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**Sustainable
Agricultural Research:
Institutional and
Financing Reforms in
Senegal**

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Acronyms

ANCAR	<i>Agence Nationale de Conseil Agricole et Rurale</i>
BAME	<i>Bureau d'Analyses Macro-Economiques</i>
CET	Common External Tariff
CIDA	Canadian International Development Agency
CNCR	<i>Conseil National de Concertation et de Coopération des Ruraux</i>
DRCSI	<i>Direction de Recherche sur les Cultures et Systèmes Irrigues</i>
DRCSP	<i>Direction de Recherches sur les Cultures et Systèmes Pluviaux</i>
DRPF	<i>Direction de Recherche sur les Productions Forestière</i>
DRPH	<i>Direction de Recherche sur les Productions Halieutiques</i>
DTSPA	<i>Direction de Recherches sur la Santé et les Productions Animales</i>
EISMV	<i>Ecole Inter-états des Sciences et Médecine Vétérinaires</i>
ENSA	<i>Ecole Nationale Supérieure Agronomique</i>
ENSUT	<i>Ecole Nationale Supérieure Universitaire de Technologie</i>
FAO	Food and Agriculture Organization, United Nations
FNRAA	<i>Fonds National pour la Recherche Agricole et Agro-Alimentaire</i> or National Fund for Agricultural and Agro-Industrial Research
FNDR	<i>Fonds National de Développement Rural</i>
GDP	Gross Domestic Product
GOS	Government of Senegal
ICS-SENCHIM	<i>Industries Chimiques du Sénégal</i>
IFAN	<i>Institut Français d'Afrique Noire</i>
IMF	International Monetary Fund
ITA	<i>Institut de Technologie Alimentaire</i>
ISRA	<i>Institut Sénégalais de Recherche Agricole</i>
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
PAD	Project Appraisal Document
PSAOP	<i>Programme des Services Agricoles et d'Appui aux Organisations Paysannes</i>
SFI	Sustainable Financing Initiative
SNRAA	<i>Système National de Recherches Agricole et Agro-alimentaire</i>
SODEFIX	<i>Société de Développement des Fibres Textiles</i>
SONACOS	<i>Société Nationale de Commercialisation des Oléagineux du Sénégal</i>
SPAAR	Special Program for African Agricultural Research
TCI	<i>Taxe conjonctuelle à l'importation</i>
UEMOA	<i>Union Economique et Monétaire Ouest Africaine</i>
USAID	United States Agency for International Development

Executive Summary

The Senegalese economy is heavily dependent upon agriculture. As in most of West Africa, the origins of its agricultural research system lie in the colonial period. This study focuses on Senegal's two principal government agricultural research institutions, the *Institut Sénégalais de Recherche Agricole* (ISRA), established in 1974, and the *Institut de Technologie Alimentaire* (ITA), created in 1963. Most institutional and financial reforms in agricultural research have been undertaken with World Bank and other donor support. Among the reforms have been increased linkages with producer's associations, the private sector, and NGOs; decentralization and regionalization; and the creation of a new National Fund for Agricultural and Agro-Industrial Research (*Fonds National pour la Recherche Agricole et Agro-alimentaire*, or FNRAA).

ISRA has recently been reorganized into eight regional research centers corresponding to the country's eight agroecological zones, and established participatory outreach to research users and other stakeholders. The institute recognized the problem of maintaining its scientific capacity and set up a new salary structure that is somewhat better than the civil service salaries, though it continues to lose people to private companies or international projects. ISRA needs a functional performance-based evaluation system, but as a public sector agency it is limited by civil service laws.

ITA is a small institute with its roots in food technology. In the 1990s, with Canadian support, ITA initiated an institutional reform effort that reduced, reorganized, and trained management staff; established staff incentives; developed a strategy for identifying and obtaining user input for determining research priorities; and revised its legal status to enable ITA to contract with the private sector and also receive consistent funding from the government.

The latest agricultural sector reform project is the Bank-funded *Programme des Services Agricoles et d'Appui aux Organisations de Producteurs* (PSAOP). The project's demand-driven focus seeks to hold researchers accountable to producers by linking sustainable production by small holders to ISRA, ITA, and the new FNRAA, over a very short time frame. Related to the research program are the substantial resources PSAOP targets to support both the continued overhaul of the extension system and capacity building of producer organizations. The effective achievement of these sets of activities will influence ISRA's and ITA's ability to contribute to sustainable increases in smallholder productivity.

As public sector entities, ISRA and ITA are subject to the civil service policies and constraints facing government agencies in Senegal. Besides these policies, ISRA and ITA face limitations on revenue generation. Currently both institutes are prohibited from selling the results of their research, as those results are considered to be in the public domain. One possible exception is contract research. It appears that under the FNRAA, research organizations may be able to reap some financial advantage from research results. While raising funds for agricultural research through taxes on agricultural products holds potential for supporting ISRA and ITA, broader economic policy aims to reduce the tax burden on the private sector to make it more productive and competitive.

ISRA and ITA have been highly dependent upon donor funds, and their budgets reflect the peaks and valleys associated with the various donor projects that have supported them over the years. For both institutions, this funding peaked in the late 1980s and declined substantially during the 1990s up to the present. National resources have increased in importance during this period. The FNRAA is

intended to be a major new mechanism in funding agricultural research in Senegal, and one that increases the influence of farmers' groups and the private sector due to their role in priority-setting. To date it has a limited track record, having operated only two funding cycles. ISRA won the majority of grants awarded.

Although the FNRAA is in place and functioning, and institutional changes have been made at ISRA and ITA, the long-term funding needs of agricultural research in Senegal are by no means assured. National and international donors need to join the FNRAA, but are only likely to do so if ISRA and ITA prove themselves as leaders in agricultural research through user-ready and demand-driven research results, effective collaboration with others in the research system, and effective research management. Success is the best way to convince stakeholders to continue to provide resources for agricultural research.

ISRA and ITA have taken major steps to introduce performance-enhancing measures. However, both institutions remain within the public sector, which limits their autonomy to achieve reform results. Rightsizing must continue to occur, but with consideration for the absorptive capacity of the institutions and their staff's ability to adjust to the pace of reforms. Two ongoing questions are: 1) how will ISRA reforms progress if a majority of PSAOP funding is targeted away from the center to support regional research units? b) are ISRA and ITA, in fact, rightsized?

It will be important for the FNRAA to demonstrate that competitive grant funding can contribute to NARS performance. Over the next three years, the FNRAA must prove that it is a viable mechanism for funding agricultural research in Senegal. This means that the research groups that were awarded grants in the first two rounds of FNRAA competitive grants must produce results on time, document their success, justify the costs and benefits, and extend their innovations throughout Senegal. One ongoing question is, what proportion of FNRAA proposals should be funded, and for what types of research? Initially, accepted research proposals have not targeted areas that may be significant to Senegal's agricultural exports (horticulture and fisheries), its basic food needs (rice), and its future (biotechnology). FNRAA is currently considering narrowing criteria to priority topics as defined by a group of NARS experts. Another question is, how can the FNRAA be sustained? The FNRAA is intended to become a foundation or similar legal entity by the end of 2001 as a trigger for Phase II funding of the PSAOP. In principle, an autonomous foundation could provide independence, transparency, and prestige, and thereby serve as a magnet for attracting funds. However, building such a track record will take time.

Research institutes will need a funding base beyond the FNRAA which is not designed to support recurrent costs, infrastructure, and long-term training. Worldwide experience shows that competitive funds cannot and should not be the major mechanism for funding research, but should complement regular budget appropriations. However, in Senegal the trend in government funding (especially for ISRA) is downward. Therefore, research institutes must seek other sources of revenues or face continued institutional decay. Further, they must help national and international stakeholders for agricultural research to better appreciate the role of research and then contribute to their operation.

1. Introduction

Agricultural research has made major contributions to economic growth and the alleviation of poverty, yet research systems face declining and unstable public funding, both from national and international sources. The impacts of the funding crisis on African national agricultural research systems (NARSs) have been especially acute and detrimental. The efficiency and effectiveness of the NARSs have plummeted, reflecting the negative effects of degraded capacity, stop-start programs, and brain drain as researchers leave the system. Dependence on international donors to fill the funding gaps has increased, even as the level of donor funding has dropped. As many observers have noted, the current situation is financially unsustainable. It also puts at risk the development progress of African nations, given their dependence on their agriculture sectors and natural resource base.

Over the past several years, some African NARSs have begun experimenting with new financial mechanisms, and have undertaken institutional reforms to restructure and revitalize. The Special Program for African Agricultural Research (SPAAR) recently surveyed national and sub-regional research organizations across Africa to determine progress with these experiments. In a multi-country analysis SPAAR uncovered examples of efforts to involve the private sector through export commodity taxation and to move towards performance-based funding through competitive agricultural research funds, commercialization, and contract research. However, beyond the SPAAR study and some informal canvassing, little is known about the incidence, nature and success of financial mechanisms and plans for mobilizing and allocating funds for agricultural research and technology transfer activities in Africa. Even less is known about the institutional and policy factors conditioning their success or the influence these innovations may be having on the agricultural research agenda.

1.1. SFI Case Studies

To fill this knowledge gap, the Sustainable Financing Activity, in collaboration with its African partners and with USAID funding, undertook a series of country case studies to assess experience with different financial mechanisms, and to identify institutional and policy-related factors that have an impact on the use of these mechanisms. The viability of NARS depends on more than funding. The legal and administrative context in which these research organizations operate influences their capacity to capture and attract funding, gain financial returns from their research, and motivate staff to generate valuable and valued results. Functioning institutional and organizational structures as well as a supportive policy and administrative environment are also necessary (Bingen and Brinkerhoff 2000).

