

1 INTRODUCTION, BACKGROUND AND CONTEXT

1.1 Africa's rice economy

Rice in the world and in Africa

Rice is the staple food of more than half the world's population, and about four-fifths is produced by small-scale farmers for their own consumption and local markets. According to FAO, about one billion households depend on rice for their livelihood. As a food crop, it is the most consumed cereal. With a growth in demand at a rate of 3.4% per annum (1961-2005), world rice production has been less than rice consumption since 2000, bringing the world's rice stocks to 105 million tons, the lowest level in 25 years. Representing less than two months of global consumption, half of world rice stocks are being held by China.

Global rice consumption and exports are highly concentrated in Asia, which accounts for 88% of consumption and 77% of exports. Compared with the international markets for wheat or maize, which account for some 19% and 13% respectively of world production, the international rice market is "thin" at 28.6 million tons in 2006, or about 7% of global production.²

Africa has become a big player in international rice markets, taking up 32% of global imports in 2006, at a record level of 9 million tons that year. Africa's emergence as a big rice importer is explained by the fact that, during the last decade, rice has become the most rapidly growing food source in Sub-Sahara Africa (SSA).³ Indeed, due to population growth, rising incomes and a shift in consumer preferences in favor of rice, especially in urban areas⁴, the relative growth in demand for rice is faster in SSA than anywhere in the world. This is occurring throughout the sub regions of SSA.

Furthermore, international rice prices have been on an upward trend since early 2003 (see Figure 1.1 below), and it is estimated that if present trends continue, they may double their 2003 level within the next five years. Africa's domestic production is being fueled by this rise, which is reflected in higher producer prices (see Annex 8). According to OSIRIZ (CIRAD's Observatory of International Rice Statistics), in 2006, Africa cultivated about 9 million hectares of rice, and production, which surpassed 20 million tons for the first time, is expected to increase by 7% per year.

In West Africa, where the rice sector is by far the most important in SSA, the situation is particularly critical. Despite the upward trends in international and domestic rice prices, domestic rice consumption is increasing at a rate of 8% per annum, surpassing domestic rice production growth rates of 6% per annum. The production-consumption gap in this region is being filled by imports, valued at over US\$ 1.4B per year. The share of imports in consumption rose from an average of 43% from 1991 to 2000, to an average 57% by 2002-2004.^{5,6} Indeed, predictions suggest that imports in West Africa will increase to about 4.5 million tons by 2010 and to anywhere between 6.5 and 10 million tons by 2020.⁷

²Calpe, C., International trade in rice: recent developments and prospects, International Rice Commission Newsletter, 2005, FAO, Rome, Vol. 54, pp. 11-23.

³Solh, M., Rice is life in 2004 and beyond, International Rice Commission Newsletter, 2005, FAO, Rome, Vol. 54, pp. 1-10.

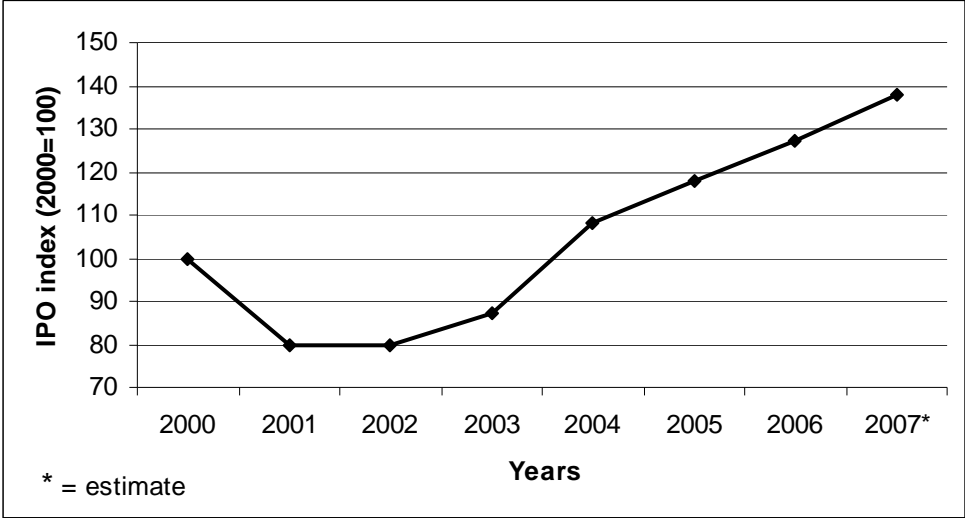
⁴Balasubramanian, V., M. Sie, R.J. Hijmans and K. Otsuka, Increasing Rice Production in Sub-Saharan Africa: Challenges and Opportunities, Advances in Agronomy, 2007, Vol. 94, pp. 55-133.

⁵WARDA, Rice Trends in Sub-Saharan Africa, Third Edition, Cotonou, 2005, p. 31 and FAOStat.

⁶IRRI, Rice Almanac, Third edition, Los Baños, 2002, p. 79.

⁷WARDA, Annual Report 2001-2, p.41.

Figure 1.1 Evolution of International Rice Prices, 2000-2007 (FOB export basis)



Source: Osiriz/Infoarroz (various issues) Monthly Report of the World Market of Rice

The policy environment of rice in Africa

From an international trade perspective, rice continues to be one of the most protected commodities in both developing and developed countries, through high tariff and non-tariff barriers, export restrictions and aid, state trading and other domestic market interventions. The United States and the European Union heavily subsidize their rice producers, and in doing so depress world rice prices. Asian producers and major exporters such as Thailand, Vietnam, Pakistan and India have national rice strategies for supporting production and sustaining market prices, although they generally do not heavily subsidize rice exports.

