously be a sensitive political issue, but an optimal rice policy might include the flexibility to allow consumers to benefit from low international prices and to substitute other grains when rice prices are high.

III. THE STANFORD STUDY

The Stanford study assesses the private and social profitability of a range of techniques for producing, milling, and marketing rice. The authors define private profitability as the value of output minus inputs, valued at the domestic market prices faced by farmers and other processors, including taxes and subsidies. Social profitability is defined as the value of output minus inputs, valued in terms of their social opportunity costs, with an attempt to remove the distorting effects of overvalued currency, trade restrictions, government subsidies and taxes, etc. Net social profitability (NSP) measures, for the nation as a whole, the economic efficiency and comparative advantage of rice production. If NSP is positive, a country has a comparative advantage in producing rice, and, therefore, the expansion of rice production to substitute for imports will generate greater income for the nation as a whole. If there is a comparative disadvantage, then the expansion will generate a smaller income for the nation.

The notion of comparative advantage is central to the study's analysis of past and present rice policies, and to the recommendations made by the authors concerning future policy. The study examines the goal of self-sufficiency in terms of three more "fundamental" economic objectives: (1) income generation, (2) redistribution of income, and (3) food security. The study ranks these objectives by country, suggesting that income generation and income distribution are more important in the Ivory Coast, Liberia, and Sierra Leone, while food security ranks higher in Mali and Senegal. As we shall see later, these rankings do not fully explain why West African nations proclaim an interest in rice self-sufficiency, but they do provide a framework for exploring the impact of different policies on private and public resources.

The last column of Table C-9 shows that the NSP for most types of rice production is negative in Liberia, Ivory Coast, and Senegal, and positive in Sierra Leone and Mali. This means that in only the latter two countries can domestically produced rice be substituted profitably for imported rice in the capital cities. Private profitability, on the other hand, is usually positive, due to the incentives created by government policy.

Table C-9. Private Profitability, Public Incentives, and Net Social Profitability (U.S.\$/mt milled rice)

Private Production Technique	Domestic Price Minus Profitability	Net Border Price	Net Social Subsidy	Net Social Profitability
Traditional Manual Upland				
Ivory Coast Forecast	156	48	226	-117
Ivory Coast Savannah	213	48	233	-70
Liberia	-96	144	-9	-231
Sierra Leone South	80	25	-	55
Sierra Leone North	26	25	-	1
Improved Manual Upland				
Ivory Coast Forest	189	48	262	-104
Ivory Coast Savannah	213	48	288	-120
Liberia	-62	144	13	-219
Sierra Leone South	128	30	36	62
Sierra Leone North	75	33	46	-4
Animal Traction Upland				
Ivory Coast Savannah	235	48	286	-95
Senegal Casamance	106	78	36	-8
Mechanized Upland				
Ivory Coast Savannah	230	48	328	-143
Traditional Manual Swamp				
Liberia	-6	144	-9	-141
Mali	-64	-122	-16	74
Senegal Casamance	na	na	na	na
Sierra Leone South	137	30	-	107
Sierra Leone North	92	31	3	58
Improved Manual Swamp				
Ivory Coast Forest	136	48	291	-180
Ivory Coast Savannah	174	48	305	-155
Liberia	42	144	12	-114
Senegal Casamance	79	65	72	-58
Sierra Leone South	158	44	49	65
Sierra Leone North	140	44	51	45
Improved Manual Mangrove				
Sierra Leone South	117	23	-	94
Sierra Leone North	64	16	-	48
Animal Traction Swamp				
Mali	-7	-123	21	95
Partially Mechanized Swamp				
Ivory Coast Forest	144	48	288	-146
Liberia	108	144	138	-174

Table C-9. Private Profitability, Public Incentives, and Net Social Profitability (U.S.\$/mt milled rice) (cont.)

Production Technique	Private Profitability	Domestic Price Minus Border Price	Net Subsidy	Net Social Profitability
Improved Manual Uncontrolled Flooding				
Sierra Leone Boliland	147	33	6	108
Animal Traction Uncontrolled Flooding				
Mali	-118	-107	-15	4
Mechanized Uncontrolled Flooding				
Sierra Leone Boliland	165	24	117	24
Animal Traction Controlled Flooding				
Mali	-21	-126	26	79
Improved Animal Traction Controlled Flooding				
Mali	8	-126	13	121
Animal Traction Irrigated Single Crop				
Mali	6	-133	4	135
Improved Animal Traction Irrigated Single Crop				
Mali	6	-133	22	117
Mechanized Irrigated Single Crop				
Senegal Fleuve	4	131	138	-265
Manual Irrigated Multiple Crop				
Ivory Coast Savannah	202	48	360	-178
Senegal Fleuve	90	150	8	-68
Mechanized Irrigated Multiple Crop				
Ivory Coast Forest	166	48	456	-*334
Senegal Fleuve	64	139	57	-132

Source: Rice in West Africa: Policy and Economics, pp. 410-411.

Note: The sum of the last three columns equals private profitability, except for the Ivory Coast, where net social profitability differs from private profitability because of differences in social and private prices of land in addition to the effects of Government incentives.

Trade and price policies, such as quantitative import restrictions, variable levies, or fixed prices, can cause domestic prices to be higher than the border price of rice imports. This provides a certain level of government subsidies on inputs, which can range from subsidized fertilizer to subsidized tractor-hire schemes, shown in the third column.

Private profitability varies considerably among countries and techniques, with the greatest variation traceable to policy differences between countries. Liberia uses a variable levy to restrict imports, which raised the domestic price of rice by an average \$144/mt in 1975-1976. Sierra Leone, Senegal, and the Ivory Coast also restrict imports of rice, but rely more heavily on input subsidies to improve private profitability. The Ivory Coast and Senegal have concentrated on subsidizing fertilizer and improved seed, while Sierra Leone has concentrated on mechanized services and fertilizers. The Ivory Coast also subsidized Government-owned mills through 1978, allowing them to pay a high price to producers. Liberia has no effective input subsidies except for the extension service, which is provided to farmers at no cost, as it is in all five countries. In general, subsidies tend to increase with mechanization and higher degrees of water control.

In Mali, private profitability is shown to be negative for rice delivered to the capital. This is due to the use of the low official paddy price used in the profit calculations. Farmers raise their private profitability, in fact, by consuming the rice themselves and/or selling a portion of their marketable surplus on the parallel market, where prices can be up to double the official producer price. Nonetheless, the Government markets some 50 percent of the domestic rice supply at lower prices, in effect forcing "producers in government projects to subsidize consumers who have access to rationed rice in cooperative markets."⁶ The Government does subsidize, to a certain degree, inputs such as fertilizer and mechanical threshing.

All countries set official prices for producers and consumers. However, only Mali and the Ivory Coast have had much success in enforcing the prices, due to these countries' high level of involvement in the marketing and milling sectors. All countries, except Liberia, have important investment programs to develop irrigated rice production. The Stanford study found the common theme underlying rice investment policy was "the overwhelming importance of foreign aid donors in designing, financing, and implementing rice development projects."⁷

⁶Pearson, p. 379.

⁷Pearson, p. 383.

IV. SOCIAL PROFITABILITY

Social profitability also varies with countries and techniques. In Mali, the positive NSP can be attributed to low wages, the high cost of imported rice due to high transport costs to the interior, and relatively low-cost partial water control. In Sierra Leone, a low wage rate is the principal reason for a positive NSP, as well as very labor-intensive techniques of production. There are a number of reasons that NSP is negative in the other three countries. First, the transportation and communication infrastructures are poorly developed. This increases the costs of transport and marketing, as well as the provision of government services in rural areas. Furthermore, the system of water control and irrigation is practically nonexistent. Second, because of the relatively low population density in the region, wage rates are relatively high compared to major exporting countries in Asia. For example, Thailand's wage rate in the mid-1970s was only one-third of the prevailing rate in the forest zone of the Ivory Coast and lower than any rate in the five countries studied except Sierra Leone.⁸ Average yields in West Africa are also lower than those in Asia or the United States. Third, a severe shortage of investment capital and qualified people to undertake major development projects exists in West Africa. Finally, too little Africa-specific rice research has taken place, and the diffusion and adoption of the few available innovations have been slow.

There is generally an increase in NSP for improved techniques that use intermediate levels of mechanization, such as animal traction. Improved techniques may or may not increase the social profitability of swamp cultivation, depending on the country. Full water control generally reduces social profitability, although double cropping helps to offset the decline. Improved control of flooding in Mali increases social profitability. Beyond these few generalizations, the Stanford data do not appear to indicate a clear advantage of one major type of rice cultivation over another, since social returns vary widely according to both specific location and specific technique.

In general, the results of the Stanford study suggest that many West African countries have a comparative disadvantage in rice, and expansion of rice production will lead to a loss of national income because of inefficient use of domestic resources. To encourage domestic production in the face of competition from the international market, governments must opt for some combination of (1) subsidy programs that represent a

⁸Pearson, p. 399.

drain on both the recurrent and investment budgets of national governments, and (2) protectionist trade and price policies that reduce consumer welfare through higher prices.

It is possible to use investment in rice production as a mechanism for income redistribution. However, this would seem to be an inefficient method of accomplishing a redistribution goal, particularly if the same thing can be done by investing in the expanded production of a crop for which the country has a comparative advantage, the Stanford study suggests.⁹ Finally, increased production, particularly in irrigated rice, will improve the security of domestic food production, but policy-makers need to decide if the marginal benefit is equal to the marginal cost when valued in terms of the social opportunity cost.

The Stanford study recognizes the difficulties created for West African governments by the highly variable price of rice on the world market, but suggests that it might be cheaper to establish a financial buffer fund to cover the expected change in c.i.f. prices or to encourage the substitution of other staples for rice during periods of high rice prices.¹⁰ It should be noted that for the two countries that have a comparative advantage in rice production--Sierra Leone and Mali-- expansion of rice hectarage can be efficiently used to generate income, redistribute income, and improve food security. The question for these countries is which technique can be expanded most efficiently.

Several remarks might be added here to give a more balanced presentation of the conclusions that can be reached given the available data. First, the study recognizes that a "number of techniques that are not profitable when rice is consumed in the capital city become socially profitable when consumption takes place closer to the farm."¹¹ This was found to be true for certain techniques in the Casamance region of Senegal and for several traditional and improved techniques in the savannah of the Ivory Coast. Hence, improved techniques may be of considerable benefit to farmers and their families if they improve yields enough to be economically feasible. Improved yields would allow families to consume more rice, and to have more

⁹Pearson, pp. 418-419. The Ivory Coast has a comparative advantage in coffee, cocoa, plasma products, copra, and maize. Senegal has a comparative advantage in peanuts and maize, in some regions.

¹⁰Pearson, p. 389.

¹¹Pearson, p. 416.

surplus rice to sell in local markets. If the increased amounts of rice can be sold in the local and regional markets, then both the producer and the society as a whole have benefited, assuming the rice substitutes for imports on-farm or in markets near the site of production. The study concludes that "it is thus desirable to expand production for many regional markets with current and improved techniques."¹² Project designers may need to undertake studies to determine if increased output from a project can be successfully absorbed in these markets.