The focus of this report is on the two principal government agricultural research institutions, the *Institut Sénégalais de Recherche Agricole* (ISRA) and the *Institut de Technologie Alimentaire* (ITA), and recently implemented institutional and financial changes to research through the World Bank funded *Programme des Services Agricoles et d'Appui aux Organisations de Producteurs* (PSAOP). The program includes a National Fund for Agricultural and Agro-Industrial Research (*Fonds National pour la Recherche Agricole et Agro-alimentaire*, or FNRAA) designed to ensure the

sustainable funding of agricultural and agro-industrial research. Discussed below are the following topics:

1. Background historical, national, and institutional issues related to agricultural research in Senegal.
2. The institutional context of ISRA and ITA, including selected institutional policies.
3. Historical and current financial data supporting ISRA and ITA.
4. An in-depth discussion of the FNRAA, including initial results.
5. Issues and ongoing questions.

1.2. The Case of Senegal Agriculture and Agricultural Research

Agriculture employs over 70 percent of Senegal's population, which is distributed over 480,000 farms. However, productivity is very low, and agriculture contributes only about 20 percent of GDP. Although drought in West Africa has often been cited as the limiting factor for agriculture, other constraints – land degradation, small size of farms, decline of farm income, access to credit, and others – have also made agricultural life difficult. Despite all of these, Senegal has the natural advantage of three major rivers, adequate rainfed cereal production in many regions, and the potential for such export activities as growing off-season horticultural products for the European market. There are also prospects for future growth and employment in the agricultural sector, because of its upstream and downstream linkages, and for further productivity in the rainfed sector, given the application and adaptation of key agricultural technologies. The 1999/2000 agricultural season benefited from favorable weather, and the sector exhibited robust growth (Commission de l'UEMOA 2001). Cereal and peanut production, cotton, animal products, and fisheries all featured strong domestic and export performance. Diversification of agriculture was also reported as planting of horticultural crops such as eggplant, onions, melon, sweet potato, cabbage, and others increased. There was continued investigation into further commercialization possibilities of tomato products (Le Soleil 2001).

Despite last years' success in the field, the effectiveness of government-led agricultural research and extension in Senegal has been the topic of debate for twenty years or so. International donor projects have sought to restructure research components (such as ITA through Canadian funding in the mid-1990s) with a varying degree of success. The focus of the current PSAOP World Bank project directly addresses the effectiveness of the research and extension system as it seeks to substantively redefine how research decisions are made and agricultural research funds are allocated. The hope is that they can be targeted to the needs of the Senegalese producer, and make researchers and their institutes accountable for demand-driven research.

2. History, Economy, Policies, and Institutions

Politically stable since independence, Senegal has struggled economically on and off through the past four decades, but has seen a glimmer of economic stability over the last half decade. Recent policy reforms affecting agriculture have generally helped strengthen the sector, but there is always the specter of another Sahelian drought and/or the intensification of environmental degradation ahead. This brief chapter covers some of the macro-concerns at the base of Senegalese agricultural research – its history, macro-economic and governmental policies that are in force today, an outline of the national agricultural research system (NARS), and a discussion of the international donors that have supported Senegal and Senegalese agriculture in the recent past.

2.1. History of the Senegalese NARS

As in many countries in West Africa, the French colonial government developed a number of research stations and experimental gardens in Senegal. Early research on crops such as groundnuts (for oil), millet, sorghum, and cowpea was done at Bambey, which remains one of the locations of ISRA's research facilities today. Livestock research on animal traction and a soil chemistry laboratory were also early features of the research system. The *Institut Français d'Afrique Noire* (IFAN – later integrated into the University of Dakar) was an early provider of training and basic research on biology, ecology, and related subjects.

The absence of trained African personnel in Senegal immediately after independence meant that research activities were coordinated through French institutes for many years. Mazzucato and Ly (1994) note that the two countries funded the research jointly, with France providing the researchers and Senegal providing the agricultural labor. In 1963, ITA began research on food science. Originally a commercially oriented public sector institution,¹ its legal status was modified so as to qualify for FAO assistance.² The establishment of a national agricultural research network emerged from the comprehensive national development plans of the late 1960s and early 1970s, and in 1974 ISRA was created.

ISRA underwent numerous changes and reorganizations during the next twenty years. Inheriting seven research departments and ten research centers from the French dominated system, ISRA for years had a dual organizational structure that separated research programming from implementation. The World Bank-financed Agricultural Research Project (1981-1987) brought significant financial resources and numerous reorganizations to ISRA (occurring in 1982, 1983, and 1987). The final restructuring under that project created five departments (or *directions*), and during the same period ISRA was transferred to what would eventually become the Ministry of Agriculture.

ITA and selected university departments remained independent of ISRA, but were dwarfed by ISRA's national network. By the early 1990s, ISRA had more than 90 percent of the country's total number of full-time agricultural researchers. One significant change of note for ITA was the shift away from primarily a research portfolio in the late 1980s toward more applied activities such as extension, training, and meat quality control.

¹ In French, an *établissement public à caractère industriel et commercial*.

² In French, an *établissement public à caractère administratif*.

2.2. Macro-Economic Situation and Policies

The January 1994 devaluation of the CFA franc constituted a new economic starting point for Senegal. Reform programs associated with that event included the consolidation of public finances and a general strengthening of Senegal's competitiveness in order to achieve sustained and balanced growth (IMF 1999). Real GDP growth in 1996-1998 was over five percent per year, but due to poor weather agricultural production declined. This was also a period of dramatic agricultural sector reforms, from a major program on phosphate soil fertilization, to institutional reform of the cotton parastatal company, to the creation of a quality control unit for horticultural products to help promote exports. As noted in the introduction, favorable weather during the 1999-2000 season resulted in high agricultural productivity and increased agricultural exports.

Agricultural products account for 20 percent of Senegal's total merchandise exports, while food imports absorb 29 percent of total foreign exchange earnings (FAO 2000). Exports are dominated by groundnuts, followed by cotton and fruits and vegetables. Groundnuts were once the engine of the economy, but decline in demand for groundnut oil, concerns over the privatization of the sector, and high costs of production have driven total output down. Furthermore, the quality of agricultural exports such as groundnuts and fishery products must be raised to international standards so that they can be successfully marketed to Europe.

Senegal is a net importer of food, most particularly rice. Rice farming illustrates the difficulties the agricultural sector faces: high costs of production mean that some level of trade protection is needed for local producers. At the same time increased demand (as consumer preferences shift away from coarser grains such as millet and sorghum) have made rice one of the chief imports of the country.

A number of sources highlight Senegal's agricultural trade policies (FAO 2000, IMF 1999, Commission de l'UEMOA 2001). During the Uruguay Round negotiations, agricultural tariffs were set at a relatively high and uniform rate and Senegal made no reduction commitment. Several agricultural products are considered sensitive – among them sugar, rice, bananas, onions, potatoes, millet, sorghum, and corn – and are often at the heart of trade, tariff, and tax discussions. The application of the Common External Tariff (CET) within UEMOA has provoked a wide-ranging debate in Senegal over lost tax revenues to the GOS and increased competition for Senegal's agricultural producers. Another tax applicable to agriculture is the Import Tax (*taxe conjoncturelle à l'importation – TCI*), which is applied and adjusted to compensate for losses due to world price fluctuations and the potential for "unfair" trading practices.

The 1999-2001 Economic and Financial Policy Framework Paper (IMF 1999) takes a two pronged approach to the agricultural sector: privatization and good governance. Ongoing promotion of the private sector is cited as "the heart of the government's strategy to accelerate growth," and includes efforts to "promote partnership between private sector enterprises and scientific and technological research institutions." At the same time, the IMF stresses the need for "good governance" through a myriad of administrative reforms with the goal of "ensuring transparency, responsibility, control, merit, and sanctions, in order to increase effectiveness of services and to reduce costs." The nexus of private sector and good governance policies come to a head with the institutional reform and privatization of many Senegalese parastatal entities, such as SONACOS (groundnut oil refinery) and SODEFITEX (cotton parastatal), which represent the two largest export commodities. Consistent

with the emphasis on privatization, the IMF calls for the removal of the fertilizer subsidy (with current marketing done through a private sector firm) and the cessation of government credit for seeds.

All national reforms should also be placed in the broad context of decentralization. SPAAR (1998) notes that decentralization has been gradual, encouraging a redefinition of the role of the public sector to allow involvement of private sector and other institutions (i.e., associations, NGOs) in the management and delivery of services. Investment programs in the rural areas have helped provide for increased financial transfer between the GOS and local governments, and have sought to create opportunities to help local governments increase their own revenue. It is in this context, one that promotes closer cooperation between national and local institutions, that the agricultural extension and research systems are being reformed.

2.3. National Agricultural Research System

Today, Senegal's national agricultural research system (referred to as the SNRAA, or *Système National de Recherches Agricole et Agro-alimentaire*) can be described as a system in transition. Traditional research institutes are undergoing substantial institutional changes, and new actors are accepting responsibility in exchange for the promise of increased benefits. Institutional components of the system include the following:³

- ISRA, which reports to the Ministry of Agriculture and Animal Resources, and will be further discussed in Chapter 3.
- ITA, which reports to the Ministry of Higher Education and Scientific Research, which will also be further discussed in Chapter 3.
- The Universities of Dakar and Saint Louis with their related laboratories (Cheikh Anta Diop University, IFAN, *Ecole Nationale Supérieure Universitaire de Technologie* - ENSUT, the Agronomic school -ENSA- and the International Veterinary School -EISMV, etc.).
- Private companies such as ICS-SENCHEM (*Industries Chimiques du Sénégal* which produces fertilizer and chemical products) and Nestlé, and national non governmental organizations (NGOs).
- Specialized departments of the Ministry of Agriculture (such as the Plant Protection Department).
- Bilateral and international research institutes, such as IRD, the *Coopération Internationale en Recherche Agronomique pour le Développement* (CIRAD), and the West African Rice Development Association (WARDA).

³ The newly reformed extension system, ANCAR, is not included in this section as an research institution.

Note, however, that the World Bank has often linked research, extension, and producer organizations as calling them "agricultural services"

- Producer organizations and accompanying producer federations (such as the *Conseil National de Concertation et de Coopération des Ruraux*, or CNCR).

The most substantial change in the SNRAA is the increased influence of these new producer organizations which are now sufficiently organized and visible to be included in national policy dialogue. CNCR, for instance, was created in 1993 when nine producer organization federations banded together to create a strong coordination voice aimed at influencing the actions of the government and the international donors (Republic of Senegal 1999a). Since the mid-1990s, such organizations have been involved in key reform activities, national workshops and assessment activities (Eponou 1999). Recently, they participated in the creation of a research-extension-producer system that seeks a “profound change for more effectiveness” (CNCR 2000). This system is supported by the World Bank through the PSAOP.