While the international policy environment is not favorable to develop rice production in SSA, the rise in international rice prices by 75% since 2003 continues unabated. Furthermore, African producing countries protect local production through import tariffs, quantitative restrictions, and sometimes with subsidies on seeds and fertilizers. The political will to achieve self-sufficiency is there in WCA⁸ and ESA, but usually without the needed public investment needed in research, extension, input delivery, credit, irrigation development, markets, etc. In addition, given the order of magnitude of growth in rice consumption, it is clear to the Panel that seeking to eliminate imports over a short time span is unrealistic.

In the case of Nigeria, between 1986 and 1994 there was an import ban, subsidized provision of inputs and finance for production, but none of these measures halted the long-term trend of continuing import-dependency. More recently, the government has announced its intention to impose an import ban again.⁹ Through the country’s Presidential Rice Initiative, which aims at self-sufficiency in rice, producers have been supported by subsidies on seeds (50%) and fertilizers (25%), the legalization of private fertilizer imports, and strong border protection against rice imports – an import duty of 50% and a levy of 50%. As a result, rice production has increased for

⁸ With some exceptions as tax exempt imports in Guinea and an agreement to subsidize imports.

⁹ However, these domestic protection measures may not be sustainable in the long term because of its adverse effects on consumer prices.

five consecutive years. However, Nigeria still imported around 1.8 million tons of rice in 2006, despite consumer prices that are among the highest on record due to import protection.¹⁰

In Guinea (Conakry) where NERICA rice (New Rice for Africa) has so far made the largest impact, domestic production covers about 70% of consumption. In 2006, the country imported 350,000 tons of rice¹¹, and now has an agreement between the government and urban labor unions to provide a subsidy on rice imports. This agreement was reached after most rice imports were made tax-free in the last trimester of 2006. In Senegal, rice imports surpassed 600,000 tons in 2006, and according to the international press, the recent riots in Dakar, the capital, were fueled by increasing consumer prices of rice.

Poverty, food security and rice

About one quarter of the world's extreme poor live in SSA, and this share is increasing. Poverty in this region is largely a rural phenomenon, with 80% of the poor in rural areas. Rural poverty reduction must therefore be given priority if the Millennium Development Goals (MDGs) are to be achieved. It has only recently been acknowledged that economic growth can be only truly sustainable when poverty is explicitly taken into account. Therefore, since the great majority of agricultural producers are smallholders, they constitute the engine of income growth in rural areas.

A positive perspective from a recent IFPRI-IITA-CORAF/WECARD and ECOWAS study¹² on regional strategic alternatives for agriculture-led growth and poverty reduction in West Africa noted that "... if countries can maximize their agricultural potential, nine out of twenty West African countries can achieve the 6 % annual agricultural growth target and another seven will attain more than 5% growth in the next 10 years." The study also stated that among the major commodities, rice shows the highest potential for growth, and could subsequently generate the largest producer benefits among many countries and the region as a whole. The study also predicted that "Joint investments in rice research and development at the regional level will provide even higher returns, given its potential for transferability across borders". Furthermore, in CORAF's Strategic Plan (2000), rice was identified as the priority food crop in West Africa's coastal countries, and ranked as the second most important food crop after vegetables in Sahelian West Africa.

Rice production and marketing has large multiplier effects, with many forward and backward linkages throughout the economy, producing a large value surplus, leading to wealth accumulation (savings), which can be the source of new investments, increasing (land and labor) productivities, resulting in a continued process of positive cumulative change in the economy and people's living conditions. The conclusion is that rice development is potentially the best driver of development for SSA – the locomotive that will enable growth and poverty reduction. In addition, WARDA is in the driver's seat of such development. The fact that prices to producers in Africa are rising provides new incentives for technological change, and constitutes an opportunity that WARDA should not miss.

¹⁰ 2.3 million tons in 2005 according to the FAO Rice Market Monitor of December 2006 (Vol. IX – Issue No 4). Nigeria consumes about 4.5 million tons of rice per year.

¹¹ Brossier, Jacques, Evaluation of the impact of NERICA rice varieties in Guinée", CCER WARDA, July 2007.

¹² IFPRI in collaboration with IITA, CORAF/WECARD and ECOWAS, Regional Strategic Alternatives for Agriculture-led Growth and Poverty Reduction in West Africa, final draft report, Washington D.C., December 31, 2006.

Rice production and productivity, quality, and local institutions

While in the ESA region, rice is very much a cash crop for small- to medium-scale farmers, it is more of a subsistence crop in West Africa, where most of the continent's rice is produced. In West Africa, 75% of the total production of rice in 1999/2003 is from upland, hydromorphic and lowland ecosystems, with about 25% from irrigated fields (see Table 1.1). Rice is also produced in mangrove production systems and in flooded environments.¹³