Second, the concept of comparative advantage is most properly viewed from a dynamic rather than static perspective. With this in mind, the authors of the Stanford study did a sensitivity analysis to test the robustness of their results. They conclude that, in general, the results are very insensitive to changes in the cost of capital or skilled labor, but more sensitive to variation in the cost of unskilled labor, yield, and the world price of rice. In the Ivory Coast, Liberia, and the northern part of Senegal, the costs of unskilled labor would have to be less than half of the assumed values and yields or the world price would have to rise 25 to 80 percent before production for the major urban market would become profitable.¹³ The study recommends continuing economic research to monitor changes in economic conditions that would alter the comparative advantage of rice production in West Africa. Finally, the Stanford study recognizes that "research into and development of more appropriate technologies are required before future rice production will become socially profitable. Critical areas for research include development of chemical and mechanical techniques to substitute for labor, more efficient use of irrigation water, additional investment in infrastructure, and cost-reducing changes in processing and distribution."¹⁴ The study is not optimistic that conditions will change rapidly, but suggests that research is both a necessary prerequisite to improve the situation and is needed to evaluate the economic efficiency of new developments and technical advances.

¹²Pearson, pp. 422-423.

¹³Pearson, pp. 422-423.

¹⁴Pearson, p. 393.

V. CURRENT RICE DEVELOPMENT EFFORTS IN WEST AFRICA

The somewhat pessimistic results of the Stanford study notwithstanding, it is estimated that there are currently some 150 projects in West Africa in which rice is a primary or significant component.¹⁵ In the course of this evaluation, team members visited a number of rice development projects and held discussions with government officials and donor agencies supporting these projects. An attempt was made, where appropriate, to ascertain the rationales for the projects in the minds of government officials and representatives of the donor agencies, as well as to obtain indications of progress to date. While a project-by-project analysis is beyond the scope of this report, a summary of the major findings and observations follows.¹⁶

1. West African governments are generally committed to the concept of obtaining and preserving self-sufficiency in rice production. The strength of the commitment is roughly related to the importance of rice in the national diet and the magnitude of imports, and the relative importance of the consequent drain on foreign exchange reserves. For example, Senegal is more concerned about the effects of a continued drain on foreign exchange reserves than is Nigeria, a country with enormous oil-generated foreign exchange reserves. With regard to the issue of comparative advantage, government officials commonly reject the idea or refute the conclusion that their country does not have a comparative advantage in rice production. The concept is particularly unacceptable in countries such as Liberia where the vast majority of farmers produce rice. As noted in the previous section, governments of many WARDA countries have progressively introduced programs of price supports, import restrictions, and input subsidies for rice that are often more generous for rice than for other staple foods. Those who stand to gain from such policies become the strongest domestic advocates for the continuation of government rice programs. Behind the general push for self-sufficiency lies a desire for independence from world markets as far as basic foodstuffs are concerned, the growing popularity of rice among elites and urban consumers generally, and a suspicion

¹⁵WARDA Donors Conference Document, FAO, Rome, April 14-16, 1981, p. 32. WARDA is in the process of compiling an annotated list of projects. The figure of 150 does not include an estimated 25-30 projects presently under negotiation.

¹⁶The comments are based upon a small sample of rice projects. A fully representative sampling was impossible within the time frame of the impact evaluation.

that the comparative advantage argument is simply a ploy aimed at perpetuating the trade and dependency relationships of the colonial era. In short, the comparative advantage position, even where it is understood, is generally not regarded as being sufficiently compelling in relationship to other considerations and government objectives to merit a reduction in efforts to promote rice production.

2. Representatives of donor agencies supporting rice development projects are less inclined to disagree with the major thrust of the Stanford study. However, they offered the following reasons for continued support of such projects:

- a. Recipient countries want the projects.
- b. Several countries will grow rice regardless; rice development projects will reduce the negative net social profitability of such efforts.
- c. Certain improved rice techniques promise to reduce labor requirements per unit of output and thus have the potential to free labor for other, more profitable activities while maintaining levels of rice production.
- d. Rice production from a number of projects is intended solely or primarily for consumption in the area of production and not to replace imports in major markets at or near the point of importation.
- e. While the Stanford study correctly reflects the situation as of the late 1970s, recent projections suggest a continuing increase in world market prices in the 1980s. This continues to be a controversial point among researchers and policy-makers, about which a decision is largely dependent on one's view of the future. Food harvests in the early 1980s have driven prices down (see Figure C-3).
- f. There is considerable scope for improved efficiency in production, marketing, and processing of rice in virtually all West African countries, using techniques already available in these countries.
- g. While major breakthroughs are not probable in the short term, research on rice in the region is likely to produce an increasing number of results during the 1980s which will improve production efficiency.

3. In a number of cases, the promotion of improved practices for rice production is only one component of agricultural development projects covering commodities in a particular

region. This is the case, for example, in the World Bank's Upper Lofa County Rural Development project in Liberia, the Northeast Savannah Rural Development project in the Ivory Coast, the Eastern Integrated Agricultural Development project in Sierra Leone, and the Volta Region Agricultural Development project in Ghana. A cursory examination of the projected costs and returns in the project documents suggests that the rice components are often marginal in terms of social profitability, but their inclusion is justified in terms of the importance of rice in the farming systems of the areas and the possible beneficial effects of improved rice production efficiency on the production of other commodities. In other instances, projects are viewed as pilot efforts aimed at determining the feasibility of technical packages and producer organizations.

4. The performance of projects to date is quite mixed. On the one hand, results from farm-level trials and farmer tests of improved practices are encouraging in a number of instances, notably in the case of swamp rice in the Casamance region of Senegal and mangrove swamp rice in Sierra Leone and Guinea Bissau. In other projects, yields per hectare and rates of farmer acceptance have been considerably below expectations, as has been the case in the Mopti project in Mali. Among the problems cited were the facts that the improved techniques required increases in labor inputs and expenditure per hectare and that the new varieties were less resistant to varying water conditions and therefore not worth the extra risk, even if yields did improve. Farmers are reluctant to reduce acreage or "put more eggs in fewer baskets" to accommodate the new techniques, even though there is a good prospect of a significant expansion in yields. This appears true particularly in areas such as Liberia, where labor rather than land is the major constraint to expanded production. Farmers appear more receptive to yield-increasing measures in areas such as the mangrove swamp region bordering the Scarcies River in Sierra Leone, where nearly all suitable land is already being cultivated.

5. Virtually all the irrigation schemes visited or reviewed reported a range of technical and managerial difficulties that impeded realization of targeted acreages and yields. The inexperience of participating farmers in managing intensive irrigated farming systems is frequently cited, although there was also some evidence of mismanagement at the level of project administration. In Mali, farmers reported that local extension workers were sometimes less than fair in distributing the irrigated land inside project polders, land that previously had been controlled by local villages. Farmers wanted to know if it were possible to have a polder built without a requirement that project managers control the land. In Senegal, better results were achieved in small-scale, locally controlled

irrigation schemes than in the large-scale schemes.¹⁷ At the Kou Valley project in Upper Volta, there were indications of considerable progress in the development of farmer organizations, despite continuing technical problems.

VI. NOTES COMPARING THE STANFORD/WARDA STUDY WITH SELECTED
IBRD RICE PROJECT ANALYSES

During the course of the evaluation, some of the results of the Stanford study were compared with the per hectare input/output assumptions in a selection of IBRD-supported projects. Unfortunately, time limitations during the evaluation did not permit a comparison of Stanford study assumptions with a range of projects with rice components in each country or a systematic untangling of an impressive range of incomparabilities. However, the findings suggest that the Stanford study needs updating and extension to other countries and areas. The update would serve to take into account relative price changes and technological advances, and to identify current areas and technologies where there is a net positive social profitability.

Documents relating to projects in northern Ivory Coast, northern and eastern Sierra Leone, and central Liberia were examined. In the case of the northeastern project in the Ivory Coast, which has both a lowland and an irrigated rice component, there were insufficient data to make close comparisons with the Stanford study. The scientific complications included the fact that the irrigated rice component included a rehabilitation of existing facilities. Cost data for the lowland rice production were mixed with those for other crops. However, the yield increase attributable to use of a modest package of improved practices is significantly greater in comparison with the Stanford study (one ton of paddy as compared to half a ton), which may be the major explanation for a net positive economic return in the project (as compared to a net negative profitability in the Stanford study), assuming delivery to Abidjan in both instances.

Similarly, a yield increase "gap" exists in the case of Sierra Leone, as shown in Table C-10.

¹⁷See Edward W. Sparling, "A Survey and Analysis of Ex-Post Cost-Benefit Studies of Sahelian Irrigation Projects," Development of Economics, Colorado State University, 1981.

Table C-10. Comparison of Stanford Study and IBRD Analyses of Sierra Leone Inland Swamp Rice Project Production

	<u>Stanford Study</u>		<u>Eastern IBRD Project</u>		<u>Northern IBRD Project</u>	
	<u>T</u>	<u>I</u>	<u>T</u>	<u>I</u>	<u>T</u>	<u>I</u>
Yield ¹	2.2	3.3	2.0	2.5-3.5	1.0	2.8
Persondays ²	356	390	192	195-250	150	280

T = Traditional, I = Improved.

¹ In metric tons paddy per hectare.

² Total persondays per hectare including hired labor.

Table C-10 also includes estimated persondays per hectare associated with each technology and shows significantly higher estimates in the Stanford study than either of the Bank projects. It is quite possible that both sets of figures are correct. Inland swamp areas are very heterogeneous in terms of the traditional input/output relationships and returns to improved practices. Thus, even in areas where set social profitability appears low or negative, pockets of high profitability may also exist associated with special soil and water conditions. (The inverse may also be true.) For this reason, rice, more than other staple foods, may require greater site-specific testing of possible improvements in comparison with traditional practices.

In contrast, the physical input/output relationships are similar for both swamp and upland production in Liberia (not unrelated to the fact that the Stanford study draws heavily on data from the Lofa country project supported by IBRD). The IBRD data suggest a major increase in rice prices and labor costs relative to other inputs between 1975 and 1984 but, on balance, the domestic rice production appears to remain at a disadvantage compared to imports in the Monrovia market.

VII. CURRENT TRENDS IN RICE POLICY

Most governments set official producer prices for paddy and many also attempt to control retail prices, with varying degrees of success. Governments continue to face the difficult task of trying to get prices high enough to provide an incentive to producers and low enough to keep consumers from rioting, as was the case in Liberia during the spring of 1979. This problem was also evident in Senegal recently. Certain multilateral donors were suggesting an increase in the price paid to producers, while the Senegalese Government was worried about the effect that the price change might have on urban consumers. A small increase was declared in 1981. Senegal also disbanded its parastatal marketing agency in 1980, charging other Government agencies and some private traders with the collection and distribution of local and imported rice. Mali has raised its producer price recently, in an attempt to provide incentive (or less disincentive) to local producers. Wage rates have risen somewhat in Mali, but not enough to offset the comparative advantage Mali had during the middle 1970s.

At least in some countries, there seems to be a greater awareness of the high cost of rice policies. The Ivory Coast recently lowered the price paid to producers from 75 CFAF/kg to 60 CFAF/kg and increased the retail consumer price by 10 CFAF, in an attempt to lower the subsidy rate and to slow increased rice consumption. Donor agencies are also more aware of these costs.

There seems to be a tendency away from large rice projects aimed at import substitution for the capital city, and more of an emphasis on substitution in regional markets. There is also a tendency away from large-scale irrigation projects. Of course, there are exceptions to these tendencies. Large river basin dam and irrigation projects are proceeding in Senegal and being considered in Gambia and Mauritania. Niger is continuing to place an emphasis on irrigated rice production, with little research or investment in floating varieties.

Comparative advantage in West Africa continues, in most cases, to be represented fairly well by the Stanford study. One major exception is Sierra Leone. A recent agricultural assessment by New Mexico State University suggests that wage rates have risen enough in Sierra Leone to offset the comparative advantage reported in the Stanford study.¹⁸ Although

¹⁸See "Sierra Leone, Agricultural Sector Assessment," USAID, 1980, and Dunstan S.C. Spencer, "Rice Self-Sufficiency in Sierra Leone, Is It an Impossible Dream?" Memo, WARDA, 1981.

there may be some methodological differences in the calculations of social profitability, this finding would suggest a reorientation of Sierra Leone's policies towards rice. However, the country has continued to pursue an aggressive program of expansion in rice. This matter should be carefully examined by Government and donor agency officials.

