



The CGIAR at 31: An Independent Meta-Evaluation of the Consultative Group on International Agricultural Research

**Thematic Working Paper
The CGIAR in Africa:
Past, Present, and Future**

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Abbreviations and Acronyms

AGM	Annual General Meeting (CGIAR)
AIDS	Acquired immune deficiency syndrome
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
ASB	Alternatives to Slash and Burn (a CGIAR System-wide program)
CDC	Center Directors' Committee (CGIAR)
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical (CGIAR)
CIFOR	Center for International Forestry Research (CGIAR)
CIMMYT	Centro Internacional de Mejoramiento de Maíz y Trigo (CGIAR)
CIP	Centro Internacional de la Papa (CGIAR)
CORAF	Conseil Ouest et Centre Africain pour la Recherche et le Développement
CP	Challenge Program (CGIAR)
DGF	Development Grant Facility (World Bank)
FAO	Food and Agriculture Organization of the United Nations
FARA	Forum For Agricultural Research in Africa
GPPPs	Global public policies and programs
ICARDA	International Center for Agricultural Research in the Dry Areas (CGIAR)
ICLARM	International Center for Living Aquatic Resources Management (CGIAR)
ICRAF	International Center for Research in Agroforestry (CGIAR)
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics (CGIAR)
ICW	International Centers Week (CGIAR)
IFPRI	International Food Policy Research Institute (CGIAR)
IITA	International Institute of Tropical Agriculture (CGIAR)
ILCA	International Livestock Center for Africa (CGIAR)
ILRAD	International Laboratory for Research on Animal Diseases (CGIAR)
ILRI	International Livestock Research Institute (CGIAR)
INIBAP	International Network for the Improvement of Banana and Plantain (CGIAR)
IPGRI	International Plant Genetic Resources Institute (CGIAR)
IRRI	International Rice Research Institute (CGIAR)
ISNAR	International Service for National Agricultural Research (CGIAR)
MARP	Multi-country Agricultural Research Program for Africa
MTM	Mid-Term Meeting (CGIAR)
NARS	National agricultural research systems
NGO	Nongovernmental organization
NRM	Natural resource management
OED	Operations Evaluation Department (World Bank)
R&D	Research and development
SACCAR	Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training
SPAAR	Special Program for African Agricultural Research
SRO	Subregional organization
TAC	Technical Advisory Council (CGIAR)
TSR	Third System Review (CGIAR)
USAID	United States Agency for International Development
WARDA	West Africa Rice Development Association (CGIAR)
WTO	World Trade Organization

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Preface

This is one of five thematic working papers by independent scholars prepared as part of the meta-evaluation of the Consultative Group on International Agricultural Research (CGIAR) conducted by the Operations Evaluation Department (OED) of the World Bank. The report, entitled *The CGIAR at 31: An Independent Meta-Evaluation of the Consultative Group on International Agricultural Research*, is available on OED's external Web site: <http://www.worldbank.org/oed/gppp/>. The thematic working papers are: C. B. Barrett, "Natural Resources Management Research in the CGIAR: A Meta-Evaluation," C. K. Eicher and M. Rukuni, "The CGIAR in Africa: Past, Present, and Future," B. Gardner, "Global Public Goods from the CGIAR: An Impact Assessment," W. Lesser, "Reviews of Biotechnology, Genetic Resource and Intellectual Property Rights Programs," and D. J. Spielman, "International Agricultural Research and the Role of the Private Sector."

The report on the CGIAR is part of a two-phase independent review by OED of the World Bank's involvement in global programs. The first phase has been published: *The World Bank's Approach to Global Programs: An Independent Evaluation, Phase 1 Report* (OED, Washington, D.C., 2002). The second phase, due in fiscal 2004, involves case studies of 26 programs, of which the CGIAR is one. The inclusion of the CGIAR evaluation in the OED review of the Bank's global programs was requested by the Development Grant Facility (DGF) and Bank Management in June 2001, and endorsed by OED's global program advisory committee.

While the focus of the meta-evaluation is on the Bank and the strategic role it has played and ideally will continue to play in the future in ensuring the CGIAR's development effectiveness, the thematic and country working papers and the country background papers focus on the different components of CGIAR activities that determine impact, including country perspectives. In addition to informing a broader understanding of the policy and technical context of CGIAR implementation, the papers provide a tool for assessing the performance and impact of the whole CGIAR partnership; this, in turn, provides a critical context for gauging the impact and value added of the Bank's participation in the program, the primary objective of the CGIAR meta-evaluation.