2.4. Donors, Partners, and Funding

The influence of the World Bank and other donors (including France, European Union, Japan, USAID, Germany, Canada, African Development Bank, and various UN organizations) has been strong in the development and direction of agricultural research in Senegal over the last twenty years.⁴ The World Bank, for instance, has approved over 100 projects in all sectors valued at some US\$2.1 billion. Agricultural based projects have ranged from export promotion activities (1997-2002) to agriculture sector adjustment credits (1995-98) to the development of rural activities (1989-99) to irrigation projects on the Senegal River (1987-95). Specific projects have also targeted agricultural research – the Agricultural Research Project (1981-1989) provided for long-term training for researchers, and for reorganization and strengthening the operations of ISRA. A second set of projects (Agricultural Services Projects 01 and 02) implemented between 1990-97 sought in parallel to strengthen research, extension, ministries related to agriculture, and producer organizations. The research-oriented “twin” (Agricultural Services Project 02) supported ISRA to implement adaptive research in farming, applied research to priority zones in Senegal, applied research to natural resources management, and institutional support. An additional component was also planned (but never fully implemented) to establish an unallocated research reserve fund to enable urgent research work to be financed without delay.

The most recent World Bank-funded project, the PSAOP, supports strengthening of and linkages among agriculture research, extension, and farmer and producer organizations. The project, funded in 1999, suggests a radically different approach to the support of agricultural research, where research funding would be separated from that of execution through the creation of a national agricultural research fund. As noted in the World Bank project appraisal document (PAD), a separate funding body has advantages over the direct funding of an executing institute:

- It allows for effective involvement of research users and stakeholders in priority setting and resource allocation; thus, it interests them in funding research and provides an enabling environment for sustainable funding.

⁴ See

<http://inweb18.worldbank.org/AFR/afr.nsf/31fe5b703606b96d852567cf004dd24a/6672b6641d5ca009852567d1004d597b?OpenDocument> for project summaries and further information.

- It allows other research suppliers (other than ISRA and ITA) to have access to funding, thus it ensures an optimal utilization of scarce human and physical resources, provides the financial tool for building a national agricultural research system; and promotes collaboration among all entities involved.
- It improves the scientific quality and relevance of research activities through scientific rigor in proposal selection and implementation through external control and reviews, void of conflicts of interest.
- It ensures that funding is effectively allocated to the teams of researchers whose proposals have been approved.
- It enforces researchers' accountability for results.

A noteworthy trend is the increasing regional nature of agriculture and agricultural research, which has created and strengthened regional partnerships. The Senegalese Minister of Planning in 1998 called for cooperation between the NARSs of the sub-region to address issues beyond the capacity of each NARS to address individually. Regional discussions have been held on the establishment of a regional financing mechanism for research and technology development, housed potentially at the African Development Bank (SPAAR 1998).

Finally, the promotion of the private sector has prompted a plethora of small agribusiness entrepreneurs to seek investment for projects in such diverse areas as ice cream production, poultry and egg production, improved animal feeds, establishment of a palm plantation, and production of specialty fruit juices.⁵ One could consider this as an indicator of the relative success of both agricultural research and the private sector promotion campaign, and it certainly provides a research institute such as ITA with potential future partnerships through producer coalitions, contract research, and other mechanisms.

⁵ See <http://www.emainvest.com/projects2001/senegal.html>. Many investors established "hotmail" accounts to communicate with potential investors from around the world.

3. Implementing Agricultural Research in Senegal – ISRA and ITA

While not the only research institutes in SNRAA (see section 2.3), ISRA, and to a lesser extent ITA, have been the primary conduit for GOS-led agricultural research and the primary beneficiaries of government support. Recent developments call into question their role of prominence in agricultural research. A number of World Bank projects in the 1990s identified the lack of accountability of research (and also extension) institutions to producers and lack of responsiveness to their needs as a major concern.⁶ It was further determined that financing research on agricultural production under ISRA only, as had been done under previous Bank projects, was unsatisfactory.

This chapter features a short description of both ISRA and ITA, followed by a description of the PSOAP as it will likely influence the direction of these research organizations. Additionally, a number of issues related to internal policies are discussed to better understand some of the institutional challenges that ISRA and ITA will face in the coming years.

3.1. Institut Sénégalais de Recherche Agricole

ISRA is the main public research institute in charge of research on agriculture, livestock, forestry and fisheries. Created in 1974, ISRA has recently been the focus of legislation to modify and clarify its research mandate such that it remains a leader in agricultural research in Senegal, but no longer has a monopoly.⁷ ISRA conducts 22 research programs under the six general categories:⁸

1. Forestry includes programs on forest management, forest product physiology, forest resource improvement, and tree farming.
2. Fishing includes programs on traditional fishing, industrial fishing, fish farming, and associated environmental impacts.
3. Animal Husbandry includes programs on pathology, animal nutrition, farm management of livestock, and pastoral management of livestock.
4. Irrigated Farming Systems includes programs on irrigated grains, management of natural resources, and irrigated fruits and vegetables.

⁶ A 1995 Agricultural Development Policy Letter further stated that the responsibility for research and extension functions that were previously exclusively within the agriculture ministry's mandate should be shared with producer organizations. See Eponou (1995).

⁷ Legislation includes the following: in 1997, Loi No. 97-13 - *Creation des Etablissements Publics à Caractère Scientifique et Technologique*; in 1998, Decret No. 98-982 - *Fonctionnement et organisation de l'ISRA*; and in 1999, Decret No. 99-86 - *Règlement d'établissement de l'ISRA*

⁸ A complete synopsis in French of ISRA research programs can be found at http://www.refer.sn/sngal_ct/rec/isra/program.htm

5. Rain-fed Farming Systems includes programs on dry zone cereal production, dry zone management of natural resources, legume production, farming diversification in Casamance and Senegal Oriental, rainy zone cereal production, rainy zone management of natural resources.
6. Macroeconomic Bureau has a single program on economics and rural sociology.

ISRA has recently been reorganized into eight regional research centers corresponding to the country's eight agroecological zones: Senegal River Basin, Sylvo-pastoral zone, Northern Peanut Basin, Southern Peanut Basin, Upper Casamance and Western Senegal, Lower and Middle Casamance, the Niayes, and the Coastal Zone. Each regional center has a multidisciplinary natural resource management and production systems team in charge of coordinating on-farm testing and adaptation, as well as participatory technology development. This team is specifically in charge of direct collaboration with producer organizations and extension services.

In anticipation of the aforementioned PSAOP, ISRA elaborated a policy and management statement for the Institute using a participatory approach involving users, stakeholders and staff. This statement describes a vision for the institute, and specifies its working relationships with other national institutions, other NARS in the sub-region, the International Agricultural Research Centers, and advanced research institutes worldwide. Elements of the statement include the following:⁹

- Quality demand-driven research whose results are accountable;
- Competent, productive, flexible, and motivated staff;
- As an institute, positioned at the heart of SNRAA so that it will function to its comparative advantage;
- Adoption of a decentralized organization that is open to partners and clients alike;
- Definition and implementation of a dynamic information system; and
- Assurance for sustainable funding for ISRA through a variety of funding mechanisms.

Through the PSAOP, the World Bank is committed to support ISRA with a number of institutional changes. There will be limited development of infrastructure under the program, mainly rehabilitation. New construction will take place only to consolidate existing research sites that would have been retained after restructuring. Scientists and managers will receive long-term training either from the World Bank loan or from other sources of funding. In addition, short-term training may include financial management, station management, human resource management and documentation and publishing.

⁹ Elements elaborated from the July 17, 2000 Abt Associates study questionnaire completed by Director General Pape Abdoulaye Seck.

Although the PSAOP is designed to assist ISRA in some institutional reforms, progress will also need to be made on the issue of salaries and incentives. Current ISRA staff include 49 technical and administrative staff, 188 researchers, 27 research assistants, and 283 support staff.¹⁰ Budget estimates reveal that salary costs, which in 1996 were 37 percent of the total budget had risen to 58 percent by 2000 (See Chapter 4).

Although a new salary structure was introduced that is somewhat better than the civil service salaries, it is not enough to attract and keep researchers. According to personnel at ISRA, they lose several people a month to private companies or international projects and organizations.¹¹ Thus, the organization may ultimately lose its investment in its high caliber research staff. The top researchers have had their salaries capped, often for years. Although some stay at ISRA because of their original idealistic motives or by inertia, the likelihood is that good researchers will eventually go elsewhere. Even the new managing director was hired at the top of the salary grid and cannot hope for a salary increase in future years.

The management staff and others interviewed as part of this study were very clear about this being a major problem even beyond basic research funding. They felt strongly that ISRA's survival requires a new system for hiring and performance-based evaluation, including changing the salary grid and caps that are currently in place.¹² With the FNRAA emphasis on private sector funding of research and performance-based evaluations, unmotivated staff will not fail to produce the research necessary to attract necessary funding and the organization could disappear. This is not necessarily because the organization *should* disappear, but because the government incentives system is not adequately flexible to compete with the market for expert researchers.

ISRA senior staff welcome a functional performance-based evaluation system. They would rather have a smaller, well-paid, well-performing team of researchers than the larger number of researchers they have now who do not provide high quality work or who jump ship for better jobs elsewhere. At present, there seems to be little leeway for implementing such a system since it is governed by the laws of the civil service.

3.2. The Food Technology Institute

ITA is a small institute (staff of 17 researchers, 23 technicians, and 22 support personnel) with its roots in food technology. In the 1990s, with Canadian support, ITA initiated an institutional reform effort that, among other things, "right-sized" it to its present level of 17 researchers. The restructuring reduced, reorganized, and trained management staff; established staff incentives; developed a strategy for identifying and obtaining user input for determining research priorities; and revised its legal status to enable ITA to contract with the private sector and also receive consistent

¹⁰ The ISRA web page lists 159 researchers (124 Senegalese and 35 expatriates) and 582 total staff. Discrepancies may be due to the loss of staff noted above.