It should be added that there are several countries not well represented by the countries selected for the Stanford study, particularly Nigeria and perhaps Ghana. Nigeria is an example of a country where wage rates, exchange rates, and prices have been severely distorted by the export of oil. The overvalued currency encourages imports of food. High wage rates in the nonagricultural sector also have a devastating effect on agricultural production by drawing away labor needed in agriculture. In an attempt to encourage domestic production, the Government at one point in 1979-1980 banned all rice imports. When prices shot up very high, the Government was forced to allow some imports. The problems in Nigeria indicate the difficulty of finding the right mix of incentives for local production and a trade policy that will meet import requirements. With prevailing exchange and wage rates, Nigeria may not have a comparative advantage in any food crop, and a certain level of protection may need to be adopted as the only way to expand (or maintain) agricultural production. Similar problems with overvalued currency exist in Ghana, except that the country does not have the foreign exchange reserves of Nigeria, and therefore has suffered severe shortages of food imports when domestic production did not meet local demand. Again, some level of protection may be necessary if agricultural production is to be maintained or expanded.

VIII. IMPLICATIONS FOR THE ROLE OF WARDA

Despite the limited evidence of impact of the Stanford study on rice policies and development projects to date, the evaluation team believes there is an expanded role for WARDA to play in the area of economic and policy issues. To a considerable degree, WARDA has already initiated or proposed involvement in the following areas:

1. Monitoring of developments with respect to (1) world market and domestic rice prices, (2) rice policies of member countries, and (3) the progress of rice development projects. Although some original analysis might be involved, similar to the Stanford study, primary emphasis in the near term would be placed on assembling and disseminating information from other sources such as planning agencies of member countries; bilateral and multilateral assistance organizations such as the World Bank, FAO, and USAID; institutions concerned with food

policy in developing countries such as IFPRI; and the monitoring/evaluation units associated with rice development projects.

2. Participating in policy discussions of member country governments and deliberations between such governments and external donor agencies, with the aim of rationalizing rice policy, taking into account both policy objectives of member governments and economic considerations such as costs of production, economic values for inputs and outputs, and comparative advantage calculations.

3. Identifying areas and techniques where the net social profitability appears the most attractive. The team would recommend, on the basis of economic considerations alone, that highest research priorities be established for mangrove swamp rice and for upland rice in the more humid areas, with particular emphasis on the development of labor-saving intermediate technologies. Floating rice might come next on the research agenda, although Mali is the country primarily interested in such research (Niger and Nigeria seem to be more interested in irrigated technologies). Research on irrigated rice technology should perhaps receive a lower priority until the relative costs of irrigation schemes can be reduced. Investments in research should, in general, be concentrated in areas with higher rainfall and where rice is a primary crop. In drier areas and where rice is a secondary crop, more attention should be given to alternative crops.

4. Injecting net social profitability considerations into the determination of rice research priorities by WARDA, as well as by international, regional, and national research organizations operating in West Africa.

The evaluation team concludes that the Stanford study is a baseline document of high professional quality reviewing rice policies and projects in selected West African countries. It can serve as an important reference point for the future activities of WARDA. It should be noted that WARDA has not been an uncritical proponent of national self-sufficiency or of the proliferation of rice development projects, although the organization's mandate places a limitation on the nature of the adversary role. Instead, WARDA should be able to make increasing use of its growing expertise and special relationships with member countries to work toward a rationalization of rice policies. Comparative advantage is just one of several important considerations that member countries must weigh in designing policies. Given present world market prices and resource endowments of the region, some observers have argued that certain countries do not appear to have a comparative advantage in producing anything, even for domestic consumption, except in areas distant from the principal point of importation. To do nothing

is not an acceptable alternative, quite aside from employment, equity, and income generation considerations, and carefully selected projects can assist in pointing the way to developing a true comparative advantage in the production of certain commodities in the future. It would be in the interests of the region as a whole for WARDA to identify and concentrate its efforts on those areas with positive net social profitability and disassociate itself from indiscriminate and clearly uneconomic efforts to promote national self-sufficiency.

By putting its eggs in fewer, more carefully selected baskets WARDA can significantly increase its chances of making a major impact on rice production in the region during the coming decade. However, this would leave WARDA with the very real problem of an increasingly skewed distribution of the benefits of its activities in favor of those few countries and areas that enjoy a comparative advantage in rice production.

APPENDIX D

WARDA AND RICE RESEARCH IN WEST AFRICA

by

Robert I. Jackson
and
Sid Bowers

I. INTRODUCTION

The West African Rice Development Association (WARDA) is an intergovernmental organization with 15 member countries (see map on page xi). Approximately 2 million hectares are planted to rice in the region, and the average productivity is relatively low, estimated at 1.3 tons per hectare.

Rice production and import statistics for the 15 WARDA countries for the decade of the 1970s are presented in Table D-1. The last three columns of this table are very striking, particularly those for the most recent years. It is obvious that the rapid and significant increases in imports clearly indicate that the average per capita consumption is increasing at a faster rate than annual total production. Self-sufficiency in rice becomes more and more unlikely with the passing of time. Unless there is a marked decrease in the per capita consumption

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... significant increase in total production, the goal of self-sufficiency appears unlikely to be achieved within the next decade. Any adverse conditions, either environmental or agricultural, will further lower the chances of meeting the goal.

Table D-1. Rice Production and Import Statistics for the WARDA Countries

Year	Paddy Production (1,000 mt)	Rice Imports (1,000 mt)	Cost Imports (\$1,000)	Percentage Imported
1970	1,862.5	420.7	53,107	25.5
1971	1,848.3	490.4	53,774	28.7
1972	1,877.9	445.1	55,187	26.4
1973	1,999.3	637.7	138,436	32.6
1974	2,306.9	551.3	228,780	26.6
1975	2,394.8	242.5	84,303	13.3
1976	2,417.2	394.6	131,013	19.8
1977	2,060.0	1,113.3	388,813	32.8
1978	2,195.8	1,263.8	542,454	40.2
1979	2,317.2	-	-	-

In the AID Project Paper for WARDA dated December 1974, the stated goal is to increase the quantity and quality of rice production in West Africa in order to approach regional self-sufficiency, but no target date is mentioned. The Project Paper further states that the purposes are (1) to develop new high-yielding rice varieties for the different ecosystems of the region, and (2) to disseminate high-yielding varieties and related cultural practices to West African farmers.

The development and dissemination of higher yielding varieties should enable increased production. Equally important, small farmer productivity increases resulting from varietal improvement and related technologies are essential to increasing small farmer incomes and thus to addressing the fundamental problems of rural development and income distribution. WARDA's intention to draw the vital link between research and development programs is reflected by stating that the dissemination of high-yielding varieties is a project purpose.

WARDA's priorities, approved by its Governing Council, are as follows:

1. Variety improvement
2. Training
3. Coordination of research and development
4. Seed multiplication
5. Fertilizer trials
6. Agrometeorology
7. Weed control
8. Plant protection
9. Mechanization of rice cropping
10. Water management

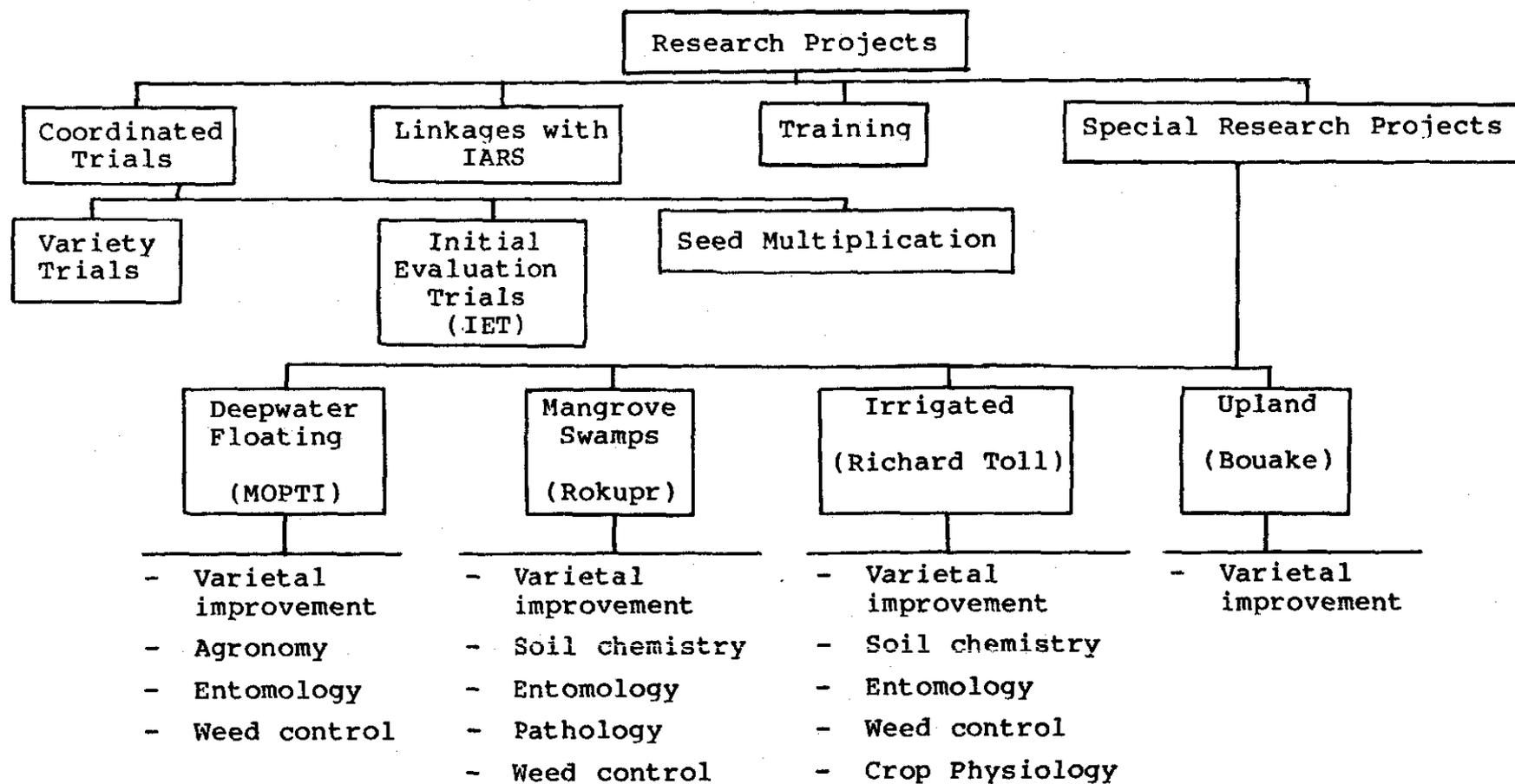
Some of the above are research projects, others are training projects, and still others are development projects. The functions of WARDA's Research Department are shown in Figure D-1.

II. WEST AFRICAN ECOLOGY

The four major ecosystems for rice cultivation in West Africa are (1) rainfed/upland (humid forest area, semiarid area), (2) irrigated (swamp rice, controlled irrigation), (3) deepwater/floating, and (4) mangrove swamp.

Associated with these four ecosystems is an extremely wide variation in environmental conditions that includes rainfall; evapotranspiration; solar radiation; temperature; level of insects, diseases, and weeds; soil types; and cultural management.