All five thematic working papers are based on extensive reviews of CGIAR's own evaluations as well as other related scholarly literature and discussions with relevant stakeholders. Four of the five thematic working papers were extensively peer-reviewed by knowledgeable external experts. A list of working and background papers and peer reviewers for the working papers is provided in Annex 2.

In addition, four country case studies on Brazil, India, Colombia, and Kenya provide developing country perspectives on the CGIAR. Two of the four – a study on India, written by Dr. J. C. Katyal and Dr. Mruthyunjaya, and a study on Brazil, by Jamil Macedo, Marcio C.M. Porto, Elisio Contini, and Antonio F.D. Avila – are issued as country working papers. The other two – C. Ndiritu, "CGIAR-NARS Partnership: The Case of Kenya" and L. Romano, "Colombia Country Paper for the CGIAR Meta-Evaluation" – are available on request.

The CGIAR was the first program providing global public goods to receive grants from the Bank's net income. Although the program has an impressive tradition of self-assessments, System-level evaluations have been few and far between. An exception, the Third System Review (TSR), was carried out in 1998, 17 years after the previous System-level review. OED determined that a meta-evaluation would most effectively assess CGIAR performance and inform OED's overall review of the Bank's involvement in global programs. In brief, the objectives of the meta-evaluation were three-fold:

- Evaluate implementation of recommendations in the 1998 TSR review
- Identify issues confronting the CGIAR from a forward-looking perspective
- Draw lessons for overall Bank strategy on global public policies and programs

The meta-evaluation report is in three volumes. *The Overview Report (Volume 1)* addresses strategic questions regarding the organization, financing, and management of the CGIAR as these have affected research choices, science quality, and the Bank's relationship to the CGIAR. *The Technical Report (Volume 2)* explores the nature, scope, and quality of the System's scientific work, assesses the scope and results of the reviews, and analyzes the governance, finance, and management in the CGIAR. *The Annexes (Volume 3)* provide supporting materials and are available on request.

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Summary

“There are two primary criteria for the success of international agricultural research centers. First, they must be centers of excellence, applying the world’s best scientific talent to the practical problems they were established to solve...Second, they must work collaboratively to improve the scientific expertise, operational efficiency, and output of national research programs.”
 – Nyle C. Brady, 1977

1. The purpose of this paper is to examine the performance of the Consultative Group on International Agricultural Research (CGIAR) in sub-Saharan Africa (hereafter Africa), identify problems facing the System, and discuss strategies to improve the performance of the System. The CGIAR is a network of 16 international agricultural research Centers. The first CGIAR Center in Africa was established in Nigeria in 1967 and it became operational in 1970. Currently, all 16 CGIAR Centers have programs in Africa. The total agricultural research expenditure in Africa is divided as follows: NARS, 75 percent; CGIAR, 15 percent and private, 10 percent The CGIAR is spending about 45 percent of its budget in Africa.
2. At the beginning of Africa’s independence in the early sixties, 10 percent of the agricultural researchers in Africa were African and 90 percent expatriate. However, massive overseas training programs reversed the ratio to 90 percent African and 10 percent expatriates by the early 1990s. This capacity building effort represents an important success story. But knowledgeable observers generally agree that agricultural research in Africa today is generally weaker and at an earlier stage of institutional maturity than in Asia and Latin America.
3. Currently, 80 percent (4,800) of Africa’s agricultural researchers are concentrated in 13 countries, while the remaining 20 percent (1,200) of the scientists are dispersed in 35 countries across the continent (Mrema, 2001b). This 80/20 research paradigm is at the center of the NARS/ SROs/ CGIAR debates over how to strengthen agricultural research in Africa. This concentration and dispersion of talent in a continent of 48 countries raises three complex and interrelated issues of research priorities, organization, and financing of research.
4. The study begins by examining the performance of colonial research systems from 1900 to 1960 and highlights the payoff to the use of strategic planning in setting up regional research stations to generate new technology for surrounding countries rather than establishing a full blown research system in each colony. The shortcoming of the colonial model was that it trained colonial rather than African researchers.
5. We then examined the post-independence expansion of the NARS in Africa and point out that the CGIAR Centers can never achieve their full potential unless the NARS are effective and financially sustainable. We then analyzed the rise of sub-regional research organizations (SROs). The balance of the paper analyzes the historical development of the CGIAR in Africa followed by a discussion of guiding principles to improve the performance of the CGIAR and national agricultural research systems in Africa.