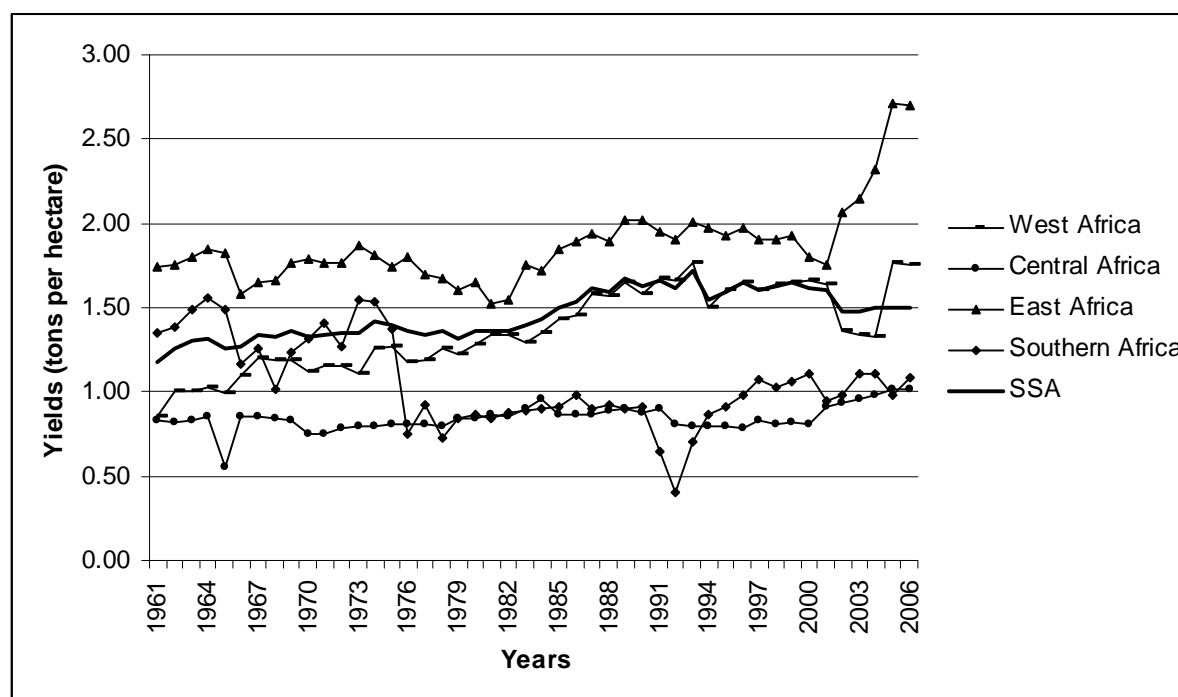
Yields constitute one of the main challenges of rice production in SSA. The gap between potential yields and actual yields is usually large, for a variety of reasons (discussed further in this report). Furthermore, in spite of their rise in more recent years, average rice yields in SSA have been, overall, decreasing since the mid-1990s. The more recent increases are mainly due to the expansion of rice production into marginal areas in West Africa, where most production occurs (see Figure 1.2, below).

Table 1.1 Estimation of rice production trend by each rice production ecology in West Africa during 1984 and 1999/2003

	Area (million ha)		Production (million t/year)		Yield (t/ha)	
	1984	1999/2003	1984	1999/2003	1984	1999/2003
Upland	1.5	1.8	1.5	1.8	1	1
Rainfed lowland	1.5	1.8	0.75	3.4	1.4	2.0
Irrigated lowland	0.23	0.56	0.64	1.9	2.8	3.4
Total	2.6	4.7	3.4	7.7	1.3	1.6

Source: CCER on Integrated Genetic and Natural Resources Management, Gurdev Kush, Toshiyuki Wakatsuki and Glietho Isabelle Adole, 22 January-10 February 2006, WARDA, Cotonou.

Figure 1.2 Evolution of paddy rice yields in Sub-Saharan Africa (1961-2006)



Source: Alioune Diagne, 2007, personal communication, WARDA.

¹³ Research on the mangrove ecology is coordinated by the Rokupr rice research station in Sierra Leone with financial support from WARDA.

Another challenge is the inferior quality of domestic rice *vis à vis* imported rice. Domestic rice is of uneven quality, has impurities, and is usually sold in bulk, in 5kg bags, unbranded, at a discount of 30% to 50%, compared to imported rice. There are exceptions to this, as in Guinea (Conakry) and in Mali, where local rice (for certain varieties) receives a price premium. In order to improve quality of local rice, institutional innovations are needed that make producers more responsive to end-user requirements, and attach much more importance to milling and cleaning, and identity preservation (no mixing of different rice varieties).

The institutional environment for the development of rice production in SSA represents a third challenge. It is gradually improving as a result of NEPAD's¹⁴ focus on agriculture with the CAADP¹⁵, the African Rice Initiative (ARI), and efforts by WARDA and its many partners, particularly its Council of Ministers (COM). However, national institutions efforts to support rice production and post-harvest are almost always insufficient. Many village associations belong to the village community as a whole, have no formal association status, often have no formal accounting system, and entirely depend on the credibility of their leaders. It is thus not surprising that many fail while others are purely political organizations capturing resources through political networks. It is thus unrealistic to expect them to perform effectively as farmer-owned businesses. Cooperatives, when they are established, have to be coherent with pre-existing hierarchical social structures. Many of them lack business orientation and responsiveness to the members. How to create and support effective institutions is a major challenge.

The truth of the matter is that in SSA, growth in rice demand as a preferred staple is so strong that production intensification and higher yields per hectare will not be sufficient to fill the gap and meet rice demand. Unlike in Asia during the green revolution, productivity gains are likely to come in small increments due to the diverse nature of Africa's cropping systems.¹⁶ Yet the potential for growth in the African rice sector is enormous. A rapid increase in the area under rice, irrigated as well as rainfed, is necessary. In particular, the development of new irrigated rice schemes is vital. Only about 17% of the rice area in Africa is irrigated. Asia, in contrast, has about 57% of the rice area under irrigation, but has little or no room for further expansion. Indeed, Ram C. Chaudhary and Dat Van Tran¹⁷ seriously consider whether Africa can be the future rice bowl of Asia. By 2010, Asia may no longer have net rice exports, because of increasing population and consumption, and decreasing land, labor, water and other resources. Instead, by 2020, it is expected that Asia may become a rice-importing continent. They state that millions of hectares of land appropriate for rice growing lay idle in Africa. Water and other resources are available and plentiful. They add that there are other comparative advantages of Africa, which can complement Asian strengths. In addition, they argue that Asia-Africa cooperation in rice production can convert many African countries from net rice importers to net rice exporters, as well as provide hope for Asian countries to fill their rice bowl.