Figure 1. Organization Chart of WARDA's Research Department



The average total annual rainfall for the region varies from as little as 300 mm to as much as 4,500 mm. Normally, a crop of rainfed/upland rice requires a minimum of 600 mm of water, more or less uniformly distributed throughout the growing season. Moisture stress for any significant length of time during the growing season, particularly at the seedling and flowering stages, can reduce yields, even to the point of crop failure. The other extreme, too much rain, can be nearly as devastating, because prolonged and heavy rainfall is associated with high humidity that encourages the incidence of diseases, insects, and weeds. Solar radiation varies widely throughout the region and to a somewhat lesser extent within a given area. In Richard Toll, located at 16 degrees north of the equator, the mean daily sunshine is 11.3 hours in December and 13.0 hours in June. Rokupr, which is 9 degrees north and where one might expect less variation, has 7.3 hours of sunshine daily in December and 5.2 hours in June, but because of cloudy weather, there are only 2.1 hours of sunshine a day in August. The evapotranspiration rate is higher during the main crop season in June at Richard Toll than at Rokupr. The maximum temperatures during this season are 38.5 degrees C at Richard Toll and 30.6 degrees C at Rokupr. The average annual rainfall at these two stations is 300 mm and 3,000 mm, respectively. The rice plant consumes more moisture under high temperatures and long hours of sunshine, and disease and insect problems are less frequent than under conditions of lower temperatures and less sunshine. Under good cultural management, associated with sunny conditions and adequate moisture, rice yields are higher. Soils good for rice cultivation are those which retain moisture and have relatively high fertility. Many of the soils in the region need good management, particularly those with aluminum and iron toxicity problems. Rainfed rice is grown in soils which are least productive due to their inherently low fertility level and vulnerability to drought conditions.

III. WARDA RESEARCH STRATEGY

WARDA's goals related to the research department's activities are to introduce into the region varieties/germplasm that are adaptable to the different ecosystems; to develop or adapt production packages and technologies; and to reduce losses to insects, diseases, and weeds. All of these goals are aimed toward improving production and productivity.

WARDA's first step toward introducing new varieties is to screen a wide range of germplasm under the various agroclimatic conditions found in the region. About 3,000 lines are grown annually for preliminary observation and seed multiplication. Approximately 10 percent of these varieties are selected for inclusion in the Initial Evaluation Trials (IET). The IETs

contain approximately 200 entries which are selected for the different ecosystems. These trials were observed at Suakoko, Rokupr, and Sapu during this evaluation. At the time of observation, there appeared to be little or no material that was superior or equal to that in the coordinated variety trials, the next step in the screening process. Recently, there have been nine different sets of coordinated variety trials, two for the off or dry season and seven for the main or wet season, covering the different ecosystems of the region. One set, that for the off-season (dry season), was planted at 10 locations in the region. Each set consists of about 15 varieties. About 80 coordinated trials are conducted each year throughout the region. As a general rule, a variety is included in a trial for no more than two years. After that time, a member country may wish to test it further or release it as an approved variety. No information was available at WARDA headquarters or had been released by member countries as to the number of varieties tested under the WARDA program or the possible area planted with varieties from this system. Also, there was little evidence during the team's visit to a selected number of the countries that any significant area was planted to varieties tested under this program.

During the first few years of WARDA's research program, fertilizer trials were conducted on a similar basis as that for the coordinated variety trials. These were discontinued in 1976 when it was realized that these trials were too site-specific to be continued in the coordinated trials program.

Weeds are one of the biggest constraints to rice production in the area, particularly for upland conditions where 30 percent or more in losses have been found. Trials have been carried out at five locations on rainfed/upland rice, and at most locations hand weeding was found to be superior to herbicides. Under irrigated conditions, good land preparation was very advantageous for weed control. The same situation was observed at Rokupr for the mangrove swamp areas where power tillers had been introduced to prepare the land before transplanting. However, no suitable program had been developed for the purchase, maintenance, and use of power tillers by these farmers.

Many different insecticide trials have been carried out in the region. Several of these were observed at Rokupr and there appear to be little or no beneficial economic results from the use of insecticides.

In addition to the research programs discussed above and carried out by the headquarters staff in Monrovia, technical supporting services are provided which include the Seed Nursery Farm at Suakoko, Liberia; the Seed Laboratory and Processing Center at Fendell, Liberia; the Plant Quarantine Center at

Ibadan, Nigeria; and the West African Germplasm Conservation Center at Fendell.

The Seed Nursery is used to screen all of the introduced material after seed samples have been cleared by the Quarantine Center. The Seed Laboratory and Processing Center has equipment and facilities for seed cleaning, sample drying, purity and germination tests, and moisture determination. Facilities are now available for short-term seed storage as well as medium-term storage for germplasm conservation. This latter facility will be used to preserve WARDA's intensive rice collection efforts from the member countries.

IV. THE SPECIAL RESEARCH PROJECTS

Special research projects of WARDA are located at Richard Toll/Fanaye, Senegal for irrigated rice; Rokupr, Sierra Leone for mangrove swamp rice; Mopti, Mali for deepwater and floating rice; and Bouake, Ivory Coast for semiarid upland rice.

At Richard Toll, trials related to varietal improvement, crop physiology, entomology, soil chemistry, and weed control are conducted. The staff at Rokupr conducts trials related to varietal improvement; insect control, including crabs; disease control; herbicides and cultivation methods to control weeds; and soil science. At Mopti, projects dealing with varietal improvement, agronomy, weed science, entomology, and preextension are considered. Only varietal improvement has been undertaken during the past at Bouake. The work at the Mopti Station is discussed in a separate appendix.

A. Richard Toll

The special project in Richard Toll/Fanaye was established to conduct research on constraints related to irrigated rice production. The climate is very typical of that of the Sahelian area and was described in more detail earlier in this profile. Senegal has plans for constructing dams to increase the potential for growing more rice under irrigated conditions along the Senegal River. The barest essential facilities have been constructed at the research site and include the development of about 6 hectares of irrigated land, laboratories, sheds, and offices. The major objectives of the project were to conduct research on varietal improvement and physiology, weed control, entomology, soil and fertility studies, and, more recently, azolla culture.

Rice grown under Sahelian-zone conditions is subject to long periods of solar radiation and high-light intensity. Even though these conditions are very favorable for high productivity, there are soil and climatic problems which prohibit continuous rice cropping, even when adequate irrigation water is available. Some of these constraints are saline soils, photoperiod-sensitive varieties, high evapotranspiration rates, low temperature during early growth stages and high temperature at anthesis (both lead to sterility), and loss of grain to birds.

Varieties well adapted to the irrigated conditions found in the area of Richard Toll and other similar ecosystems are being sought. Characteristics, including high yield; tolerance to cold temperatures and saline soils; resistance to birds, major diseases, and insects; favorable response to fertilizer; and good grain quality are the aims of this research component.

Water control on farmers' fields is not adequate and this leads to improper control of both wild perennial and annual rice species. Research has been carried out on chemical, mechanical, and cultural practices for weed control. A study on formulation, rates, and numbers of applications has also been undertaken. It is anticipated that as this study progresses, it will provide information on the relationship between cultural practices such as direct sowing, transplanting, and ratooning and herbicide applications.

Insect pests cause severe losses in rice yields in the area. To combat these losses, research workers are identifying the natural enemies of the insect pests, estimating yield losses, studying the effect of cultural methods on insect populations, and screening germplasm for insect resistance. The date of sowing appeared to be a determining factor in the abundance of stem borers and the amount of destruction they caused. Whitehead, which is associated with time of planting, was most serious for the early sowings from June to July. Varietal resistance was determined to be the only means for controlling dead hearts. Insecticides have been found to control stem borers, but no economic studies have been carried out to determine the profitability and chances of farmer adoption of these practices. Rice insect pests have been collected in the area and identified. Also, several predator insects have been collected from the area.

Soil and fertility studies have been conducted to classify the various rice soils in the area and the fertility changes which take place under intensive rice cropping. This is a relatively long-term study and will consider methods of correcting nutrient deficiencies as they may occur with continuous cropping. Sulfur-coated urea (SCU) has been tested and compared to granulated urea; early results indicate that SCU is not significantly better than granulated urea in terms of rice productivity.

Research on azolla and its benefit to irrigated rice culture has been undertaken. Azolla is a nitrogen-fixing blue-green algae associated with a small aquatic fern and has worldwide distribution in both temperate and tropical climates. Its annual nitrogen-fixing rate may be as high as 450 kg of nitrogen per hectare. Azolla species have been introduced and have multiplied. Comparative growth studies of different azolla species in irrigated rice plots, including age of the rice plant when the azolla is introduced, have been undertaken. Nitrogen fertilizer was applied to some of the plots. At the time of observation, there was very little difference between any of the plots and no discernible increase in growth or color (indicating presence or absence of nitrogen) of the rice plants. With the extreme weather conditions found at Richard Toll--hot and cold, high evapotranspiration rates and shortage of water during the off-season--azolla does not appear to have much promise as a nitrogen supplement in the Senegal Basin.

Upon closer examination of the research being conducted at Richard Toll/Fanaye, it becomes quite obvious that nearly all the research is site-specific and its uses and benefits will be applicable largely to the Senegal River Basin. Thus, the program is more or less a national one. It would make little difference if this or similar research were conducted at other irrigated areas as it would still be site-specific and thus essentially a national program rather than one for the irrigated areas found in the region.

B. Rokupr

Mangrove swamp rice is considered by some to have the greatest potential for increased production in West Africa. Less than 10 percent of the rice area of the region is planted with mangrove-swamp rice, yet production is over 12 percent. It is believed that with improved technologies, packaging, and productivity, the areas under cultivation could each be doubled.

Mangrove-swamp rice research is carried out at the Rokupr station in Sierra Leone. This is a relatively old station, first established as a national station in 1934. In 1952, it became the West Africa Rice Research Station, and then in 1964, it again became a national station. During the time from 1934 until the present, the research has been concentrated on mangrove swamp rice problems.

The objective of the research program is to increase the productivity of mangrove-swamp rice through studies on varietal improvement, entomology, plant pathology, agronomy, and control of weeds. One goal is the selection of varieties for growth in

the mangrove swamp during the rainy season. This would require a plant that is long maturing (160-180 days), photoperiod sensitive with large panicles, tall, semi-erect, resistant to shattering, and suitable for low-fertility conditions. Another is selection for varieties that are short maturing (140-150 days) and salt tolerant for use on more saline areas. A large number of varieties are being screened for maturity duration, pest and disease resistance, and tolerance to physiological disorders resulting from soil-toxic conditions such as salinity. A small hybridization project is underway, but it is not far enough along to have any new varieties ready for trial. Trials on optimum date of sowing, age of seedlings at time of transplant, and plant population density are being conducted.

One of the first steps taken by the entomologists was to make a collection and survey of the insect pests of mangrove-swamp rice. These collections indicate that insects are much more important than originally anticipated and that improved cultural methods are also of great importance for reducing losses caused by insects. These methods include dates of transplanting and sowing, rates and kinds of fertilizer applied, and burning of the rice stubble. The breeders and entomologists are working together on varietal resistance. Crabs also cause serious damage to the seedlings after transplanting. Both chemical control by soaking the seedlings in insecticide before transplanting and the age of seedlings at transplantation have given some means of crab control. Most of these studies have been undertaken at Rokupr and are intended to be tried gradually in other member countries.

The plant pathology program has been quite similar to the one for entomology, in that disease surveys of Sierra Leone have been made and cooperative programs are being carried out with the breeders to develop varieties with disease resistance. Work on rice blast and "udbatta" has been initiated and will continue to receive special attention.