6. The findings of our analysis of the CGIAR System in Africa are:
- First, despite some difficult start-up problems, the CGIAR Centers have made major contributions to African agriculture. Virtually every African informant agrees that the CGIAR varieties have been an important contribution to African agriculture and that this pipeline of new technology should be continued.
 - The second conclusion is that the CGIAR Centers in Africa are under-funded and over-stretched. The quality of science is being threatened as Centers are pulled downstream and cajoled and/or seduced into adding more pet projects of donors.
 - The third conclusion is that the CGIAR will not achieve its full potential until the NARS of Africa are productive and financially sustainable. In some respects, the CGIAR institutes are being called upon to compensate for the failures of national systems. For example, most NARS breeding programs remain little more than variety-testing efforts. If the CGIAR shuts down their applied breeding tomorrow, this will sharply reduce the Centers' germplasm available to NARS. But then do the CGIAR Centers pursue variety development forever? The question remains: do the CGIAR Centers in Africa provide the germplasm for national variety-testing for another 20 to 30 years? The bottom line is that ways must be found for Africa to provide leadership, ownership, and responsibility for public financing of their national agricultural research system.
 - The fourth conclusion is that there is an urgent need for donors to abandon the tactical approach of strengthening one NARS at a time and adopt a strategic approach to building five to ten agricultural science bases in Africa. Each agricultural science base (ASB) would have a critical mass of scientific expertise to produce new technology and share it with technology borrowers, public and private. All NARS, large and small, would be eligible to become technology producers and/or technology borrowers and compete for ten-year competitive (ASB) grants. Although several commentators have criticized this proposal because they claim it will be hard to gain African political support, what are cost effective alternatives for strengthening the 35 small NARS in Africa?
 - The fifth conclusion is that the combined efforts of the NARS, SROs, CGIAR, and the private sector, represent an incomplete and unsustainable model of technology generation and transfer because consideration is not being given to human capital replenishment and universities. Without question, most of Africa's future scientists will have to be trained in African universities because of the dramatic decline in donor assistance for overseas study. Yet, the university puzzle is generally being skirted and there is a high degree of tension surrounding NARS/SRO/CGIAR/university relationships. Three major questions need to be addressed: how to improve the quality of M.Sc. training in African universities in traditional fields such as plant breeding, agronomy, animal science, crop management, and agricultural economics? Second, which universities and faculties of agriculture in Africa should be assisted in developing the capacity to train future African scientists in new scientific areas such as biotechnology, biodiversity, information technology, and intellectual property rights? Third, what

can be done to extract more research output from agricultural universities and faculties of agriculture?

- The sixth conclusion is that the NARS, SROs, CGIAR, and donors are involved in a gigantic learning process of trying to figure out how to solve some of the same organizational and financing problems that colonial governments so skillfully overcame. We are witnessing an evolutionary division of labor between the CGIAR, SROs and NARS and the transition from CGIAR-led priority setting to African-led priority setting and cooperative execution of research programs. And in this regard, the SROs are an important institutional experiment. But the future of the SROs is unclear because of the sustainable financing issue. We are of the opinion that Africa probably needs five to six SROs instead of the present three because of our belief that a single SRO can work most effectively with eight to ten NARS instead of the 21 that are now members of CORAF.

1. Introduction

1.1 Founded in 1971, the Consultative Group on International Agricultural Research (CGIAR) has been lionized as a bold and creative institutional innovation. The 16 international agricultural research Centers (IARCs) that comprise the CGIAR System have mobilized funds from 58 public and not-for-profit members and developed new technology that has reduced real (inflation-adjusted) food prices and improved the lives of millions of farmers and consumers around the world. For example, two of the Centers developed the high-yielding rice and wheat varieties that ignited the Green Revolution in Asia in the 1960s and the 1970s.

1.2 The CGIAR is only 30 years old but it is regarded as an institutional icon that is producing global public goods to improve the welfare of mankind (Dalrymple, 2001). However, the CGIAR's current budget of \$340 million has been flat for the past four years. The CGIAR's Third System Review recommended a number of innovations to make it more relevant to the dramatic changes in the technological and institutional environment of global agricultural research (CGIAR, 1998).

1.3 The World Bank is keenly interested in the performance of the CGIAR because it is the largest contributor (\$50 million per year) to the System and because it was for most of the System's life the most important donor, thereby guaranteeing the continuity and stability of the System (Binswanger, 1994). Moreover, the CGIAR accounts for 40 percent of the Bank's Development Grant Funds (DGF) available to support global programs in such areas as health, agriculture and the environment.