1.2 WARDA's mission and as a research for development institution

WARDA was created in 1970 by 17 member countries as a rice development association in West Africa before it joined the CGIAR in 1987. While it is a CGIAR research Center, development activities have always been prominent at WARDA because of its origins and association status –

¹⁴ New Partnership for Africa's Development

¹⁵ Comprehensive Africa Agricultural Development Programme

¹⁶ Balasubramanian, V., M. Sie, R.J. Hijmans and K. Otsuka, Increasing Rice Production in Sub-Saharan Africa: Challenges and Opportunities, *Advances in Agronomy*, 2007, Vol. 94, pp. 55-133.

¹⁷ Ram C. Chaudhary and Dat Van Tran, Can Africa be the Future Rice Bowl for Asia?, in *Proceedings of the 4th Asian International Rice Conference*, Cebu, the Philippines, 1999, 29 p.

governed by a Council of Ministers (COM) of 17 West African countries. Moreover, the *modus operandi* of WARDA, as the smallest of all CGIAR Centers in terms of budget, is collaborating with NARS and stakeholders at all levels.

WARDA's challenges in rice productivity, rice quality and post-harvest, and rice institutions are certainly daunting. WARDA's mission statement has evolved over the years in response to these challenges, and to developments in the CGIAR and its member states. WARDA's mission for the period 2003-2012 is *to contribute to poverty alleviation and food security in Africa, through research, development and partnership activities aimed at increasing the productivity and profitability of the rice sector in ways that it ensures the sustainability of the farming environment*. Key aspects contained in this mission are the goals, the strategy through which these goals will be achieved, and WARDA's objectives, including the focus on attaining sustainable rice production and contributing to the achievement of the MDGs. The Panel is of the opinion that the need for rice and for research on improving its productivity and supply remains high in SSA (as discussed above), and that WARDA's mission remains relevant and appropriate.

Presently, development activities of WARDA occur mainly through networks operated through its technology transfer unit, rice policy dialogue in Africa, through APRAG and through the Africa Rice Initiative (ARI), which promotes the production and diffusion of quality seed, particularly of NERICAs.

WARDA varieties have not been adopted as widely as hoped for. WARDA has therefore tended to move more towards the development side of the research and development continuum, especially concerning foundation seed production in the ARI¹⁸ framework, given the lack of sufficient private sector activities in seed production in West Africa. Thus, WARDA, like any other commodity-based CGIAR Centers operating in SSA, struggles with the issue of how far to go in (foundation) seed production.

1.3 The general organization of WARDA

In response to external and internal developments, the organizational structure of WARDA has changed several times since the 4th EPMP. The new Director General established a new organizational structure at WARDA in 2007, as shown below, in Figure 1.3. The division between a research and development department and a corporate services department, both headed by an Adjunct Director General, seems to be working well. To the Panel, this organizational structure appears functional and adequate.

1.4 The "Ivorian crisis"

During the review period, a major determinant of WARDA's program was the "Ivorian crisis". In September 2002, WARDA was suddenly confronted with a huge external shock that has had significant long-lasting after-effects. A *coup* attempt by rebel forces in Côte d'Ivoire, centered initially around Bouaké, WARDA's permanent headquarters, necessitated a hurried mass evacuation of all staff and families to safer ground in Abidjan and Bamako (in Mali). Center management and staff showed commendable resourcefulness and fortitude; and were able to retrieve most of the germplasm collections and important documents and data, thus maintaining many essential functions. Despite their heroic efforts, and the financial assistance and moral support from WARDA's investors and partners, Center operations were inevitably, severely

¹⁸ Presently, 100 tons of NERICA foundation seed are being produced by WARDA at M'bé for Nigeria in the framework of Nigeria's Presidential Rice Initiative.

disrupted, and staff and families had to face considerable professional challenges and personal hardship during this harrowing period.

In May 2003, the opposing forces in Cote d'Ivoire signed a Peace Agreement, which promised an immediate end to hostilities. Encouraged by this, the Board and Management of WARDA initiated plans to return to Bouaké. Upon receiving assurances from national and local authorities, a partial return to the headquarters in M'bé was attempted in September 2004. However, this attempt was interrupted by a resumption of hostilities around Bouaké, including the tragic loss of life of one WARDA senior staff member. This meant a second retreat from Côte d'Ivoire, and the relocation of WARDA to its current temporary headquarters in Cotonou, Benin.

The Center's headquarters and most of its staff have thus been located in Cotonou since January 2005. In April 2005, the WARDA Board and Management assessed the evolving situation in Côte d'Ivoire. In view of the continuing uncertainty and unpredictability of the ground realities in Bouaké, and in order to provide stability to the work program, staff, and families, they came to the conclusion that the return to M'bé could take between 3-5 years, if not more. Thus at the time of this EPMR, five years after the first eruption of the "Ivorian crisis", WARDA is still awaiting a return of stable peace in Côte d'Ivoire.

The main events of the "Ivorian crisis" are further described in Annex 9. The severe continuing effects of this crisis on WARDA's research program, governance, and management are discussed in the main text. In the Panel's view, the Center has now largely--but not wholly--recovered from the effects of this "Ivorian crisis", as discussed in relevant sections of this report.