The kiri kiri grass found in the mangrove swamps is an extremely difficult weed for farmers to control and causes severe losses in rice yields. Good cultivation through the use of power tillers for soil preparation prior to transplanting has given positive results in the control of this grass.

The monitoring of salt content of water and soil along the Scaries River has enabled the scientists to define the geographical limits for rice production. It has been established that nitrogen is the major deficiency in most areas. An injection technique for the application of urea has been shown to correct this deficiency and has given results similar to those obtained from the use of sulfur-coated urea, a fertilizer more expensive than urea but with a longer release time. The germ-plasm collection is being tested for salt tolerance in collaboration with the breeder.

The research activities on mangrove-swamp rice for WARDA are concentrated at the Rokupr Station and this program, like the one at Richard Toll, serves primarily as a national program. Even though rice is grown in the Casamance in Senegal under similar environmental conditions, the team was told that the research efforts of Rokupr had little applicability to the Senegal area. On the other hand, Guinea Bissau has profited markedly from this research and is greatly expanding the area under cultivation and increasing production.

C. Bouake

Although none of the team members visited the Bouake Station in the Ivory Coast, considerable attention and discussion were given to it in the course of the evaluation. The station conducts research on several crops grown in the area, and rice is only one of these crops. The Institut de Recherche en Agronomie Tropicale (IRAT) was given the mandate to work on upland rice for the Ivory Coast. The upland rice program for WARDA is carried out at Bouake by two scientists, and is limited strictly to research on upland conditions--that is, semi-arid areas. The program has largely been one of testing newly developed or introduced plant material. The plant characteristics that have been selected are drought resistance, resistance to disease, acceptable grain type and eating quality, short to medium duration, and shattering resistance. The WARDA rice breeder has developed a method to screen varieties for shattering resistance. Several varieties have been developed at the station that are suitable for strictly upland conditions or semiarid areas but are not widely accepted for rainfed conditions.

Approximately 65 percent of the rice area in the region is rainfed/upland, but WARDA has had only two research assistants working on rice for this ecosystem. The average yield is estimated to be less than one ton per hectare for rainfed/upland rice grown in the region, while that for other rice crops is estimated to be twice this amount. Because of the erratic rainfall pattern and amounts, upland rice is a high-risk crop. For this reason, the work at Bouake has been largely concentrated on developing drought-resistant material. Coupled with poor rainfall as a drawback to upland rice production is the very low management level of the West African farmers. Nevertheless, there are areas in the region in which rainfall/upland rice is grown where more humid conditions exist than in the Ivory Coast. Presently, the WARDA program is conducting little research on these conditions. It can be argued that the potential for increasing the productivity and production of rainfed/upland rice is not as great as that for other rice crops and, therefore, should not receive as much effort. On the other

hand, because this rice is grown on such a wide expanse of land and is the major rice crop for subsistence farmers, it seems logical to do more research on it than that which is currently undertaken for semiarid conditions alone. All aspects of its cultivation, including varietal improvement, cultural techniques, insect disease and weed control, and tolerance to adverse soil and climatic conditions, should be more closely examined to see if changes could lead to more rice production. This should be followed up with research in those areas with the largest potential for increases in production.

D. Mopti: Constraints

The objective of this Mopti research activity was to develop deepwater/floating rice varieties and cultural practices to overcome small farmer production constraints. The Project Paper envisioned station scientists performing as an integrated team "concentrating complementary scientific guidance resources on the resolution of mutual objectives." The West African Rice Development Association (WARDA) was to provide additional scientific guidance through its Scientific and Technical Committee in coordination with international crop research institutions and the Institut d' Economie Rurale (IER) which is responsible for crop research in Mali.

Progress toward overcoming small farmer production constraints was modest, at best, because of the following factors.

1. Personnel

Lack of a Senior Staff

Recruitment of two expatriate senior scientists and an agriculture extension liaison specialist was authorized. The two senior scientists were to serve as station director and deputy director, whose respective duties would be to administer the station, direct the research of African assistant scientists, and to assist in guiding and advising the station research. The extension specialist was to visit extension services of member countries to provide information on the Mopti trials and ascertain the status of the research packages developed. Unfortunately, the expatriate senior scientists and extension specialist were not recruited, since Mopti, located 450 miles northeast of Bamako, lacks the amenities that expatriates expect. For example, there are no medical facilities or internationally accredited schools, electricity is uncertain, the climate is disagreeable, and imported goods are not readily

available. Recognized senior scientists can find other, more attractive employment opportunities. As explained below, this lack of direction and guidance caused research deficiencies in the early project years and diminished the potential impact.

In July 1979, Dr. Stephen Koli, a Ghanaian soil scientist, was recruited as the acting deputy director. (Koli received his B.Sc. degree from Cornell, his M.S. from Wisconsin, and his Ph.D. from Oklahoma State University.) As a result of his training and experience, he is very knowledgeable in the fundamentals of applied research. While his presence definitely improved the station's research, additional senior scientists are required to develop, within the project, the research expertise and impact potential originally envisioned. The lack of senior scientists' guidance and assistance remains the single most serious constraint to quality research.

Junior Staff

In 1976, research assistants were hired to assist in varietal improvement, agronomy, weed control, entomology, and extension research. Additionally, a farm manager and financial officer were appointed. Because expatriate senior scientists could not be recruited, these junior staff members were assigned responsibility for conducting station research.

The first station experimental work was initiated in 1977. Although this evaluator was unable to locate the 1977 annual report, reportedly little was achieved during this season. (This is hardly surprising for a new, relatively inexperienced organization so remote from supporting institutions and agencies.)

Annual reports from 1978 to 1980 were reviewed. The quality of the 1978 and 1979 field experiments was fair at best. The coefficients of variation (CV), which express the standard deviation per experimental unit as a percentage of the experimental mean, were exceedingly high--as high as 85 percent. The implied "lack of control" was so great, in many cases, that experimental results are doubtful. The 1970 CVs decreased significantly and were generally in an acceptable range. (This improvement apparently coincided with Dr. Koli's appointment as the acting station director.) However, the overall implication is that of a previous lack of technical guidance. We could not detect from reports or interviews that WARDA/Monrovia has extended technical field plot assistance. Knowing about the lack of experienced senior scientists at Mopti, Monrovia should have periodically sent members from its research staff to Mopti to actively guide and participate in station field research. Similarly, there is no evidence of the USAID project manager visiting the station during the last two project years.

A need for additional guidance is still evident by the almost complete lack of trial and plot identification. Clear and distinct marking and identifying of all trials and plots is important (1) to avoid the application of erroneous plot treatments; (2) to serve an extension purpose, since viewers can thus more fully understand the trials; (3) to develop pride and a sense of participation in all station personnel as a result of neat, well-established plots; and (4) to influence touring executives and administrators from donor agencies who frequently lack technical backgrounds and often make judgments based on appearances. (The latter is not entirely misleading since neat, well-marked plots are indicative of concern and an effort to perform good field research.)

The problems associated with the research staff have increased. At the time of this evaluation, the weed control assistant had gone to the United States for graduate studies, the assistant in charge of entomology had died, the assistant in charge of extension research was in the hospital, and the agronomy assistant was in Guinea working on off-station regional plots. The acting director, with his administrative and other duties, cannot direct all station research; additional assistance is urgently required.

The ultimate solution to staff constraints could be the appointment of Malian senior staff who accept the living conditions at Mopti. To this end, WARDA has taken appropriate steps by sending station personnel for advanced training, with the intent of ultimately appointing them to station senior scientist positions. Meanwhile, WARDA must immediately fill both the senior scientist and research assistant vacancies either by recruitment or by assigning Monrovia research personnel to help the station on a periodic visitation basis.

2. Station Facilities

In general, station facilities, such as offices, laboratories, equipment, warehouse, and sheds, were adequate to support an applied field research program. However, the experimental area has serious deficiencies which continue to constrain station achievement: lack of both water control and precision land leveling. The station consists of 35 hectares divided into 4 polders. Within the station is a canal whose gates open into each polder. The head of the canal is blocked but has a concrete pumping pad.

The intent was to convey water by pumping, and control its level in the polders independent of the level of the adjacent Niger River. Unfortunately, this system was never used; in fact, it was never completed. Water is now conveyed to the

polders through another canal which circles the station and whose water level is controlled directly by the river. Thus, only crude water control is possible; when the river is very low, the polders have no water.

For on-station deepwater/floating rice research, it is important to control water depth, duration of treatment, and time of treatment. In fact, the station requires both drainage and irrigation capability so that any combination of water treatments can be applied. This is not possible at Mopti: the annual reports contain numerous references to on-station experiments and plots lost to drought and flood. Additionally, seedlings on some plots did not emerge or the stand died because rain (prior to flooding by the river) flooded undrainable lower polder areas, draining seedlings and leaving higher plots dry.

A trial or a treatment lost through a lack of water control is a year's time lost and, because of high station overhead costs, represents considerable monetary loss. To assure repeatable experimental conditions and to prevent drought or flood losses, adequate station water control facilities should be developed and polders should be precisely land-leveled. A qualified irrigation engineer should assess station field conditions and develop plans and recommendations for an adequate water control system.

3. Project Purpose

Toward the goal of achieving West African self-sufficiency in rice, the project proposes "to develop and assimilate new high-yielding rice varieties and cultural practices for specified rice types of regional priority in West Africa." Obviously, the stated purpose places high priority on breeding and selection for high yields. To a degree, this purpose does not sufficiently stress increasing West African rice production through other approaches, such as increased availability of high-quality seed or breeding for "avoidance of risk." Indeed, the development of high-yielding deepwater and floating rice varieties may not be feasible; excessive plant growth and stress in response to deepwater may preclude any significant breakthrough in developing high-yielding deepwater/floating rice varieties.

The more profitable route is through improved cultural practices. Of course, this is covered in the project purposes. Variety selection and minimal hybridization are part of the Mopti research program. For Mali, breeding and selection for "risk aversion" in relation to drought should be given priority over breeding for high yields. Discussion with the station

director, farm manager, and Operation Riz-Mopti extension personnel indicated that approximately one-third of the planted crop is lost yearly to drought induced by insufficient early rain or early recession of flood waters. The risk of loss by drought is so important that farmers are reluctant to invest in weeding, fertilizer, and other recommended cultural practices. Undoubtedly, this drought factor will slow the adoption rate of other important station-developed packages even if water control capability should accelerate the selection or development of varieties with greater drought resistance.

E. Mopti: Achievement and Impact

Phase I of the Mopti operation has made little impact so far on deepwater/floating rice production. While the lack of senior scientists, the recent shortage of research assistants, and lack of water control have all seriously constrained progress, a primary deterrent affecting the farmer is insufficient time. Although the staff was organized in 1976, no experiments were initiated until 1977. The time required to develop and select varieties, practice-test them under farm conditions, and extend them to farmers precludes the possibility of significantly influencing production within four cropping years.

One must evaluate the station achievements in the proper perspective; despite the above-mentioned constraints, Mopti has been conducting applied research trials with some modest accomplishments.

1. Seed Multiplication

Presently, Mopti multiplies improved seed of three varieties formerly selected by the Institut de Recherche en Agronomie Tropicale (IRAT) (Khao Gaew, Nang Kiew, and Mali Swan). Seed of foundation quality is being produced in each generation. While the source of breeder's seed was not indicated, it probably comes from Suakoko, Liberia. This foundation seed is sold to a Government of Mali seed organization which remultiplies it to produce registered equivalent seed (based on generations only). The resulting seed is further remultiplied by contract farmers to produce a generation-equivalent certified seed which is sold to the general farming public. It could not be determined if the various seed grades were processed for multiplication and subsequent distribution.