¹¹ Ikpi (1999) notes that ISRA lost 18.1 percent of its scientists in 1987. As noted in Chapter 4, this corresponded to a period when funding through the 1981-1989 Agricultural Research Project was on the decline.

¹² World Bank (1999) notes that ISRA and ITA were considering entering the African and Malagasy Council for Higher Education system for researchers' promotion. No verification of progress has been made on this issue.

funding from the government. A Canadian management consulting firm, CRC-SOGEMA, provided institutional support during the restructuring of ITA and cites the following results of the project:

- An overall 20-percent reduction of staff and recruitment of specialized personnel for specific functions, which provided opportunities for younger personnel.
- Creation of new products and services, with an emphasis on potential growth products, which subsequently experienced a 267-percent growth in sales from 1995-96.
- Implementation of computerized management systems.
- Laboratory rehabilitation with an emphasis on new products and services.
- A training plan aimed at supporting changes in organizational behavior to improve quality of services and a continued stream of new products was emphasized.

The Canadian International Development Agency (CIDA) coordinated with the GOS to ensure that ITA's funding was paid quarterly, on time, for basic items such as salaries. The management at ITA said that this practice continues, even several years after the end of the project.

ITA research is generally more tangible than those of ISRA, i.e. technologies such as farm machines and equipment. The research budget is allocated to horticultural research and product development (40%), cereal and legume/groundnut research (30%), animal research (15%), and fishery research (15%). A strategic plan covering the period 1998-2003 supports this research through the creation of institutional priorities, including specifics on research and development, technology transfer, reduction of production losses, specialty technical training, and quality control.

As part of the restructuring program, ITA has greatly improved its management and financial systems. There is now a manual on research management, a new system for personnel evaluation, and progress on elaborating a marketing plan for the institute.

3.3. Proposed Changes to ISRA and ITA through PSAOP

As noted in the Project Appraisal Document for the PSOAP:

Perhaps the most important institutional reform ... is to step away from the national research institutes (ISRA and ITA) as the exclusive building blocks for improving research capacity and performance. The challenge for Senegal is to determine how to exploit the complementarities between the various actors involved in research – mainly the University, agricultural schools and NGOs – as to allow additional scientific skills and resources to be tapped and therefore develop a well-articulated research system (World Bank 1999).

Table 1 outlines the goals and objectives of the PSAOP as related to ISRA, ITA, and the FNRAA. All of these are ambitious and are likely to pose challenges. The project seeks to hold researchers accountable to producers by linking sustainable production by small holders to ISRA, ITA, and the new FNRAA, over a very short time frame. Fifteen percent production goals, directly tied to research performance are called for. Under the establishment of an effective research system, no indication to date has been given as to what financial sponsors may contribute 10 percent of the FNRAA funds. It is presumed that these funds will be raised from the private sector, but no mechanism, such as a commodity levy or cess, has been suggested. The PSAOP's managerial capacity objectives call for significant investments in training. However, as noted, ISRA is losing qualified staff, and an investment plan related to personnel may need to wait until staffing issues are resolved. For ITA, the situation is a bit different – there is a risk that younger, entrepreneurial staff will use the short- and long-term training to enhance their personal capacity and move quickly into an agro-industrial community that seems to be expanding.

Table 2 outlines the project outputs and activities for agricultural research for the three entities for the years 2000-2002 (Phase I). ISRA and ITA are expected to submit well-conceived and collaborative research proposals to the FNRAA. Recent experience with the USAID Natural Resource Based Agricultural Research Program competitive grant fund (section 5.1) suggests that researchers may lack the capacity to meet these expectations. By denoting required reports and activities that focus on information systems, training plans, and infrastructure rehabilitation, the project seeks to promote both transparency and accountability at ISRA and ITA. However, there appears to be a decided lack of external evaluation as part of the process, unless external reviewers and ad hoc studies can fulfill that function.

PSAOP targets substantial resources to support both the continued overhaul of the extension system and capacity building of producer organizations. If achieved, such activities will amplify ISRA's and ITA's ability to contribute to sustainable increases in smallholder productivity. Reports from CNCR, ANCAR, and others will be cross-referenced to better assess whether agricultural research under PSAOP is appropriate to the needs of producers.

Table 1: Goals/Objectives and Impact

Descriptive Summary	Verifiable Objective Indicators	Means of Verification
1. Sustainable increase in smallholder productivity	By year 2005: <ul style="list-style-type: none"> • Crop yield increases between 15-35% depending on the farming system and agro-ecological zone for 15-30% of the farms. • Livestock productivity increases between 30-70% for 10-15% of the herds depending on agro-ecological zone. • Volume of agricultural products processed by small entrepreneurs and women associations increase by 15% • Lessening trends of environmental degradation 	ANCAR, ISRA, and ITA reports Reports from CNCR and Chamber of Commerce Reports from the Center for Ecological Monitoring
2. Establish an effective national agriculture and agro-processing research system through the National Agricultural Research Fund	<ul style="list-style-type: none"> • 30% of total operational financing of agriculture/ agro-processing research allocated by FNRAA • 80% of R&D projects identified within the scope of R&D extension are financed by FNRAA • At least 2 more financial sponsors of FNRAA contribute 10% of the funds 	Annual reports of the institutes FNRAA statistics on the number and types of research financed Periodic reports of ongoing contracts Evaluation reports
3. Improve ISRA and ITA efficiency through improving their scientific and managerial capacities, and rehabilitating their infrastructure and upgrading their equipment	<ul style="list-style-type: none"> • Investment plan carried out • Number of theses and long term training programs by administrative staff • 20% of scientific and non-scientific staff benefiting from training once during the three years • Three management training sessions for key scientific and administrative leaders during the three years (joint training possible) 	Performance review process in place Evaluation reports Annual reports of the implementation of the training plan Studies specific to the situations

Source: World Bank (1999).

Table 2: Project Outputs and Activities for Agricultural Research – ISRA, ITA, and FNRAA

Descriptive Summary	Verifiable Objective Indicators	Means of Verification
1. Effective functioning of the FNRAA allowing an allocation of resources to operational research according to the objectives of SNRAAA	<ul style="list-style-type: none"> • At least 10 projects financed the first year and 50 projects financed over three years • Percentage of projects approved by the Fund without modification • Percentage of projects approved by the Fund once modified 	<p>Minutes of meetings – ISRA, ITA, and FNRAA</p> <p>Annual report of the management committee</p> <p>Annual Report of the Scientific Committee</p>
2. Research projects meet the following criteria (a) mobilization of all actors of research; (b) responsive to needs identified with the users; (c) adaptability to the globalization of science	<ul style="list-style-type: none"> • Fifteen research contracts associated with at least two agencies of SNRAA by the end of 3 years • Number of thesis and scientific congresses during six years • Number of projects carried out consistent with demand 	<p>Reports of the activities of the Institutes and FNRAA</p> <p>Ad-hoc studies</p>
3. Install a management information system	<ul style="list-style-type: none"> • Fully operational by 1999 	External scientific, administrative, financial, and accounting audits
4. Establish a training plan	<ul style="list-style-type: none"> • Number of training programs annually 	Annual training reports
5. Establishment of institute rehabilitation and implementation plan	<ul style="list-style-type: none"> • All structures rehabilitated in three years • Seventy percent of equipment procured in three years 	Balance sheets and accounting/ physical inventories
6. Consolidation of the pilot committee of the National Research System	<ul style="list-style-type: none"> • At least three annual meetings starting in 1999 onward 	Minutes of meetings
7. Development and submission to FNRAA of projects linking two or more institutions	<ul style="list-style-type: none"> • Four projects in the course of two years 	Annual reports of the institutes and FNRAA
8. Development and submission to FNRAA of thematic research projects stemming from strategic planning	<ul style="list-style-type: none"> • Seven projects undertaken by the end of two years • Number of publications • Number of methods put at the disposition of regional centers 	<p>Publications</p> <p>Proceedings of conferences</p>
9. Development and submission to FNRAA of applied research projects stemming from strategic plans	<ul style="list-style-type: none"> • Eight projects undertaken within two years • Twenty-five percent of strategic plans are translated into projects 	<p>Annual reports of the institutes</p> <p>Annual reports of FNRAA</p>
10. Participation in R&D assessment organized by CLCP within the scope of R&D consultations	<ul style="list-style-type: none"> • Number of sessions with farmer organizations • Fifty tests of technology transfer are available within two years 	Annual reports of the RD unit
11. Development and submission to FNRAA of R&D projects stemming from the participatory assessment	<ul style="list-style-type: none"> • Fifty percent of felt needs identified in the assessment are translated into projects 	Annual reports of the extension staff

Source: World Bank (1999).

3.4. Policy Issues Facing Research Organizations in Senegal

As public sector entities, ISRA and ITA are subject to the constraints and difficulties facing many government offices in Senegal. As noted in Chapter 2, many national policies affect agricultural production and the efficient functioning of ISRA and ITA as research institutes.

3.4.1. Science and Technology Policy

Privatization policies and the growing number of large and small private companies involved in agricultural processing raises the issue for ISRA and ITA of public versus private sector-oriented research. Currently both institutes, given their status as governmental organizations, cannot sell the results of their research, which is considered in the public domain. One possible exception is if the research were conducted under a specific contract with a private business that pays for the research. Given their past reliance on internally generated resources to help smooth out fluctuations in GOS and international donor funding (see Chapter 4), this restriction may limit the ability of these institutes to generate revenues from their research.

The proscription on selling the research "results" does not necessarily extend to research "byproducts." Under the terms of its restructuring, ITA is not supposed to sell research byproducts, except for rare circumstances where they are sold under contract to entrepreneurs who are funding the research or who purchase rights to the byproducts. ISRA, however, continues to sell its research byproducts in order to help defray expenses, and, versus Dakar-based ITA, has experimental plots in rural areas that make this possible.

At present, ITA and ISRA do not have any structures in place to protect their research results from being exported outside of Senegal and used elsewhere. This level of protection of research results would seem to be, at a minimum, something the government and private sector could support, instead of allowing research results to be entirely unprotected.