1.5 Key developments since the fourth EPMR¹⁹

Institutional developments

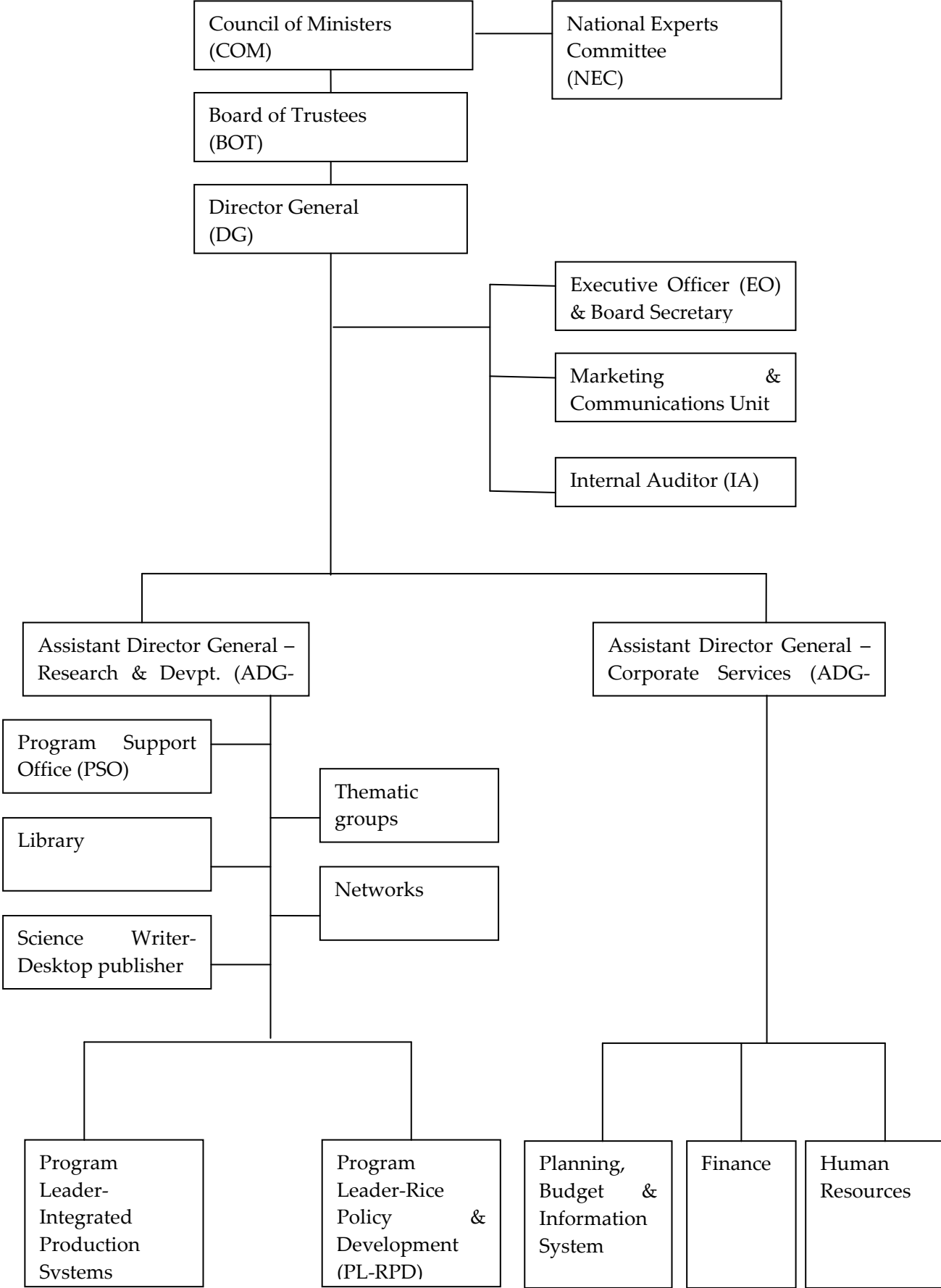
In March 2001, WARDA completed its Phase II Construction (Phase II) at its headquarters in M'bé, Côte d'Ivoire. Phase II included two main buildings: the Information and Documentation Center (IDC) hosting offices, a computerized library and the conference hall; and the Research Extension Building hosting offices and fully equipped laboratories for grain quality and physiology, pathology and agronomy. This development was fully funded through Member states' contributions.

In September 2002, WARDA completed the construction of a fully equipped biosafety building at M'bé, Côte d'Ivoire. Genebank facilities were also under construction, but this was not carried through because of the "Ivorian crisis". The "Ivorian crisis" in 2002-2004 caused serious disruption and resulted in a financial loss for WARDA. Many staff left and had to be replaced. In September 2006, WARDA completed the construction of a fully equipped genebank at the IITA-Benin Station in Cotonou where it has established its temporary headquarters. The materials and equipment were retrieved from M'bé.

WARDA has taken a more prominent role in Eastern and Central Africa, providing backstopping and financing for the newly established Eastern and Central Africa Rice Research Network (ECARRN) created by the Association for Strengthening Agricultural Research in Eastern & Central Africa (ASARECA).

¹⁹ The Panel's comments on WARDA's follow-up actions on the 4th EPMR recommendations are presented in Annex 7.

Figure 1.3 Organizational structure – Africa Rice Center



WARDA is swiftly moving towards achieving gender balance: from no female senior staff at the time of the 4th EPMR to nine women employed in senior positions, including two in the Senior Management Team (SMT).

Governance

The number of Board members was reduced, in line with CGIAR guidelines. Throughout the period under review, the Board and the COM provided an element of stability to WARDA, its management and staff, and helped weather the disruption caused by the “Ivorian crisis”.

Programmatic developments

Several reorganizations in program structure took place following the 4th EPMR recommendations. WARDA published a new Strategic Plan 2003-2012 (SP) in 2004, preceded by a priority-setting exercise and extensive consultations and planning meetings over a period of three years. Two core research areas were defined in the SP: integrated rice production systems, and rice policy and development. Each program comprises several projects, partnerships and network activities.

Several rolling Medium-Term Plans (MTP) were also prepared to guide WARDA’s research. An internal priority-setting task force helped prepare the 2005-2007 MTP. The number of projects was reduced from 14 in the 2004-2006 MTP to eight in the 2005-2007 MTP, and to six in the proposed 2008-2010 MTP. The consolidation aims to simplify WARDA’s research program structure. As a result of the “Ivorian crisis”, the Centre experienced a large turnover of IRS and GSS²⁰ support staff, with several senior experienced scientists leaving WARDA. Actual staff numbers have recovered and are now comparable to those at the time of the 4th EPMR, indicating a rapid build-up of staff capacity in recent years.