1.4 In order to gain a sound understanding of its involvement in global programs, the Bank is carrying out a meta-evaluation of the CGIAR as part of a larger OED (Operations Evaluation Department) evaluation of Global Public Policies and Programs (GPPP) under the direction of Uma Lele. The aim of the meta-evaluation is to derive strategic, programmatic, and operational lessons and implications for the Bank's future involvement in global public programs. This paper represents an input into the meta-evaluation of the CGIAR (World Bank, 2001).

1.5 The meta-evaluation of the CGIAR in Africa will largely rely on past reviews of the CGIAR, CGIAR documents, and interviews with knowledgeable experts, with special emphasis on feedback from African research managers, scientists, and donor representatives in Africa. This paper will assess:

- The performance and impact of the CGIAR in Africa to date;
- The development of mutually beneficial partnerships between the NARS, SROs, private sector and faculties and universities of agriculture; and
- The future role of the CGIAR in Africa.

2. The Setting, Problem, and Approach

2.1 The performance of the CGIAR in Africa can best be understood in historical perspective. Africa is only one generation away from independence. The year 1960 is commonly called the year of independence because 16 nations won their independence during that year. The Portuguese colonies of Mozambique, Angola, and Cape Verde followed in 1975. Zimbabwe won its independence in 1980, Namibia in 1990 and South Africa became a majority-ruled country in 1994.

2.2 Today, all 48 nations in Africa are independent but Africa has been torn apart by the Cold War, political instability, civil war, and it is now racked by the HIV/AIDS pandemic. After 40 years of development programs and billions of dollars of foreign aid, Africa is a poor continent with little hope of rapid improvement in its standard of living. Agriculture is the primary source of livelihood for two-thirds of the people of Africa. Africa's quest for food security, poverty alleviation, and balanced regional growth recognizes the fundamental dual role of the agricultural sector for food security: the supply of food and the provision of employment and income-earning opportunities for the majority of the population.

2.3 The CGIAR in Africa has an important role to play in helping the 660 million people of Africa achieve their food security needs. The performance of the CGIAR Centers operating in Africa is also of central importance to the meta-evaluation of the CGIAR because Africa claims 45 percent of the CGIAR's \$340 million annual budget even though Africa constitutes only 10 percent of the world's population. Because of the heavy commitment of CGIAR funds to Africa, it is natural to pose the question: what has been the impact of the CGIAR in Africa? Impact studies have shown that the CGIAR Centers have been most productive in Asia followed by Latin America and the Middle East, with Africa bringing up the rear (Evenson and Gollin, 2003). Without question, the CGIAR has had some important success stories in Africa, but Africa has also been the problem continent for the CGIAR and donors over the past 20 years.

2.4 Closer examination reveals that some of the regional and national agricultural research programs in Africa have also been less productive than their counterparts in other continents, (Eicher, 1992; Byerlee and Alex, 1998; Rukuni, 2001). However, there is abundant evidence that many of the problems that the CGIAR Centers and NARS have encountered in Africa are not the result of the ineptitude of research managers and scientists, but are a function of Africa's political turbulence and its early stage of scientific and institutional development. For example, although EMBRAPA of Brazil is praised as a successful NARS, it should be kept in mind that Brazil was independent for 138 years before Nigeria reclaimed its independence in 1960.

2.5 Africa is a young continent in terms of the development of its agricultural science base. Pardey, Roseboom, and Beintema (1997) report that at independence in 1960 there were roughly 90 percent expatriate and 10 percent African agricultural scientists. By contrast, Lele and Goldsmith (1989) report that virtually all of the agricultural scientists in India were Indian at independence in 1947. Human capital degradation is a critical issue in Africa because of the declining quality of the educational experience in many faculties and universities of agriculture in Africa and because of the dramatic cutback in

scholarships for Africans to pursue overseas training in agriculture. For example, 20 USAID scholarships were available to Africans for studying agriculture in the United States in 1998, down from 250 in 1985 (Eicher, 1999). This poses two questions: Who will train the next generation of African agricultural scientists? And, will they be competitive with scientists in biotechnology in Malaysia, China, India, and Brazil? Without question, the lack of African scientific capacity is impeding the transition from the current “CGIAR first” model to African-led research partnerships, networks, and alliances with public and private research organizations (Eicher 2002).

2.6 Currently, 80 percent (4,800) of Africa’s agricultural researchers are concentrated in 13 countries, while the remaining 20 percent (1,200) are dispersed in 35 countries across the continent (Mrema, 2001b). This 80/20 research paradigm is at the center of the NARS/SROs/ CGIAR debates over how to strengthen and finance agricultural research in Africa. This concentration and dispersion of talent in a continent of 48 countries raises three complex and interrelated issues of priorities, organization, and financing of research.