It appears that under the FNRAA, research organizations may be able to reap some financial advantage from research results. Article 10, Publications and Intellectual Property, states that "patents can be sought by the leading research institution on behalf of a research team that has been awarded funding for a research project. The costs of submitting a patent request can be included in a research proposal and are eligible for FNRAA funding." It is not clear, however, what the outcome of a patent request would be in terms of the ability of ITA or ISRA to use it for income-generating purposes, given their government status and the general resistance to licensing research results.

At a recent conference in Senegal, staff from the French organization, *Agence Nationale de Valorisation de la Recherche*, made a presentation on government-arranged risk capital or insurance for private sector companies and entrepreneurs that want to invest in developing and marketing research products. A research center would then presumably receive a percentage of profits on sales. Other models of how research (even public research) can be commercialized are also proliferating in the US research system and might provide useful information to Senegal. Many U.S. research universities, for instance, have offices of university-industry relations and research foundations with sufficient legal and administrative expertise to determine the relative rights and benefits of the

university (on whose property the innovation was first propagated), the researcher (who was the initial discoverer), and associated personnel (who may have rights given their role)¹³

3.4.2. Policies Related to Future Funding for Agricultural Research

In Senegal the TEC (*Tarif Extérieur Commun*) is now being applied.¹⁴ The Ministry of Finance takes pride in being the first country in the *Union Economique et Monétaire Ouest Africaine* (UEMOA) to achieve the conditions and requisite handbooks, etc., necessary to be able to institute it throughout Senegal. A Ministry representative expressed concern about the possible conflict in trying to encourage the competitiveness of the private sector on one hand while burdening it with more taxes to fund agricultural research on the other. Many in Senegal recognize the important role agriculture can play for the benefit of the country. Whether, and how, this translates into financial support for the sector is another issue.

Another funding question was raised during discussions with ISRA relative to their ability to generate revenues from leasing of research land under their title to farmers or others for their use. They are aware that other countries allow this, but do not know the legality of this in Senegal, especially in light of protection of natural resources on these lands.

¹³ For example, the University-Industry Relations and Wisconsin Alumni Research Foundation assist faculty in protecting their intellectual property rights and benefiting from them, but at the same time represents the interests of the University of Wisconsin. See <http://www.wisc.edu/warf/>.

¹⁴ The TEC is levied on imports from outside of the eight-member country common market of the UEMOA. The intent is to provide incentives for local industries in this common market to develop and flourish with less competition from other countries (notably Europe and Asia), and to reduce and eliminate cross-border tariffs within the region. The intent is also to reduce the overall tax burden on the economic sectors of these countries, particularly those that are the most valuable to the countries' trade and production sectors. The CET ranges from zero to 20 percent on imported items, and a phased application was set to begin in January 2000.

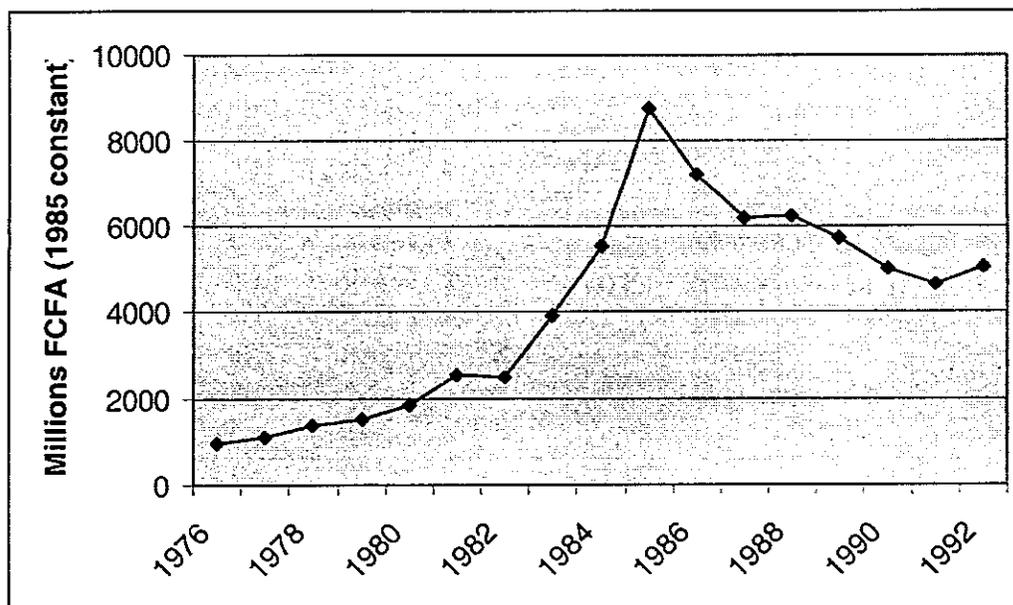
4. Financial Resources of ISRA and ITA

The new institutional arrangements created by the PSOAP, and the implementation of the FNRAA for traditional agricultural research institutes (further elaborated in Chapter 5) present a distinct change in the funding for both ISRA and ITA. The following chapter outlines a number of financial issues faced by ISRA and ITA as they enter into these new arrangements. The financial data presented below are from a number of sources, and in some cases there are discrepancies. The focus here is on identifying trends rather than establishing a single set of accurate numbers.

4.1. Historical Finances of ISRA and ITA

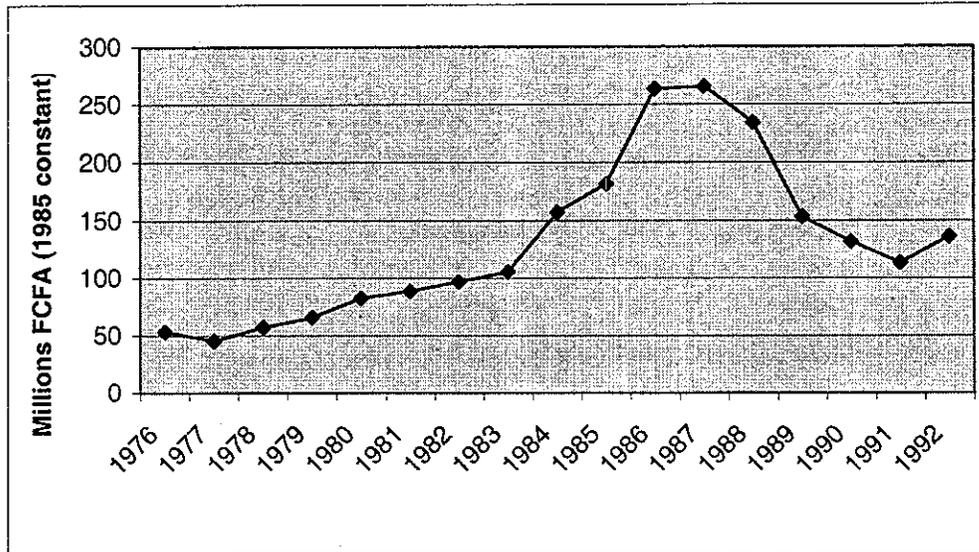
Mazzucato and Ly (1994) provide an historical perspective on the institution growth of both ISRA and ITA from 1975-1992 through the examination of their research budgets (Figures 1 and 2). The increase in the ISRA research budget is directly linked to the 1981-89 World Bank Agricultural Research Project. Within four years of the start of the project, the budget increased more than threefold. When the project ended, ISRA's budget remained at more than twice its pre-project level. The ITA research budget (noted to be typically 20 times smaller than ISRA during this period) also grew steadily through 1983, and then experienced three years of substantial inputs through international donors. The decline in research dollars in the late 1980s and 1990s is attributed to both declining donor funds and ITA's shift in focus from research into other areas.

Figure 1: ISRA Total Research Funding 1976-1992 (in constant 1985 FCFA)



Source: Mazzucato and Ly (1994).

Figure 2: ITA Total Research Funding: 1976-1992 (constant 1985 FCFA)



Source: Mazzucato and Ly (1994).

Source-of-funding data (Table 3) parallel the last seven years of research budgets shown in Figures 1 and 2, and underscore the contribution of the international donor community. For ISRA, donor funding during this period was never less than 59 percent of the total, and the GOS contribution did not exceed 33 percent of the total. Donor funds for ITA were never as important as they were to ISRA, and indeed fell to quite low levels in 1989-1990. As noted previously, the policies of ITA to expand its portfolio to activities other than research were instrumental for the increased self-generation of funds in the early 1990s.

Table 3: Source of Funding – 1986-92 (percentage of total)

Institute	Source of Funding	1986	1987	1988	1989	1990	1991	1992
ISRA	Government	23.0	31.4	18.9	19.5	33.0	31.8	32.5
	Own Income	5.0	4.3	6.9	3.5	7.3	3.3	4.2
	Donor	72.1	64.2	74.2	77.0	59.7	65.0	63.3
	<i>Total</i>	<i>100</i>						
ITA	Government	52.9	53.5	62.0	74.1	81.2	52.7	66.4
	Own Income	4.4	6.2	6.1	11.9	14.3	18.5	22.0
	Donor	42.7	40.3	32.0	14.0	4.5	28.8	11.5
	<i>Total</i>	<i>100</i>						

Source: Mazzucato and Ly (1994).

4.2. Recent financing of ISRA and ITA

With the exception of external funds from bilateral and multilateral contributions, ISRA's funding has been fairly stable in CFA terms over the 1990s (Figure 3). Data from the early 1990s and the year 2000 suggest that GOS has maintained a steady – and even slightly increasing – commitment to ISRA and currently accounts for nearly half (47 percent) of the total budget. Internally generated resources have been increasingly mild over the decade from approximately 5 to 7 percent in the first half of the decade to nearly 18 percent in 2000. Donor resources have dropped in both real and relative terms, presumably due to the end of both World Bank and USAID programs (Figure 3 and Table 4).

When converted into US dollar terms, ISRA's situation is less sanguine (Figure 4). At nearly US \$15.5 million budget in 1991 when ISRA had a monopoly on agricultural research, total resources dropped to approximately US\$5.0 million by the year 2000.