Financial management

Despite the crisis that erupted in Côte d’Ivoire in September 2002 and the subsequent temporary relocations of the Center’s headquarters, WARDA has grown from a position of chronic deficit to positive reserves, to cover 87 days at the end of 2005, and 105 days at the end of 2006. WARDA’s budget remained more or less stable around US\$ 10-11M over the period under review. A further indicator of financial health is the Center’s efficiency of operations expressed as a ratio between indirect and direct costs. For 2006, the indirect/direct cost ratio is projected at 28%, slightly above the CGIAR average.

Communication and public awareness

On 2nd September 2001, to commemorate WARDA's 30th anniversary, a new corporate website was launched in English and French, with a stronger focus on research and partnerships. Besides its new look and design, it has several new features and components. A new website for the ECARRN was also developed. The ARI and IVC sites were revamped, and the SWIHA site was restructured.

²⁰ IRS = Internationally-recruited staff; GSS= General support service staff.

1.6 Evolution of WARDA: strategic and medium term plans, research program structure, research organization by location, CGIAR system priorities

The strategic plan

A strategic plan (SP) was prepared in 2001-2003, and covers the period 2003-2012²¹. A priority-setting exercise preceded the elaboration of the SP. This is discussed in the section on relevance and quality of science. It recognized three rice ecologies in a continuum as a major focus of WARDA research: rainfed upland, rainfed lowland, irrigated.

The Medium Term Plans

WARDA develops the standard CGIAR required documents such as regular three-year rolling MTPs²², which permits WARDA to adapt its research to agricultural changes in Africa and the evolution of world rice research. The MTPs²³ are plans of work and indicate how WARDA's research activities fit within the CGIAR's system priorities, the type of international public goods to be developed, and what impact pathways are followed. They list projects with the expected activities and outputs, and the breakdown of the budget among projects. They are prepared annually and submitted to the Science Council for review, and commentary and subsequently to the Executive Committee of the CGIAR for approval.

As part of the ongoing CGIAR Centre alignment process, regional MTP's have also been prepared. WARDA was assigned to lead the process in WCA (refers to SC issue 15). In the regional MTP, five programs are defined, using the system priorities as the organizing principle. In total, 13 CGIAR Centers participated in the preparation of the WCA MTP, together with CORAF/WECARD, NARS scientists, policy makers and NGOs.

More important than the form of MTPs is the content. WARDA tries to cover too much ground with too little resources. For example, WARDA intends to extend its activity geographically to East and Central Africa. The Institute has broadened its research topics to include in its project portfolio a systemwide initiative on HIV/AIDS in agriculture that looks, at best, very remotely linked to WARDA's core mission (see above). WARDA has already extended its activity relatively far towards development, with its involvement in ARI. With the present human resources, WARDA cannot reasonably stretch in all these directions (geographic, thematic and research continuum), and remain effective and efficient. WARDA's management should adopt a more cautious approach towards such dispersion. Above a given threshold, the risk is a lowering in research quality and an over-exploitation of existing human resources who are already arguably over-stretched. Increase in activity should only be envisioned once additional and sustainable resources are secured.

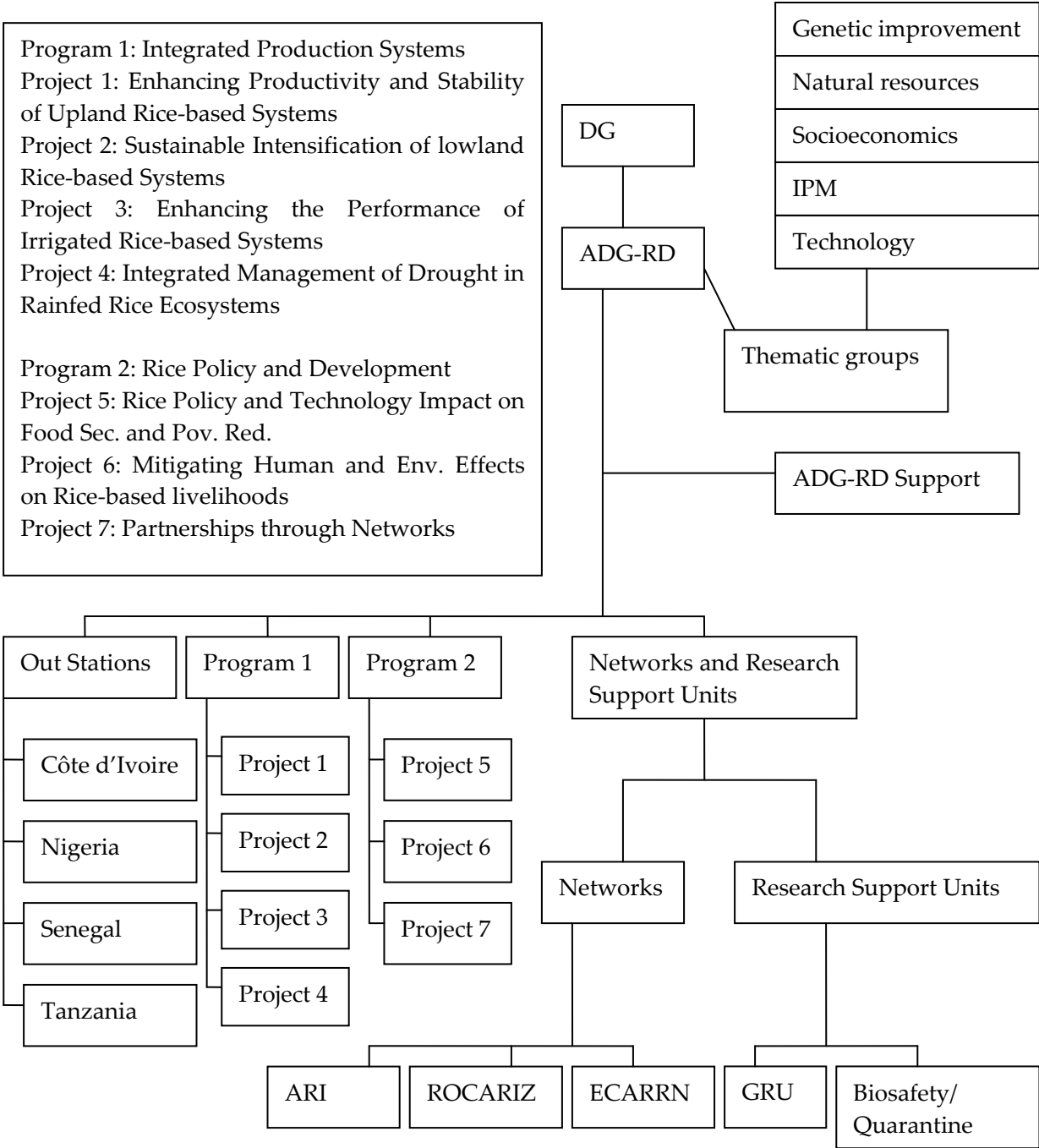
The 4th EPMP had already cautioned WARDA on the danger of a rapid geographic expansion. The same can be said for thematic expansion. The Panel cautions WARDA to only extend its thematic activities in rice and in areas where it has an obvious comparative advantage, and only after it has secured the needed human and financial resources. This is further elaborated in Chapter 4 on partnerships and linkages.