Reportedly, this seed is in great demand but short supply. The station produced its first seed crop in 1978, an estimated 10 mt. Based on estimated planting rates and yields, subsequent

successive multiplications were estimated to have 25 to 1 and 15 to 1 multiplication ratios. Thus, approximately 3,750 mt of seed, derived from station sources, were sold to farmers in 1981. At sowing rates of 100 kg/ha, this was sufficient seed to plant 37,500 hectares or approximately 25 percent of Mali's floating rice/deepwater area. Station production of recommended varieties in 1979 and 1980 was estimated at 16 and 12 tons, respectively. Indeed, the production of foundation seed of present and future recommended varieties is an important area in which the Mopti Station can exert considerable impact on deepwater/floating rice production. They have the ability to provide seed of assured genetic purity. The use of high-quality improved seed should, as a purchased input, increase yields at least 10-15 percent; this is the most cost-effective way of increasing production.

2. Varietal Improvement

On-station varietal trials were conducted in 1981 for the third time; 1981 was also the second year of off-station testing. There were 11 off-station testing sites in 1980 and 9 in 1981, including the farmer field trials conducted with Operation Riz Mopti, the Government of Mali's local rice extension organization. (In Mali, extension services are organized by crops.)

Based on varietal testing, some of the more consistent varieties include the following:

1. BKN 6986-105-P (medium and shallow zone)
2. BKN 6986-38-1 (shallow zone)
3. DM-16 (medium and shallow zone)
4. DM-17 (shallow zone)

It is anticipated that the station will make varietal recommendations in 1982 (based on trials ending in 1981). However, based on the present seed multiplication rates, these will not be available to farmers until 1985. Hybridization at Mopti has not, as yet, resulted in recommended varieties.

3. Cultural Practices

Plowing, with either oxen or tractor, followed by harrowing, increased yields 100 percent over hand-hoe preparation.

Sowing from July 10-20, versus other times, results in significantly higher yields. Sowing before these dates reduces the yields because of greater competition with wild rice and because of soil crusting. Seeds sown after these dates are less able to withstand the flood. Planting from July 10-20 allows better organization of weed-control measures.

The variety BH2 was found to be responsive to nitrogen fertilizer. Applying 100 kg/ha of ammonium phosphate at tilling followed by 100 kg/ha urea just before flooding increased yields by 1.8 mt/ha. For nonsubsidized fertilizers, benefit-cost ratios were highest at Mopti-South (benefit-cost = 2.5) with 50 kg/ha ammonium phosphate at tilling, and 50 kg/ha of urea just prior to flooding. The ratio (benefit-cost = 6.28) at Sofara was highest, with 50 kg/ha ammonium phosphate at tilling.

The station anticipates a release of recommendations very soon. Unfortunately, fertilizers complicate the drought issue, and generally farmers resist applying fertilizer to deepwater/floating rice because of the high probability of crop loss and the generally low-yield response.

In the Mopti area, weeds present a very serious constraint to increased production. From research on- and off-station, Mopti is now recommending two hand weedings, at 21 days and 49 days after the rice emerges. The 21 days apparently corresponds to the average time required to distinguish the rice plant from annual wild rice. At 49 days, the water is not yet deep enough to hinder farmers.

Other promising control measures include plowing and harrowing following harvest, with another harrowing at the beginning of the next season.

4. Extension

Currently, the Mopti Station cooperates closely with Operation Riz Mopti, the local rice extension service, in conducting additional variety, fertility, and weed control trials for farmers. Operation Riz Mopti conducts other research independent of the Mopti Station. However, the WARD/Monrovia station assists them with their experimental design and their various extension and rice production training courses given at Fendell, Liberia.

F. Mopti: Recommendations

To facilitate greater productivity and benefits to farmers, the following are recommended.

1. Provide additional direct senior scientist research input either by recruitment or periodic visitation by WARDA/Monrovia scientists.
2. Fill all vacant research assistant positions.
3. Increase the production of recommended improved varieties of foundation seed.
4. Continue the emphasis on developing weed-control measures, particularly mechanical measures.
5. Emphasize varietal selection and breeding for drought resistance.
6. Develop an adequate water control system which includes both irrigation (flooding) and drainage capability.
7. Strengthen the existing extension ties with Operation Riz Mopti through consultation, exchange of information, and expansion of cooperative on-farm trials.
8. Promote a greater extension function at the station through field days, tours, and so on. Accordingly, identify and mark all trials and plots.
9. Initiate a program to train Malians (through a combination of advanced academic and experimental station experience) for Mopti senior scientist positions.
10. Promote more frequent visits by both USAID and WARDA officials.

V. CONCLUSIONS

In summary, it appears that as the WARDA research programs evolve, these programs are becoming more and more site specific and, at the same time, are fulfilling the needs of the areas or ecosystems in which they are located. There is a dearth of trained scientists conducting rice research within the national programs, but the Richard Toll/Fanaye, Mopti, Rokupr, and Bouake stations are beginning to provide results that are most useful to countries in which the projects are located.

At the same time, the scientists located in WARDA headquarters appear to be underutilized. There are at least nine staff members in the Research Department who do not really have active projects. Some of these workers could and should be assigned to one of the four stations. Even if they were assigned to a station, they could still travel to the member countries to provide technical assistance as they now do, since that role is quite limited.

APPENDIX E
TRAINING IMPACTS

by
Elon Gilbert

I. INTRODUCTION

Since its inception in 1973, the West Africa Rice Development Association (WARDA) training program has provided short-term courses on a variety of subjects related to rice research and development for over 650 participants from the 15 member countries. Former participants in the WARDA courses now occupy a significant number of middle- and upper-level rice research and development positions throughout the region. WARDA's training program emerges as one of the most important areas of potential impact on rice production. The adequacy of the training is only one factor influencing progress in rice production in the region. Notable among the other factors are the development of significant technological advances which can be readily used by large numbers of farmers, and the existence of policies and price conditions favorable to the production of rice. The training program can be viewed as a facilitating or

Previous Page Blank factor which can significantly improve the func-
various institutions concerned with rice re-
development in the member countries.

The evaluation team attempted to determine the extent of impact of the training program through a variety of means, including contact with former participants and their supervisors in the countries visited as well as discussions with staff of the WARDA training department and a review of the training materials. Given the limited time available and the difficulty and sometimes impossibility of isolating the impact of a specific WARDA course on the performance of an individual, an institution, or a national rice development program, the results of these efforts necessarily contain an element of subjective judgment. In any event, the full impact of the training efforts to date will not be felt for several years.

A key consideration was the extent to which former participants in WARDA training programs and their supervisors perceived that the performance of the individuals involved and of the institution generally has improved as a consequence of the training received. While it is acknowledged that perception is not equivalent to an objective test of performance, it was felt that such a test was impossible to administer given the time and resource limitations of the evaluation.

The following section briefly reviews the major components of WARDA's training program which consists of seven courses on various specialized subjects ranging in time from a few weeks to 6 months. Section II details the utilization of the training programs by member countries and suggests reasons for the observed differences. Section III summarizes the results of the survey of former participants that was carried out in the course of the evaluation, and presents the principal

observations and conclusions of the evaluation team with reference to the training program.

A. Facilities

WARDA's training program activities are concentrated at the Fendell Training Center on the outskirts of Monrovia, Liberia. The site has the advantage of proximity to the Liberian College of Agriculture farm, some of whose faculty members give lectures in the Center; to the WARDA Secretariat located in Monrovia; and to the airport. The site has the critical disadvantage of not being located on particularly good land for growing rice, and of being some distance from a rice-growing area of any significance. Thus, the contact which participants have with rice farmers and rice development projects in the course of their training is limited to field trips, which tend to be expensive and time-consuming.

The physical facilities at Fendell are now used to capacity, accommodating approximately 30 students at a time on a room-and-board basis. The cooking and eating facilities are extremely cramped, but an additional eating area is being funded under the new project. The evaluation team raised the question of whether it is advisable to add on to the existing facilities instead of moving the training activities to a more suitable location, possibly Suakoko, which is a center for rice research and development activities in Liberia and is approximately three hours from Monrovia.

B. Staff

The staff members of the Training Center come primarily from member countries. The core staff is complemented by short-term instructors in special subjects who assist with instruction. Although the evaluation team did not have the opportunity to observe all the training center staff in the classroom or field, we were generally impressed with the quality of the instructional staff and the leadership of the Center. Organizing and implementing short-term training programs which draw participants from 15 different countries throughout the West African region is no easy feat. The staff appears to be handling the various tasks quite adequately, including travel arrangements for participants, accommodations and dining arrangements, and the core responsibility of providing quality training of a specialized and intensive nature. Of special note is the fact that all courses are carried out in French and English using sequential or simultaneous translation. Training materials are also provided in both languages,

although this appears to have been a problem in some of the courses held away from the Center in other countries. In any event, translation capacity is a constraint which has not been sufficiently accounted for in the current USAID project.

C. Selection of Participants

Applicants to WARDA's training program must submit applications and be formally nominated by the appropriate Department or Ministry in the member countries. As a rule, each member country is invited to nominate two candidates for each course although additional applications may be submitted in the event of vacancies. The credentials are reviewed by a WARDA selection committee, and the candidates are notified of their acceptance or rejection.

There are a number of problems with the procedures. First, since often only central ministries of agriculture are notified of training programs, notice of their availability frequently is not widely disseminated, and there is often no systematic effort to find suitable candidates. Instead, candidates may be nominated at the discretion of the responsible officer in the ministry headquarters. The evaluation team heard complaints from those associated with research and extension programs, especially those located outside the capital cities, that they were given insufficient notice of courses or that they were rarely able to get ministry endorsement for their nominees.

Second, there were complaints both on the part of WARDA training staff and former course participants of considerable unevenness in the preparation of candidates. To a certain extent, such unevenness is inevitable given the variety of educational systems found in the WARDA region. However, the evaluation team has the impression that some of the government agencies responsible for locating and nominating candidates either do not take the specifications of minimum qualifications very seriously or have difficulty in locating candidates with the requisite background.

Given the intensive nature of the WARDA courses, it is difficult or even impossible to remedy serious deficiencies in the required background training and experience during a course. Tightening up admission requirements may not be an adequate solution since there is frequent difficulty in interpreting credentials and establishing equivalencies. Further, given communication problems, especially the considerable time that is often required for mail between countries within the West African region, WARDA is reluctant to reject applications on the basis of the nonarrival of all supporting materials.

There is no easy solution to these problems. Yet sending participants who are over- or under-qualified for a particular course is a waste of resources and time for all concerned. It might be desirable for the subregional coordinators to work with member countries to more systematically program the training needs as well as to assist in identifying suitable candidates for training. Such an effort need not circumvent existing lines of communication which characteristically run through the training offices in the central Ministries of Agriculture. Coordinators can simply assist those responsible for nominating candidates, by disseminating information about the courses and locating suitable candidates.

D. Courses

WARDA currently offers six courses in the following areas: (1) rice production specialist (6 months); (2) research assistant (8 weeks); (3) post-harvest technology (6 weeks); (4) seed multiplication and certification (6 weeks); (5) rice project management (6 weeks); and (6) rice water management (6 weeks). In addition, there are three refresher courses (3 weeks each) dealing with post-harvest technology, rice production specialist, and research assistant. Table E-1 summarizes the principal features of these courses. In the past, WARDA offered a course for field assistants which was terminated after 1981 in part because the Scientific and Technical Committee (STC) felt that the level of training could effectively be handled at the national level.