The ISRA Director General estimated that the shares of funding for forest, fishing, animal husbandry, and crop research are approximately 50 percent, 25 percent, 30 percent and 5 percent, respectively.¹⁵ The average allocation of funds (1996-2000) is 46 percent for staff salaries, 44 percent for operation costs and the remaining 10 percent for investments (Table 5). He further estimated that salary costs have increased over the last five years by over 50 percent. This has cut operating funds by approximately the same percentage (Table 5) endangering future research on grain production and animal husbandry. Only areas such as the management of natural resources, biodiversity, biotechnology, and intensive agriculture for legumes and rice will generate interest and funding.

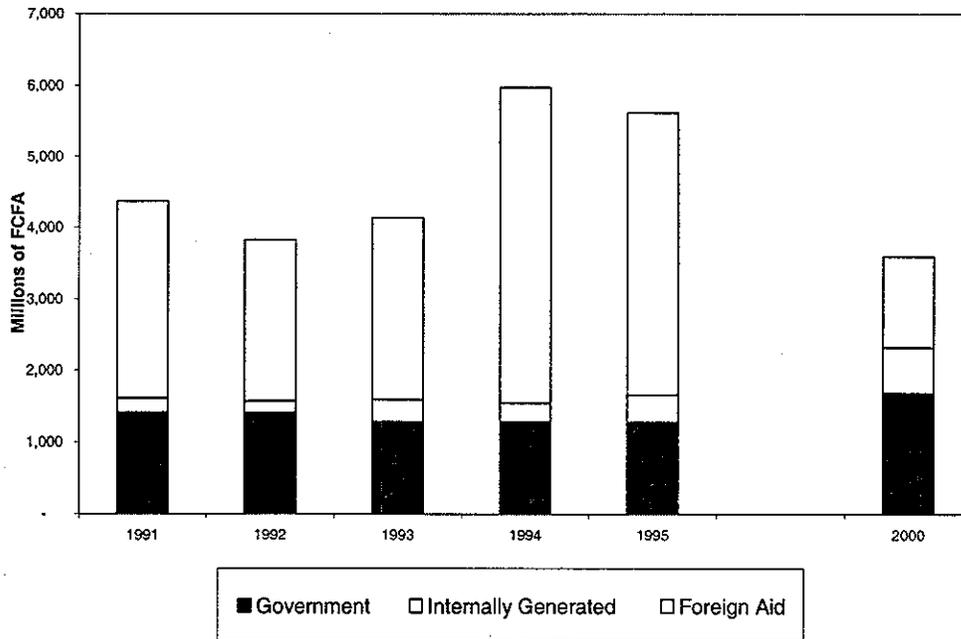
During its period of its restructuring, ITA received considerable funding from both the GOS and multilateral donors. The high percentage of international donor funding in 1993-94 presumably represented the contribution of CIDA (Table 6). Both government and internally generated funds increased over the 1993-1996 period, resulting in a steadily increased budget despite a decrease of donor funding in 1995. CRC-SOGEMA notes that due to their innovations at ITA described earlier, there was a 75 percent increase in sales during a 30-month period. No indication was given, however, as to how those funds were then reinvested in the research program, or whether that increased performance has continued in recent years.

For 2000, ITA continued to receive the largest percentage of its funding (66%) from the government central budget (Table 7), and there appears to be a slight increase in funding from 1996 to 2000.¹⁶ The aggregate of donor funding, through PSAOP and various bilateral and multilateral donors, also appears to be increased from 1996. One trend noted in Table 5 for ITA that is not surprising is the dramatic aggregate increase of salaries as a relative percentage of the total – as noted in Chapter 3, the younger (presumably entry level) staff that performed well are presumably garnering salary increases each year, and this trend will continue until a proportion of employees are either at the top of their salary range or a staff turn-over occurs.

¹⁵ Questionnaire provided by Pape Abdoulaye Seck as part of the SFI study, completed July 2000.

¹⁶ As noted at the beginning of this chapter, comparisons between data sources should be considered carefully and with some skepticism.

Figure 3: ISRA Financial Resources, 1991-1995 and 2000 (FCFA)



Source: ISRA

Figure 4: ISRA Financial Resources, 1991-1995 and 2000 (US Dollars)

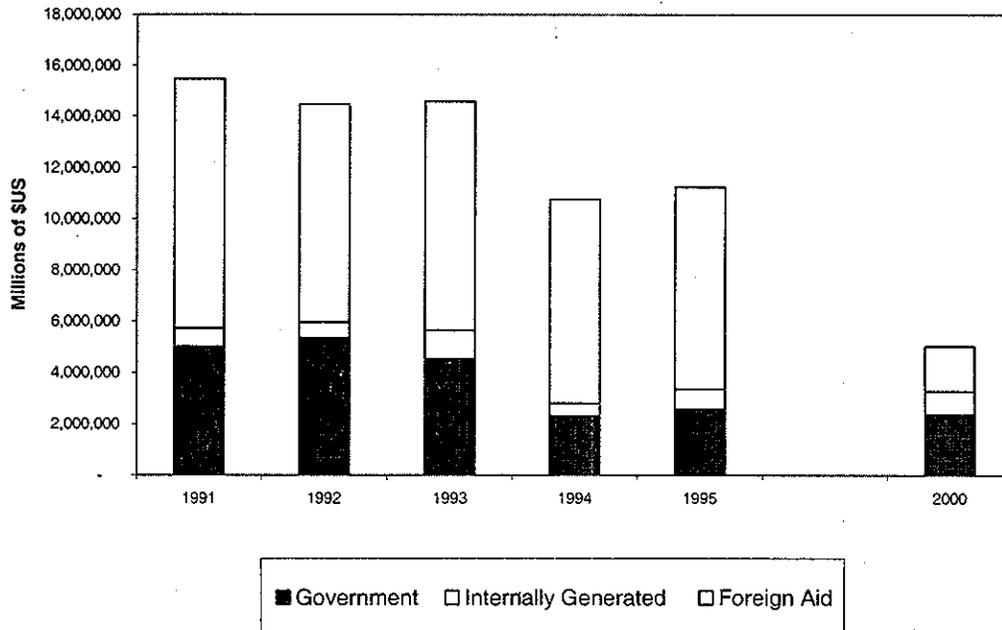


Table 4: Contribution of International Donors to ISRA: 1998-2000 (in FCFA)

Year	Contribution	% Change from Previous Year
1998	1,809,235,000	
1999	1,304,806,000	37.9%
2000	1,259,732,393	3.5%

Source: ISRA SFI Questionnaire, July 2000.

Table 5: Estimated Budget per Category: ISRA versus ITA (percentage)

		1996	1997	1998	1999	2000
Salaries	ISRA	40	40	45	55	50
	ITA	37	40	47	49	58
Operating Costs	ISRA	60	50	45	33	40
	ITA	52	49	44	42	34
Investments	ISRA		10	10	12	10
	ITA	12	10	10	10	8

Source: ISRA and ITA SFI Questionnaires, July 2000.

Table 6: ITA Evolution of Financial Resources: 1993 -1996 (FCFA)

	1993		1994		1995		1996	
	Amount	% of Total						
1. National Resources								
Government	123 633 246	56%	177 512 728	69%	234 770 557	81.5%	289 664 000	75%
Internally generated	24 488 534	11%	25 999 838	10%	27 803 499	10%	33 212 773	9%
Sub-total	148 121 780	67%	203 512 566	79%	262 574 056	91%	322 876 773	84%
2. Foreign Aid	72 145 462	33%	52 671 567	21%	27 453 568	9%	61 863 930	16%
Total Resources	220 267 242	100%	256 184 133	100%	290 027 624	100%	384 740 703	100%

Source: ITA.

Table 7: Estimated ITA Sources of Funds in year 2000 (FCFA)

Sources of Funds	Amount	Percentage	Origins
Central Government Budget.	301,664,000	66%	Government
Research Funds	50,000,000	11%	World Bank through PSAOP
Taxes and specific levies	1,620,050	Less than 1%	
Commercialization of research & products.	50,000,000	11%	
Bilateral Contributions	20,000,000	4%	Canada, Italy
Multilateral Contributions	19,751,184	4%	European Union
Others (regional funds and networks, etc)	16,900,000	4%	
Total	459,935,234	100%	

Source: ITA SFI Questionnaire, July 2000.

4.3. Potential Future Funding

No GOS funding estimates were available when field interviews for this study were conducted, but examination of the proposed funding for the life of the PSAOP offers some insight on funding changes at ISRA and ITA. The budget for ISRA is presented in the World Bank project appraisal document in three major aggregated line items: 1) support to the management unit, 2) funds for national research units (specified as crop production, forestry, animal production, and agricultural policy), and 3) funds for the eight regional units. By identifying specific budgets for both issues and regions, the budget highlights the equity issues involved in choices made amongst commodities and amongst the regions. The regional research units, in fact, are budgeted to receive almost three-quarters of the total support for the project.

The budget estimates for ISRA (Table 8) are "front-loaded" in 1999 and 2000, and then in 2004 there is a considerable one-year budget spike. Although no budget notes are provided in the PAD, one can assume that the initial two-years of funding are related to improvement of infrastructure (related to a required engineering plan), training (especially in areas of budget management), and institutional changes related to the implementation of the FNRAA. One can further assume that the 2004 spike is related to a variety of activities concerning end-of-Phase II benchmarks.

Comparing the planned support for ISRA versus ITA (Table 9) reveals that the PSAOP provides proportionately more funding to ITA than to ISRA. As noted above, ISRA is substantially larger than ITA and has garnered substantially more funds in the past. Support to ITA is, for the most part, directly to the management unit, and presumably for training, and infrastructure and equipment enhancement.

Table 8: Proposed ISRA Funding for PSAOP (\$US 000)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
	Phase I			Phase II			Phase II				
Support to Management Unit	295.1	296.8	181.2	185.3	177.4	328.1	181.2	181.2	181.2	181.2	2,188.2
National Research Units	458.7	540.9	54.0	50.9	26.9	566.2	54.8	54.8	54.8	54.8	2,017.3
Regional Research Units	845.8	2,365.2	1,273.8	261.5	106.4	1,117.7	1,273.8	1,273.8	1,273.8	1,273.8	11,065.9
TOTAL	1,599.6	3,302.9	1,509.8	497.8	310.6	2,012.1	1,509.8	1,509.8	1,509.8	1,509.8	15,272.0

Source: World Bank (1999).