²¹ WARDA, Strategic plan 2003-2012, 2004 and Achievements since the Fourth External Program and Management Review, 2007, 32 p.

²² WARDA, Achievements since the Fourth External Program and Management review, 2007, 32 p.

²³ WARDA, Medium Term Plan 2007-2009, Charting the future of rice in Africa, 2006, 141 p.

Figure 1.4 The Structure of the Research Programs



A previous EU funded review indicated that the quality of the 2002-2004 MTP was insufficient.²⁴ In the Panel's opinion, the MTP covering the years 2007-2009 was on par with other Center MTPs the Panel had access to. The Panel appreciated the efforts made to spell out the pathways to impact in the project portfolio, but felt they could sometimes be more precise. A global imprecision on the expected outputs and an underestimation of the time needed to deliver them

²⁴ Ahmadi, Nourollah and Alastar William Orr, Creating Low Management Plant Types for Resource-Poor Farmers in Rainfed Ecosystems Project, WARDA, Monitoring of CGIAR Projects Co-funded by the European Commission in 2003 in Asia, Latin America and the Mediterranean Regions, ECART-NATURA, Brussels, December 2004, 21 p. + annexes.

is also observed. The Panel, however, acknowledges the fact that the impact of research is something over which the Center has limited control.

The research structure

There were four research programs in 2000, 3 in 2004, 2 from 2005 on. There were 19 projects in 2004, and only 6 in 2007 plus the IVC, a systemwide program (SWIHA) and partnerships. The Research Program structure is now as follows, as shown in Figure 1.4.

Presently, under Program 1, there are three projects, as follows:

- Project 1: Enhancing productivity and stability of upland rice-based systems
- Project 2: Sustainable intensification of lowland rice-based systems for enhanced livelihoods
- Project 3: Enhancing the performance of irrigated rice-based systems in Africa

Under Program 2, there are also three projects:

- Project 4: Rice policy and technology impact on food security and poverty reduction
- Project 5: Adaptation to human and environmental effects of rice-based livelihoods
- Project 6: Partnerships, learning and innovation systems

In addition, there are:

- The Consortium for the Sustainable Development of Inland Valley Agro-ecosystems in Sub-Saharan Africa (IVC) (previously this was called Project 7)
- Systemwide Initiative on HIV/AIDS and Agriculture (SWIHA)

In the 2008-2010 MTP, Project 4 in Program 1 on drought in rainfed ecosystems has been merged with Projects 1 and 2. There are also five disciplinary Thematic groups that cut across these projects, as follows: genetic improvement, natural resources, socioeconomics, integrated pest management and technology transfer.

A Program Leader who is responsible for several projects leads the two Programs. The Panel understands that grouping the various projects under two Programs is expected to simplify the lines of communication and accountability, and to help provide clearer strategic direction and a sharper focus on the relevance of research undertaken at WARDA. The proposed Thematic groups, if properly implemented, are expected to help focus attention on the scientific disciplines that must underpin high-quality research products. The Panel was also informed that the current Program Leaders have been appointed to these Thematic leadership positions for the first year. In following years, the Program Leaders are expected to be elected by the scientists themselves, though based on criteria specified by Management. The Program leaders are expected to devote about 80% of their time to research, and 20% to program administration and other institutional tasks.

The Panel has several concerns regarding this research structure. For a small institute with only about 30 IRS engaged in research and only 6 research projects (i.e., excluding the IRS in corporate services and management), it is not clear that the additional administrative layer of "Program Leader" between the ADG Research and the Project Coordinators is really needed. The Panel is concerned that this layer may add to communication and supervision difficulties, especially since the administrative tasks to be undertaken by Program Leaders are expected to require only 20% of their time.

We therefore suggest that the need for Program Leaders be reconsidered at the end of the first year of the ongoing "trial" period, and Management take a decision on whether new Program Leaders then need to be appointed.

If management decides to maintain the two Program Leader positions, these leaders are expected to be selected by the scientists themselves. Rather than leaving such decisions to Program scientists, *the Panel suggests that Program Leaders are appointed by the DG and ADG (R&D) based on a thorough evaluation of past performance as a project coordinator or Program Leader.* The assessment criteria would need to include such aspects as talent/potential for managing scientific and financial resources and outputs, mobilizing funds for projects, representing the Research Program and WARDA to external stakeholders and donors, and collaborating with NARS and other partners.