Two regional courses have been held in other countries, namely a Water Management Course in Upper Volta in 1979 and a Project Management Course in Togo in 1980 (Table E-1). In general, these courses have proved costlier to organize, both in terms of funds and staff time, than the WARDA courses. In addition, the Training Department was assisted in writing special courses for individual countries, notably in Guinea in 1980. Further, the Training Department is assisting Nigeria in establishing a regular training program for various specializations related to rice research, production, and processing.

The capacity of the Training Department to assist with these special requests is very limited given the demands of the ongoing training program. In the opinion of the evaluation team, such assistance appears to be a cost-efficient means of significantly enhancing the multiplier effects of the WARDA training program. This is not to suggest that such activities should be pursued at the expense of the regular program, but that serious considerations should be given to supplementing the core staff on a short-term or long-term basis to enable WARDA to respond more generously to requests by member

Table E-1. Synopsis of Courses Offered by WARDA

Course	Purpose	Duration
Rice Production Specialist	To train rice production specialists, who should then be able to train trainers and farmers in their respective countries in the latest techniques of rice production	6 months starting in April or May each year
Research Assistant Training	To train assistants to senior scientists in the WARDA coordinated trials and in the various national research programs	8 weeks starting in February each year
Post-Harvest Technology	To train post-harvest technologists or technicians capable of assisting farmers in milling and storing their rice and of administering milling and post-harvest projects	6 weeks starting in November each year
Seed Multiplication and Certification	To train intermediate-level seed technologists capable of implementing and supervising seed production programs with the ultimate aim of ensuring that farmers get good quality seeds for planting	6 weeks (no fixed date)
Rice Project Management	To train high-level personnel capable of planning, implementing, and administering rice development projects	6 weeks (no fixed date)
Rice Water Management	To train water management technologists capable of planning and supervising irrigation and drainage projects for rice cultivation	6 weeks (no fixed date)
<u>Refresher Courses:</u>		
Post-Harvest Technology	To refresh knowledge from previous training courses	3 weeks
Rice Production Specialist		3 weeks
Research Assistant		3 weeks (no fixed date)

countries for assistance in running special courses at the national level. Such assistance might take the form of a single WARDA staff member who would help an institution in a member country to set up and run a short course, possibly making use of former participants in WARDA courses as instructors.

The major objective of the regional WARDA courses is to "train the trainers" who will then return to their own countries and train others. The evaluation team found examples of this multiplier effect, but such instances appeared to be the exception. This may reflect the fact that outside the major rice-producing countries, such as Sierra Leone and Liberia, there are both fewer candidates available for specialized training in rice and less demand for such training by institutions concerned with rice research and development. Indeed, the effects of the rice training program of WARDA may be that the number and specialized training of those in rice research and development may exceed those for most other commodities.

The multiplier effects of the training program might be further enhanced if WARDA would also serve as a clearinghouse for special courses related to rice throughout the region, assisting those seeking training to find spots in courses in other countries where vacancies exist. Further, WARDA might assist with the design of the rice components of more general courses or training programs for research and extension personnel in member countries in schools and colleges of agriculture.

The subject matter of the WARDA training programs appears generally adequate, covering the range of pre- and post-harvest technology. The evaluation carried out by USAID in 1978 called for more attention to extension techniques. While acknowledging the importance of extension training, the impact evaluation team questions how much WARDA should try to do along these lines since (1) most member countries possess extension-training facilities, and (2) training in extension techniques is more location-specific than any other aspect of rice research and development training. WARDA's comparative advantage in this regard might be to assist national programs to upgrade the technical dimensions of extension-training programs rather than significantly increasing the extension component of WARDA courses. The location of the Fendell Center away from any important rice-producing areas places WARDA at a further disadvantage in this regard. Assistance to national programs might include provision of training materials, short-term advisory assistance, and, perhaps most important, the names and institutional locations of former participants in specific WARDA courses from a given country who might help with actual instruction.

The call for more emphasis on extension training in WARDA's program is traceable in part to a perceived need for

improved linkages between research and extension activities. The evaluation team concurs, but feels WARDA's comparative advantage may be in providing training at the regional and subregional levels in farming or cropping systems research methodology. Such training seems particularly appropriate in view of the major emphasis on the Technology Assessment and Transfer program (TAT) in the current USAID support to WARDA. The training might initially take the form of having a few individuals work with the TAT teams located at Bouake, Rokupr, Richard Toll, and Mopti, with emphasis placed on learning through field experience rather than in a formal classroom context. Subjects covered would include (1) assessment of existing farming systems--what farm families are doing and why they do what they do; (2) design and testing of improvement measures under farm conditions with the active participation of farm families; and (3) interaction with village groups and extension agents. The focus of the field work would be on rice-based farming systems. In addition, WARDA might collaborate with farming systems research programs operating in areas where rice is a secondary or tertiary enterprise in the farming systems.

II. UTILIZATION OF WARDA COURSES

Tables E-2, E-3, and E-4 give the number of participants in the WARDA training program by country, year, and type of course since its inception in 1973 through 1981. In all, 664 participants (actually somewhat fewer individuals because some participants attended more than one course and, therefore, are counted more than once) have gone through WARDA courses since 1973. Well over half of this total (396) attended either the 6-month rice production specialist or the 6-week field assistant courses which have been offered nearly every year since 1973. As noted earlier, the field assistant course was cancelled after 1980 and replaced by a research assistant course in 1981. Other courses dealing with seed multiplication, post-harvest technology, and water management are more specialized and are offered every other year. The project management course is offered annually.

Although all member countries are given equal access to WARDA courses, generally each country is invited to send up to two candidates. However, as Tables E-2 and E-3 illustrate, there are considerable differences in the extent to which member states have used these opportunities. On the basis of discussions with officials of WARDA and the member states visited, it is the impression of the evaluation team that use of the training program is related to the factors discussed below.

Table E-2. WARDA Training Program: Number of Participants,
by Country and Course¹

Country	Course							Total
	Field Asst.	Rice Prod.	Post Har.	Proj. Mgt.	Water Mgt.	Seed Mult.	Res. Asst.	
Benin	14	11(1)	4	6	4	2	2	43 (1)
Gambia	14(2)	12(4)	3	7(1)	4	3(2)	1(1)	44(10)
Ghana	13(1)	13(2)	5	3	4	6	1	45 (3)
Guinea	6	6(4)	5	7	2	2	2	30 (4)
Guinea-Bissau	9	8(2)	2	4	1	2	-	26 (2)
Ivory Coast	12	3	2	5	-	4	1	27 -
Liberia	21(5)	18(5)	8	5(1)	4	4	2(2)	62(13)
Mali	18(3)	18(13)	8(4)	6(2)	3	4(1)	1(2)	58(25)
Mauritania	14	8(2)	4	5	2	3	3	39 (2)
Niger	7	6(1)	2(1)	1	3	4(3)	1(1)	24 (6)
Nigeria	8	19	4	4	4	2	-	41 -
Senegal	27(9)	22(6)	5(3)	6(1)	4	6	1(1)	71(20)
Sierra Leone	25(7)	19(8)	10	4(1)	2(1)	5(2)	2	67(19)
Togo	12	11(2)	8	6	3	4	3	47 (2)
Upper Volta	6	16(5)	4(1)	7(1)	3	2(1)	2	40 (8)
Total	206 (27)	190 (55)	74 (9)	76 (7)	43 (1)	53 (9)	22 (7)	664 (116)

¹The number of training program participants who completed questionnaires administered by the impact evaluation team is given in parentheses.

Table E-3. WARDA Training Program: Number of Participants by Country and Year

Country	Year								Total (%)
	1973	1975	1976	1977	1978	1979	1980	1981	
Benin	4	4	6	-	4	12	8	5	43 (6)
Gambia	3	2	6	3	5	7	11	7	44 (7)
Ghana	6	1	4	7	8	5	11	3	45 (7)
Guinea	-	-	-	-	-	11	10	9	30 (5)
Guinea-Bissau	-	-	6	2	5	7	5	1	26 (4)
Ivory Coast	4	1	3	4	4	5	3	3	27 (4)
Liberia	6	1	5	8	8	12	15	7	62 (9)
Mali	8	3	5	7	7	9	10	9	58(19)
Mauritania	4	3	2	5	4	10	6	5	39 (6)
Niger	3	-	3	2	5	4	5	2	24 (4)
Nigeria	3	2	6	10	9	7	2	2	41 (6)
Senegal	8	2	5	14	12	9	15	7	71(11)
Sierra Leone	7	3	7	9	8	13	16	4	67(10)
Togo	4	-	4	6	5	10	10	8	47 (7)
Upper Volta	-	-	3	4	9	6	12	6	40 (6)
Total	60	22	64	81	93	127	139	78	664(100)

Table E-4. WARDA Training Program: Number of Participants, by Course and Year

Course	Year								Total
	1973	1975	1976	1977	1978	1979	1980	1981	
Field Assistant	37	22	28	30	33	28	28	*	206
Rice Production Specialist	23	X	22	24	30	31	28	32	190
Post-Harvest Technology	X	X	X	27	X	19	28	X	74
Rice Project Management Seminar	X	X	X	X	X	23	29	24	76
Rice Water Management Seminar	X	X	14	X	X	26	3	X	43
Seed Multiplication and Certification	X	X	X	X	30	X	23	X	53
Research Assistant	<u>X</u>	<u>22</u>	<u>22</u>						
Total	60	22	64	81	93	127	139	78	664

• = Course cancelled by the STC.
X = Course not offered that year.

A. Importance of Rice in the National Economy

Countries where rice is an important element in the national diet are more likely to place priority in providing candidates for the WARDA program than countries where rice is a secondary or tertiary commodity. The most frequent users of WARDA training programs are all major rice producers, including Liberia, Mali, Sierra Leone, and Senegal. In contrast, rice is decidedly less important in Niger, which is a relatively light user.

B. Population/Pool of Suitable Candidates

As a general hypothesis, one might expect that countries with larger populations might be higher users of the training programs than countries with small populations. However, there does not appear to be a strong relationship between the two. Ghana, Togo, and Benin have all sent a slightly higher number of candidates than Nigeria, despite the fact that the latter has more than 10 times the population of the others. The size of the pool of suitable candidates might also be a factor, although once again no strong relationship is evident. The only two cases where these factors might be significant are Gambia and Guinea-Bissau. Both have small populations and relatively small pools of suitable candidates to draw from. This is particularly true of Guinea-Bissau which faces the added problem of finding candidates who are operational in either French or English.

C. Distance From Monrovia--Ease of Communications

Communication problems within West Africa cannot be over-emphasized: member countries might not hear about courses; WARDA might not receive the names of nominees in time to send authorizations for tickets; such authorizations might not be received in the member countries; and so on. The problems are further compounded if candidates are located outside the capital cities. In general, communications tend to be marginally better between Monrovia and adjoining countries including Sierra Leone, Guinea, and Senegal. Both air travel and telecommunications to Nigeria and Niger are difficult. This may help explain why countries close to Liberia tend to be better users of the training program than those distant. However, a more important factor may be the efficiency with which the officers handling the nominations (usually in the central ministries of agriculture) locate candidates and process the necessary papers.

D. Length of Membership in WARDA

This is an important factor only with respect to Guinea, which became a member in 1979. Guinea has been a strong user of the WARDA training program since joining the organization, and WARDA has offered special courses in Guinea.

E. Availability of Alternative Training Opportunities

This appears to be an important factor in explaining the somewhat low level of utilization of WARDA courses by Ivory Coast and perhaps to a lesser extent by Nigeria. Both countries have domestic training programs which include rice components although they are not focused exclusively on rice. In addition, there is a greater availability of funds in these countries to send candidates outside the region for training, as well as a strong preference for training outside the region on the part of most potential participants. It was suggested that low utilization might also be related to a negative view about the quality of the training provided by WARDA on the part of officials making decisions about nominations and training. However, no firm evidence of such attitudes was encountered.