Table 9: Proposed ITA funding for PSAOP (\$US 000)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
	Phase I			Phase II			Phase II				
Support to Management Unit	746.5	809.3	479.2	335.2	450.7	512.2	479.2	479.2	479.2	479.2	5,249.7
Other Programs	143.6	70.8	52.6	8.2	0.0	0.0	52.6	52.6	52.6	52.6	485.7
TOTAL	890.1	880.1	531.8	342.4	450.7	512.2	531.8	531.8	531.8	531.8	5,735.4

Source: World Bank (1999).

5. National Fund for Agricultural and Agro-Industrial Research (FNRAA)

The National Fund for Agricultural and Agro-Industrial Research (*Fonds National pour la Recherche Agricole et Agro-Alimentaire* or FNRAA) represents a new financial mechanism for Senegal's research community. To date, the FNRAA has a relatively short track record. Its start-up is taking place within a significantly changed setting for research and technology transfer.

5.1. A Precursor

Previous to the FNRAA, Senegal has had experience with other mechanisms for funding agricultural research. One such example was the USAID-funded Agricultural Technology Fund under the Natural Resource Based Agricultural Research Program was supported by USAID implemented in the 1990s. It was established in 1991, budgeted at US\$2 million for the six-year life of the project, and targeted to ISRA researchers and their partners (NGOs, etc.). It served as a draw-down fund for agricultural research related to natural resource management (Dufant 1999) and was intended to increase the responsiveness of agricultural research to farmers' needs. Operational features of the competitive fund included: 1) one call for research proposals per year; 2) a management team that was predominantly ISRA senior staff which evaluated the proposals with USAID input; 3) proposals limited to \$15,000; and 4) a three year maximum duration for funded projects. Oregon State University managed the program, which ended in July 1998.

Dufant (1999) notes that this competitive research funding effort had a number of institutional and performance concerns. First the research community accorded the fund little prestige, resulting in little real competition. Strict application rules discouraged so many researchers that the pool of completed proposals was quite small, leading to an acceptance rate of 90-100 percent. Administrative delays in the release of funds were cited by researchers as a major constraint for carrying out research. However, administrators complained that quarterly financial reports were incomplete and/or charges were considered questionable. Finally, the few NGOs that participated as partners in the process either were associated with US organizations or had connections with ISRA researchers. In concluding, Dufant made two important observations. First, although researchers and officials viewed the project as a success, farmers' organizations believed that they did not have enough participation. Second, the lack of administrative capacity coupled with researchers' general attitude towards the funding mechanism made the fund unsustainable.

5.2. Creation of the FNRAA

The FNRAA has started off on a very different footing. Decret 5851 of the Ministry of Agriculture officially created the FNRAA.¹⁷ The fund is under the technical supervision of the Minister of Agriculture and the financial supervision of the Minister of Economy, Finance, and Planning. The FNRAA was designed to have complete financial and administrative autonomy, and is completely separate from any government or donor financing of ISRA or ITA. By December, 2001, the FNRAA

¹⁷ See <http://www.jurisen.sn/jors/1999/jo5851b.htm>

is intended to become either a private foundation or another type of legal entity governed by private law.

The overall research objectives for the fund are identified under ISRA's and ITA's strategic plans: 1) improve the competitiveness of Senegalese agriculture, so as to increase exports and recapture domestic markets, 2) diversify the country's productive base; 3) protect natural resources; and 4) improve value-added of agricultural production through processing, particularly in rural areas, to stimulate employment and increase rural incomes (World Bank 1999). The World Bank is providing US\$4.5 million for FNRAA during the First Phase (2000-2003) of the PSOAP. IDA financing totals \$3.7 million, and IFAD financing totals \$0.7 million.

5.3. FNRAA as a Financial Mechanism

The FNRAA will finance two different categories of research projects:

- Projects drawn from medium-term strategic plans of and SNRAA institution, including ITA and ISRA. These strategic plans were developed on the basis of a participatory approach and all research projects included in the strategic plans have been accepted as part of the PSAOP project starting conditions. It is anticipated that 80 percent of the proposals will be in this category.
- Projects responding to calls for proposals made by the FNRAA on the basis of yearly priorities identified by FNRAA committees. The FNRAA will fund three kinds of research: strategic, applied, or developmental. It is anticipated that 20 percent of the proposals will fall into this category.

A manual for the management of FNRAA research projects created in August, 2000 codifies the FNRAA grant award and financing procedures.¹⁸ Allowances for direct and indirect costs, for instance, are clearly spelled out. Submission guidelines and the review process are outlined. Contract negotiations and ultimately the dispensing of funds is also covered. The manual also contains numerous appendices to guide researchers through the proposal process, and offers a sample contract between the research team and FNRAA.

5.4. Governance of the FNRAA

Three committees govern the functioning of the FNRAA:

1. The Management Committee (*Comité de Gestion* – CG) elaborates the strategic vision for the fund, approves documents and functions (i.e., manuals, budgets, and work programs), and formulates the themes and budgets for each competitive grant offering. The committee has 16 voting members¹⁹ and 5 consulting, non-voting members.

¹⁸Titled *Manuel de Gestion des Project de Recherche Phase 1:200-2003*.

¹⁹ M. Cissoko of CNCR serves as president.

2. The Science and Technical Committee (*Comité Scientifique et Technique* – CST) is charged with the scientific integrity of the FNRAA. Its duties include classification of research proposals for evaluation, evaluation of projects, and the suggestion of scientific themes for competitive grant offering to the CG. The committee has 15 members, including nine from national organizations, two from regional organizations, two from International Centers, and two from developed countries.
3. The Executive Secretariat implements the decisions of the CG. It is headed by an executive secretary and staffed by a scientific advisor and other supporting personnel.

To maintain transparency and independence, the staff of the executive secretariat was selected through a competitive process by an independent firm, and an external auditor will keep the accounts. GOS representatives hold only one quarter of the seats on the Management Committee. The remaining seats are allocated to representatives of the research community, producer organizations, agro-processors, export and import industries, decentralized collectivities, NGOs, and extension services. To reduce conflict of interest and improve the quality of research project, about one third²⁰ of the members of the scientific committee will be recruited from outside Senegal.²¹

In short, the FNRAA is structured to be largely managed by the private sector, and includes a significant role for foreign research experts as well, both from the region and internationally for transparency and scientific validation. The government staff interviewed seemed extremely open to and used to working with private sector partners. As for the independence of the financial arrangements, a Ministry of Economy and Finance representative interviewed during the study seemed to have no qualms about having the FNRAA managed outside of the government treasury.

A final issue relative to the FNRAA is the prospect of another fund being developed, entitled the *Fonds National de Développement Rural* or FNDR. The FNDR is part of a projected activity under PSAOP in future funding phase. Similar to the FNRAA, it is designed to be supported by funds from the private sector and producers. It will cover a broad range of agricultural activities including extension work, producers groups, trade associations, agricultural banking or insurance activities, privatizations -- and may also be used for financing ISRA's research. This may call into question the role of each fund and how the agriculture sector as a whole will support it. CNCR seems more interested in the FNDR than the FNRAA, likely because its member producers and businesses see opportunities for more direct activities supportive to them. Nevertheless, two competitive funds supported largely by taxes on the private sector may impose an excessively high burden on agricultural producers, potentially undermining the very development they intend to be promoting.

²⁰ Fifteen members comprising nine from Senegal, two from the sub region, two from external development partners and two from international agricultural centers.

²¹ See <http://www.eiard-infosys.org/data/newleapril2000.htm> for a recruitment notice to serve on the Management Committee. Text includes the following: "In order to help the Management Committee of FNRAA to select the projects for funding on a competitive basis a scientific and technical committee will be established and a group of peer reviewers is foreseen. Travel expenses will be covered by FNRAA. FNRAA invites scientists, fluent in French and English, who are interested to participate"

5.5. Results to Date

The first two requests for proposals have been completed, and their results and commentary on the process have been reported in the Senegalese press (see Dia 2001, Diagne 2001). Twenty-eight proposals were submitted for the first round of funding (August 2000), and eleven proposals were accepted. Of the eleven, nine projects were issued to ISRA, one to researchers at the *Ecole Supérieure Polytechnique*, and one to those at the *Université Cheikh Anta Diop*, but the proposals involve some 21 different institutions. Of these, the projects showed a broad geographic distribution, affecting Casamance, Senegal-Oriental, the Senegal River region, the Peanut Basin region, and urban and suburban areas. Twenty-three proposals were submitted for the second round of funding (February 2001), and five were accepted (three from ISRA, and two from ITA). Among the second round of accepted projects was research concerning improvement of sesame production, the re-establishment of bamboo in Southern Senegal, and model management systems related to pasture and forests in rural areas.

ISRA's success in garnering three quarters of the grants in the first two cycles is not surprising as it has essentially held a monopoly on agricultural research in Senegal (along with, to a much lesser extent, ITA). He further noted that there were no projects funded on agricultural sectors such as horticulture, fisheries, biotechnology, or staple commodities such as corn or rice. FNRAA is currently examining means of enhancing impact. One approach is by specifying that grants will only be made available on excellent proposals on selected problem areas to be defined by a group of NARS experts, as opposed to opening competition in all areas.

Neither source indicated the total funds per each offering, or financial or administrative specifics related to each accepted project. There was also no specific mention of the composition of the 21 different partners noted under the first offering, or whether the second offering had a similar type of interest by different institutions. Finally, there was no mention made of the cumulative 31 percent acceptance of the proposals, and whether the rejection of the others was based on technical, administrative, or financial issues.

6. Issues and Ongoing Questions

The FNRAA represents a dynamic attempt to solve a number of long-standing challenges for financing agricultural research in Senegal. The increased influence of farmers' groups, and the increasing role of the private sector necessitate a change in "business as usual" for government-led research institutions such as ISRA and ITA. Senegal's agriculture sector faces tremendous ecological and economic pressures, and requires research and technology development systems that are cost-effective and responsive. ISRA and ITA and their senior level personnel must learn to be "lean and mean," flexible, and transparent in their near-term future activities. And, as they accomplish this, they must be recognized and rewarded.