In addition, the Panel is concerned that the proposed Thematic groups are expected to function primarily as “virtual” teams on an *ad hoc* basis, for example to review publications and organize seminars. This may not be sufficient to strengthen the scientific quality of research at WARDA. To address this potential problem, *the Panel suggests that Thematic Group Leaders be given formal authority to monitor, on an ongoing basis, the quality of research inputs provided by scientists to their project(s), and to participate in their annual performance assessments as senior peer reviewers.*

The research organization by location

The research staff is spread over several locations as shown in Table 1.2, below:

Table 1.2 Research staff numbers according to locations

Location	IRS	Visit. Sc./ consultants	Res. assistants	Res./lab technicians	Field assistants	Research support	Total
Cotonou/M'bé	29	3	20	17	10	14	93
Samanko/Mali	1		1				2
St. Louis / Senegal	5	1	5	2	6	7	26
Ibadan/Nigeria	5		1	1	9	4	20
ECARRN	1	1		1		2	5
M'bé	1			1	10	24	36
Total	42	5	27	22	35	51	182

Staffing in the different stations/locations of WARDA is discussed under research programs and in research support.

Addressing CGIAR system priorities

WARDA's resource allocation to the various CGIAR System Priorities is detailed in Table 1.3. Three areas are strongly addressed by WARDA, and get the highest budget shares (around US\$ 3.0M each): Priority area 2 (Producing more and better food at lower cost through genetic improvement), with US\$ 3.3M; Priority area 5 (Improving policies and facilitating institutional innovation to support sustainable reduction of poverty and hunger), with US\$ 3.20M; and Priority area 4 (Poverty alleviation and sustainable management of water, land, and forest resources), with US\$ 3.12 M. Priority area 1 (Sustaining biodiversity for current and future generations) is getting US\$ 1.42M. Priority area 3 (Reducing rural poverty through agricultural

diversification and emerging opportunities for high-value commodities and products) is receiving US\$ 0.45M.

Table 1.3 WARDA's resource allocation by CGIAR system priorities (US\$ million)

WARDA's projects	P1	P2	P3	P4	P5	P6	IVC	N*
Priority area 1: Sustaining biodiversity for current and future generations								
Priority 1A: Conservation and characterization of staple crops	0.09	0.35	0.08	0.07	-	0.07	-	0.22
Priority 1B: Promoting conservation and characterization of under-utilized plant genetic resources to increase the income of the poor	0.08	0.33	-	0.08	-	0.07	-	-
Priority 1C: Conservation of indigenous livestock	-	-	-	-	-	-	-	-
Priority 1D: Conservation of aquatic animal genetic resources	-	-	-	-	-	-	-	-
Priority area 2: Producing more and better food at lower cost through genetic improvements								
Priority 2A: Maintaining and enhancing yields and yield potential of food staples	0.53	0.35	0.38	0.13	-	-	0.02	0.62
Priority 2B: Tolerance to selected abiotic stresses	0.25	0.42	0.25	0.07	-	-	0.02	-
Priority 2C: Enhancing nutritional quality and safety	0.08	0.14	-	0.07	-	-	-	-
Priority 2D: Genetic enhancement of selected high-values species	-	-	-	-	-	-	-	-
Priority area 3: Reducing rural poverty through agricultural diversification and emerging opportunities for high-value commodities and products								
Priority 3A: Increasing income from fruit and vegetables	-	0.14	0.03	-	0.03	-	0.06	-
Priority 3B: Income increases from livestock	-	-	-	-	-	-	0.02	-
Priority 3C: Enhancing income through increased productivity of fisheries and aquaculture	-	-	-	-	-	-	0.17	-
Priority 3D: Sustainable income generation from forests and trees	-	-	-	-	-	-	-	-
Priority area 4: Poverty alleviation and sustainable management of water, land, and forest resources								
Priority 4A: Integrated land, water and forest management at landscape level	0.08	-	0.25	-	0.07	0.07	0.40	-
Priority 4B: Sustaining and managing aquatic ecosystems for food and livelihoods	-	0.09	0.10	-	-	0.16	0.26	-
Priority 4C: Improving water productivity	-	-	0.10	-	0.05	-	-	-
Priority 4D: Sustainable agro-ecological intensification in low- and high-potential areas	0.17	0.14	0.18	0.25	0.08	0.04	0.28	0.44
Priority area 5: Improving policies and facilitating institutional innovation to support sustainable reduction of poverty and hunger								
Priority 5A: Science and technology policies and institutions	-	-	0.10	-	0.08	0.11	-	-
Priority 5B: Making international and domestic markets work for the poor	-	-	-	-	0.15	0.04	-	-
Priority 5C: Rural institutions and their governance	-	-	-	-	0.15	0.22	-	-
Priority 5D: Improving research and development options to reduce rural poverty and vulnerability	0.25	0.14	0.05	0.19	0.15	0.22	0.30	0.65
TOTAL	1.50	2.10	1.50	0.90	0.80	0.70	2.20	1.70

* N= networks; SWIHA project not included in the Table.

Source: 2007-2009 MTP, WARDA.

The importance given to the various priorities is generally that expected from a Center focusing on a staple crop, which gives importance to the use of genetic resources, rather than to their pure

conservation. WARDA is working in most rice growing ecosystems of Africa, including the less favorable uplands where most of the poor are located. WARDA is, nevertheless, paying attention to diversification, through research done in the IVC. Whatever the rice ecosystem, production systems include other crops. Therefore, rice production systems have to be studied in their totality. This does not seem detrimental to WARDA's core focus on rice. The division of resources among CGIAR System Priorities corresponds well to WARDA's mandate and, therefore, seems about right to the Panel.