III. SURVEY RESULTS

As part of its evaluation of WARDA's training program, the evaluation team conducted a survey of former trainees. The major part of the survey consisted of administering a standard questionnaire to former participants in the countries visited in the course of the evaluation. The questionnaire was objective and was designed primarily to identify the qualifications and current activities of former trainees. Respondents represented targets of opportunity rather than the results of random selection. There was some bias toward those working on rice research, seed multiplication, and extension projects since these were the operations which the team members visited in the course of their travels. In some instances, assistance in administering the questionnaires was obtained from officials in the institutions visited or the staff of USAID missions. In virtually all instances, staff were most cooperative in assisting in administering the questionnaires and, in the case of the former trainees, in taking time to complete the forms.

As a supplement to the actual questionnaire, it was possible in some of the countries visited to determine the current activities of former trainees through discussions with knowledgeable individuals in government agencies (usually training

or personnel officers). Except for participants in the field assistant course, who tend to be drawn from a large pool of lower middle grades in government service, the middle and upper levels of agricultural research and extension services in nearly all the member countries are sufficiently small that everybody has a fairly good idea of where their peers are and what they are doing. By this means, it was possible to account for nearly all the former participants in the rice production specialist course between 1976 and 1980 from Liberia, Sierra Leone, Gambia, and Mali. (WARDA was unable to locate the list of names of participants who attended the 1973 course which was handled by the International Institute of Tropical Agriculture in Nigeria.) The results are summarized in Table E-5.

An examination of these results clearly indicates that the overwhelming majority of former participants (41 out of the 43 from whom information was obtained) from these countries are currently working primarily or exclusively on rice. (Information was unavailable from another 10 participants, and 1 former participant from Liberia had died.)

A number of former WARDA trainees complained that the WARDA course had not contributed to their promotion, and in at least one instance a participant found that he had been demoted following his return from a WARDA course. This is not really WARDA's problem, since the promotion standards of individual member countries are involved, and WARDA should continue to place primary emphasis on the provision of specific skills related to rice research and development rather than trying to model the courses in such a fashion as to increase the likelihood that more recognition will be given to the courses in promotions. At the same time the situation adversely affects WARDA's ability to attract top quality trainees into its programs.

In summarizing these questionnaires, the major positive finding was that individual trainees acquired solid skills in a specific area and that almost all of them could apply those skills to improve their job performance, if not to gain a promotion. However, it must be added that these skills remained individual skills, not team skills: the ability to work with a team to solve interdisciplinary problems has not developed from the WARDA training curriculum. This is not the case with the training programs of certain other international agricultural research centers. This interdisciplinary problem-solving approach would require that the training be carried on in a rice farming environment where agronomic difficulties would not be presented in laboratory isolation, artificially separated from the problems to be solved. The pedagogic consequences of this isolation of training from ongoing rice-farming systems is one of the reasons why this evaluation has recommended that as much of the training as possible be moved from Fendell to Suakoko.

Table E-5. Current Responsibilities of Participants in
WARDA's Rice Production Specialist Course, 1976-1980

Current Responsibilities (as of October 1981)	Country				Total
	Liberia	Sierra Leone	Gambia	Mali	
1. Rice Research/Extension (primarily/exclusively)	6	12	7	10	35
2. Rice Research/Extension (partially)	2	-	2	2	6
3. Not Working on Rice	1	1	-	-	2
4. No Information	<u>4¹</u>	<u>1</u>	<u>-</u>	<u>6</u>	<u>11¹</u>
Total	13	14	9	18	54

¹Includes one deceased former participant.

APPENDIX F

WARDA COMMENTS ON DRAFT IMPACT EVALUATION

The impact evaluation team wishes to thank WARDA officials for their extensive and thoughtful comments on an earlier draft of this report. Some of these comments have been incorporated into the report; all are reproduced below as received.

INTRODUCTION

The West Africa Rice Development Association (WARDA) wishes to express its appreciation to the members of the Impact Evaluation Team for the time and interest they devoted to this important study. WARDA will benefit from the methodology used in this study. Also, WARDA would like to thank the United States Agency for International Development for sponsoring and financing this Impact Evaluation.

WARDA welcomes the critical analysis, findings, and proposals made in the Evaluation Report. The Report and its recommendations were fully studied by WARDA. Some of the comments should be fully considered by WARDA's leadership, management, and technical experts reflect on WARDA's programmes for possible re-organization and further priority setting. The Donors may also have to re-examine their technical and financial relationships with WARDA with the view to streamlining them for effective impact contributions.

However, WARDA does not share the view or the assumptions made by the authors of the study. Consequently, it is our view that not all of the criticisms and recommendations are based on a proper understanding of WARDA's role. As a result, wrong conclusions have been made on some issues. WARDA shall deal with these misconceived ideas as they appear in the Impact Evaluation Study.

The WARDA comments will follow the organization of the Impact Report.

EXECUTIVE SUMMARY

Project Results

Comments: Rokupr and Mopti projects have always been controlled financially and administratively from Headquarters on an equal basis except that the financial support for the two British Technical Aid Staff is administered directly by the British High Commission in Freetown, Sierra Leone.

British Technical Aid constitutes about 40% of the total budget of the Rokupr Project. Moreover, all of WARDA's Special Projects are all an integral part of the Research Department and hence are equally answerable to the Director of Research at Headquarters. Rokupr's relative success cannot be attributed to lb and le. Much

of the difference can be attributed to the more difficult nature of the deep flooded ecology and the late start of the Mopti Project. Attributes 1a, 1d, and 1e contributed partly to the difference in success.

WARDA and Impact Monitoring

Comments: The following time-table of development (staff and facilities) of the two projects is essential for a fair comparative assessment of the two.

Rokupr Project

1. Research Assistants (4) were appointed in 1975.
2. The British Soil Scientist (also became Team Leader at a later date) and the present Entomologist and Team Leader were appointed in 1976 and 1977 respectively, while the Plant Breeder (British Aid) was appointed in 1978.
3. Infrastructure development (building and laboratories) started in 1976.
4. Trained field staff and already developed mangrove swamps were available at the start.

Mopti Project

1. It is pertinent to mention that WARDA was not mandated to hire a Director for Mopti right from the beginning. The position of the Director as far as the Agreement was concerned, was to be filled by a citizen of USA. In 1978, an Acting Deputy Director was hired for one year by the USAID waiting for administration and procurement. It was only in 1979 that WARDA was allowed by USAID to appoint a Director for Mopti from other country.
2. All the research assistants (4) were appointed in 1975 but had to be sent to BIRRI and elsewhere for the necessary training.
3. The Deputy Director (present Agronomist) joined the Project in 1979.
4. Until 1978, the experimental area, office, laboratory and other infrastructure had not been fully developed and equipped.
5. The position of Director is still vacant due to various reasons.
6. Thus actual field work at Mopti started very late (in 1977).

Moreover, the two ecologies (mangrove and Mopti) are completely different. Especially in Africa, rice in deep water conditions is subjected to more environmental hazard than any other ecology, and in general more difficult to contain.

SECTION I. PROJECT SETTING AND DESCRIPTION

A. WARDA Origins and Objectives

Comment: On A (iii): WARDA's research role is more than that of an intermediary. The Special Research Projects are intended for, and in fact, are developing appropriate varieties and production technologies for various rice ecologies. The Headquarters Technical Service Staff (Breeder, Plant Pathologist, Entomologist, Agronomist and Agronomic Statistician) are backstopping the Special Research Projects while the Sub-regional Coordinators link the Special Research Projects with the national research programmes.

B. WARDA: Organization Activities

Comment: The WARDA Research programmes have resulted from programming and consultations at several levels. First in March, 1971, the West African Rice Research Workers met under the auspices of FAO, in home to draft what was adopted later that year by the WARDA Governing Council as the mid-term work programme. This incorporated rice development as a major activity. It determined the forms of rice cultivation to be studied and the research centres where these would be done. Later, a team of scientists including consultants from USAID, France and FAO updated an earlier FAO Inventory on Rice Research in West Africa by visiting the proposed centres early in 1972. Their reports were reviewed by West African Scientists and in May 1972, at the Extraordinary Governing Council Meeting held at Bamako, Mali, the first steps toward adopting a research and development work programme for WARDA were taken. The draft work programme was reviewed and re-adjusted at a meeting among the WARDA Secretariat, Technical Advisory Committee (TAC) the Consultative Group on International Agricultural Research (CGIAR), FAO, International Rice Research Institute (IRRI) and International Institute for Tropical Agriculture (IITA). This paved the way for the establishment of the coordinated trials and the special research projects. In 1974, the WARDA research programme was reviewed by USAID, CGIAR and TAC after missions to West Africa. Later, the Governing Council at its fourth seating in Ibadan adopted further improvements in the WARDA research programme with particular reference to:

- i strengthening the management capacity of the research team;
- ii integrating the special research projects with the coordinated trials;
- iii establishing multi-disciplinary research teams at the centres;
- iv strengthening support to national research activities;

- v developing closer ties between WARDA research activities and the international centres;
- vi strengthening the initial evaluation and preliminary variety trials.

The Training Department was part of the Research Department until April 1976 when it became a full fledged department.

SECTION II. ANALYSIS OF PROJECT IMPACT

A. Limiting Factors

Statement of paragraph 2: "WARDA has been in existence for nearly a decade, a long enough period, it might be argued, for there to be a fair expectation of demonstrable impact upon national rice research and development efforts of member countries."

The statement is qualified as follows:

1. Coordinated trials - in 1973
2. Modification and regrouping of coordinated trials as per ecology in 1980
3. Rokupr Project in 1976
4. Richard Toll Project in 1976
5. Mopti Project in 1977/78 but there was no infrastructure and developed experimental field. The infrastructure and some of the experimental fields were completed in 1979, and some facilities are yet to be completed.

A 7. Comment: That most WARDA Staff come out of national programmes is not necessarily detrimental to such programmes since the services of these acquired staff continued to benefit these same national programmes.

C. Rice Production Impact

Paragraph 2 - Comment: All the International Centres indulge in the practice of exchange of genetic materials and wide testing. WARDA is no exception and has the mandate in carrying out coordinated and other trials and in collaboration with national and international centres. This collaboration has definitely accelerated the variety improvement and production of rice in the West Africa Region.

Paragraph 5 - Comment: This is exactly WARDA's involvement. The Special Research Projects play a major role in this respect.

D. Impact of the Special Projects

Comment on Mopti already made.

H. Networking Relations with Member States and their Scientists

Paragraph 1 - Comment: The scientists of the WARDA Research Department are on the 6th Floor of Headquarters, all financed by CGIAR, number as follows:

One Plant Breeder (joined in 1976)
One Plant Pathologist (joined in 1981)
One Entomologist (joined in 1980)
One Agronomist (joined in 1981)
One Agronomic Statistician (joined in 1977)
One Associate Plant Pathologist (joined in 1978)

The activities of these scientists extend throughout the region in 15 member countries. This number of scientists, considering the scope of activities, could hardly be regarded as a concentration of scientists on the 6th Floor. The Sub-Regional Coordinators have always been in the field.

General: We hope our comments above will have a direct bearing on the conclusion and recommendations and lessons learned.

A.I.D. EVALUATION PUBLICATIONS

The following reports have been issued in the A.I.D. Evaluation Publication series. Those documents with an identification code (e.g., PN-AAG-585) may be ordered in microfiche and paper copy. Please direct inquiries regarding orders to:

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EVALUATION METHODOLOGY/EVALUATION ISSUES

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