Although the FNRAA is in place and functioning, and institutional changes have been made at ISRA and ITA, the long-term funding needs of agricultural research in Senegal are by no means assured. There is a need to convince national and international donors to join the FNRAA – what are the long-term benefits for such participation and support? An obvious first step is for ISRA and ITA to prove themselves as leaders in agricultural research through user-ready and demand-driven research results, effective collaboration with others in the SNRAA, and effective research management. Success is the best way (and arguably in this era of scarce finances, the only way) to convince stakeholders to continue to provide resources for agricultural research.

Critical issues for the near term include the following:

Issue 1. While significant progress has been achieved in reforming Senegal's lead agricultural research institutes, the reform process is not yet completed. ISRA and ITA, with the assistance of PSAOP and its predecessor projects, have taken major steps to introduce performance-enhancing measures. However, both institutions remain within the public sector, which raises the question of whether sufficient autonomy from civil service bureaucratic procedures can be achieved so that the reforms can lead to results. Rightsizing must continue to occur, but with consideration for the absorptive capacity of institutions and their staff's ability to adjust to the pace of reforms. Salary issues, performance evaluations, and reward systems cannot be ignored for those researchers that are competitive within the new FNRAA grants structure. Financial management and accounting systems will need improvement as well.

Ongoing Questions:

1. How will ISRA reforms progress if a majority of PSAOP funding is targeted to support the Regional Research Units? The targeted funding for regional research units may represent a change in future resource flows for ISRA from headquarters to regional centers. Although this is consistent with national decentralization policies and should be welcomed by producer organizations, it is not clear as to whether ISRA institutional structures support this wholeheartedly. One determinant of the success or failure of this decentralized approach will be the performance of the regional research units in concert with local extension agents and producers to create "local agricultural service networks."

2. Are ISRA and ITA, in fact, rightsized? One could argue that the continued exodus of personnel from ISRA means that personnel policies are not quite right, or that opportunities in the private or other governmental sectors are better. The competitive research proposal

process of the FNRAA could lead to further “weeding out” of other researchers in the near future. One could argue that ITA, given the efforts of CIDA over the last decade, is rightsized. However, increasing salary costs may force ITA to consider how it will look at personnel policies in the future. Achieving an appropriate staffing level and pattern in a dynamic environment is not a one-shot activity, but will require ongoing attention from senior research managers.

Issue 2. It will be important for the FNRAA to demonstrate that competitive grant funding can contribute to SNRAA performance. Over the next three years, the FNRAA must prove that it is a viable alternative for funding agricultural research in Senegal. This means that the research groups that were awarded grants in the first two rounds of FNRAA competitive grants must produce results on time, document their success, justify the costs and benefits, and extend their innovations throughout Senegal. FNRAA supervisory committees (Scientific and Technical Committee and Management Committees), for instance, were created to maximize the participation of national interests and international expertise – the question is whether this group of individuals becomes a collective body for effective and collaborative decisionmaking. For the FNRAA grant system to support good agricultural research, the assumptions are that: a) scientifically sound and innovative proposals that respond to national needs are offered by researchers; and b) the selection system recognizes innovation and rewards it adequately. Neither of these points are givens, and adequate monitoring and evaluation of the proposal submission and grants awards must continue. Finally, the careful planning to include transparency and equity in the FNRAA organization and proposal process must be monitored. With the severe lack of research funds available to ISRA, ITA, and others, there will be a natural tendency to exploit the FNRAA funding for their own advantage and at the expense of others.

Ongoing Questions:

1. What proportion of FNRAA proposals should be funded, and to whom? A cumulative 31 percent proposal success rate in the first two rounds of FNRAA means that more than two-thirds of researchers failed to qualify for funding. Will they re-submit proposals through FNRAA, or will they consider other options for funding (working through collaborative arrangements with international organizations, etc)? As noted in the popular press, the accepted research proposals did not target areas that may be significant to Senegal’s agricultural exports (horticulture and fisheries), its basic food needs (rice), and its future (biotechnology). This raises questions about the funding priorities of the FNRAA. Perhaps these areas will be funded elsewhere, for example, rice cooperatives (through CNCR or other groups) could band together and support research on staple crops if they know that it is not be a priority for FNRAA. Grant award procedures may need some finetuning to avoid problems common to competitive funds worldwide, for example, the tendency for awards go to senior scientists with proposal writing experience. One remedy for this problem is to reserve some competitive funding for junior-level scientists to encourage them and to build their capacity.

2. How can the FNRAA be sustained? The FNRAA is intended to become a foundation or similar legal entity by the end of 2001 as a trigger for Phase II funding of PSAOP (World Bank 1999). In principle, an autonomous foundation could provide independence, transparency, and prestige, and thereby serve as a magnet for attracting funds. However, building such a track record will take time. Capitalizing the foundation, and then building a strategy for ongoing contributions will be necessary for the FNRAA to become sustainable. One question is the source

of the funds. Besides international donors, can ISRA and ITA depend, for instance, on the beneficiaries of research on sesame production and the re-establishment of bamboo in Southern Senegal to provide financial resources to the foundation should these projects be a success?

Issue 3. Research institutes will need a funding base beyond the FNRAA. The FNRAA cannot provide for all the financial needs of each of the SNRAA institutes – it is not designed to support recurrent costs, infrastructure, and long-term training. Worldwide experience shows that competitive funds cannot and should not be the major mechanism for funding research, but should complement regular budget appropriations (see Byerlee 2000). The Government of Senegal has maintained an increasing commitment of ISRA and ITA, however devaluation and decreased donor funding pressure these research institutes to look for other sources of revenues and develop alternative financial mechanisms, or face continued institutional decay. ISRA and ITA will need to have increasingly compelling evidence of quality research products and competent management structures in order to attract resources from international donors or the private sector. Senior staff must continue to work with GOS officials to revise government policies on intellectual property, exploitation of on-station research resources, etc. such that alternative funds can be attracted and used by the institutes.

Issue 4. National and international beneficiaries of agricultural research must better appreciate the role of SNRAA institutes and then contribute to their operation. A mechanism such as the FNRAA will be sustainable only when research and technology users recognize the critical role of research innovation for their lives and then are ready to contribute to such institutions continued success. One of the conditions for continued funding for the PSAOP Phase II is the identification of two international donors that will be willing to fund ten percent of future FNRAA grants. As of this writing, however, there is no indication that any international donors are ready to commit to such a project. Nationally, and through another tranche of funding in the PSAOP, the CNCR plans to create a National Rural Development Fund, which would presumably help fund agricultural research. However, as much as the fund is also targeted to fund multiple activities and multiple groups, one wonders whether it should be counted as a viable alternative. Finally, most agricultural services, such as research and extension, have in the past been provided to farmers for free or minimal cost. This suggests that ISRA and others will need to launch a marketing and information campaign to convince farmers' organizations to support agricultural research financially.

Ongoing Questions:

1. Will national stakeholders recognize the contribution of agricultural research institutions, or will it get lost in the "agricultural services" approach? The PSAOP funding of ISRA and ITA is parallel to major support of agricultural extension (ANCAR) and producer organizations. Within PSAOP, ANCAR is slated to be completely privatized, and as such, will need to create fee-for-service mechanisms to survive. In this case, one wonders how the success of agricultural research will be translated into action by ANCAR, and whether ISRA or ITA will ultimately continue to provide new technologies and research results to ANCAR free of charge.

2. Will international donors fund agricultural research, or will they opt for agricultural promotion projects, rural and small business development projects, etc? Privatization and decentralization policies by the GOS have encouraged business development in the agricultural sector. There is no lack of agro-processing possibilities in Senegal, and it could be argued that the limiting factor in the continued development is not agricultural research, but financing,

business skills, and marketing.²² The World Bank has funded projects on private sector capacity building and trade reform and competitiveness, and USAID is supporting a project aimed at income generating activities for local business associations and entrepreneurs (Sustainable Increases in Private Sector Income Generating Activities in Selected Sectors). Both ISRA and ITA need to carefully understand this funding reality and determine where state-of-the-art agricultural research fits as part of the product stream, and how they can make the case for the contribution of the research community.

²² See, for instance, the projects listed on <http://www.emainvest.com/projects2001/senegal.html>.

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Appendix

Table 10: ISRA Financial Resources 1991-1995 and 2000 (CFA)

	1991		1992		1993		1994		1995		2000	
	Amount	%										
National Resources	1,614,838,000	37%	1,576,002,000	41%	1,599,238,000	39%	1,554,826,000	26%	1,671,538,000	30%	2,338,905,507	
Government	1,413,000,000	32%	1,413,000,000	37%	1,285,545,000	31%	1,285,545,000	21%	1,285,545,000	23%	1,699,000,000	47%
Internally generated resources	201,838,000	5%	163,002,000	5%	313,693,000	8%	269,281,000	5%	385,993,000	7%	639,905,507	18%
Foreign Aid	2,749,946,000	63%	2,250,769,000	59%	2,530,375,000	61%	4,416,511,000	74%	3,940,329,000	70%	1,259,732,393	35%
Total Resources	4,364,784,000	100%	3,826,771,000	100%	4,129,613,000	100%	5,971,337,000	100%	5,611,867,000	100%	3,598,637,900	100%

ISRA

Table 11: ISRA Financial Resources 1991-1995 and 2000 (US\$)

	1991	1992	1993	1994	1995	2000
National Resources	5,724,143	5,958,645	5,647,825	2,800,479	3,348,769	3,275,136
Government	5,008,685	5,342,357	4,539,995	2,315,463	2,575,468	2,379,085
Internally Generated	715,459	616,288	1,107,829	485,016	773,301	896,051
Foreign Aid	9,747,779	8,509,845	8,936,202	7,954,811	7,894,078	1,763,985
Total Resources	15,471,922	14,468,490	14,584,027	10,755,290	11,242,847	5,039,121
CFA/\$US	282	264	283	555	499	714