2.7 The first is the contentious issue of who sets research priorities in Africa: NARS, SROs, CGIAR, donors, or NGOs? Many Africans contend that the CGIAR has practiced a CGIAR-first model of priority setting which must give way to increasing control by NARS and SROs. But many CGIAR researchers argue that donors play an influential role in priority setting and they point to the recent diminution of core support as a manifestation of this troublesome reality.

2.8 The second vexing issue is how to organize research systems to encourage the 13 research concentration countries with 80 percent of the scientists to promote technology spillovers to the 35 smaller countries and how to help the smaller countries develop the capacity to become smart borrowers of technology from Africa and the global System. In this connection, the emergence of the SROs has stimulated debate on the role of sub-regional organizations in priority setting, training, and managing research networks.

2.9 The third issue is how to finance NARS, SROs, and the CGIAR when there is a lack of African political support for research reinforced by a decline in donor support for agriculture in general. The financing issue is especially relevant to the financial sustainability of the SROs such as SACCAR, ASARECA, and CORAF. One may legitimately pose the question: if African governments are unwilling to finance their NARS, why would one expect them to finance sub-regional research organizations? The experience of SACCAR in this regard is noteworthy. This paper argues that the three core questions raised by the 80/20 paradigm are at the heart of reforming and strengthening the performance and of financing of agricultural research in Africa.

3. Colonial Research: 1900-1960

3.1 The CGIAR’s past performance, and potential in Africa can best be understood in historical perspective because the 48 independent nations of Africa are saddled with the legacy of seven different colonial powers. Colonial decisions on where to locate research stations, the role of the government and the universities in research and the type of

extension systems have all left imprints on how agricultural research, extension, and agricultural higher education are currently organized and executed on the continent.

Strategic Decisions

3.2 From 1900 to 1930, colonial research managers gained a grasp of the size, immensity, and diversity of African agriculture and concluded that it would be unwise to try to build strong national research systems in each colony. Instead of pursuing a tactical approach to developing freestanding NARS in every colony, the colonial administrators pursued a strategic approach and initially assigned small research teams to some of the larger colonies and focused on a small number of crops. The colonial planners then set up a few regional research institutes in strategic “hub” countries (Cote d’Ivoire, Kenya, Senegal, Sudan, and Zimbabwe) and charged them with developing new technology that would spill over to surrounding countries. Global commodity networks were also established to exchange germplasm, and new institutions were developed (e.g., Empire Cotton Growing Corporation) and staffed with career scientists (Cooper, 1970).

3.3 On balance, colonial governments were successful in pragmatically piecing together a system of four interactive research and technology diffusion institutions: (1) regional research institutes; (2) commodity research networks; (3) career scientists; and (4) processing and marketing institutions. These institutions were effective in achieving the goal of expanding tropical agricultural exports. Most colonial governments devoted primary attention to export crops, secondary attention to research on food crops and livestock, and token attention to building African scientific capacity (Eicher, 1989). However, both Zaire (formerly the Belgium Congo) (Drachoussoff, 1965) and Zimbabwe gave substantial attention to food crops (Rukuni, 1993).

3.4 Commodity institutes were established by the major colonial powers in their colonies in Africa during the 1900-30 period (McKelvey, 1965). In 1921, the French established a research station at Bambey, Senegal, to carry out research on groundnuts. In 1938, the mandate of the station was broadened to become the Federal Station for Agronomic Research in Francophone West Africa. Scientists concentrated on basic studies of groundnuts, the main export crop of Senegal and several other colonies at that time. The commodity research focus at the Bambey station was similar to that of British central research institutes which were established for jute, cotton, and sugarcane in India and Pakistan and rubber in Malaysia (Ruttan, 1982). The British established a research station in Zimbabwe (formerly Southern Rhodesia) in 1909 and the Gezira (cotton) Research Station in the Sudan in 1919.

3.5 Since the colonies were expected to pay their own way and not be a burden on the European tax payers, the number of researchers was kept small in the colonial stations. However, by concentrating on a few commodities and providing scientific and administrative continuity that spanned decades, these clusters of scientists were remarkably productive. In most cases, three to four scientists, and in a few cases, no more than half a dozen, formed the commodity research teams that produced hybrid maize in Zimbabwe and Kenya, rust-resistant wheat in Kenya, improved tea clones in East Africa, hybrid oil palms in Zaire, cotton in Uganda, Sudan, francophone West Africa, and Zimbabwe. In Zaire, for example, after only six years of research in the 1930s, a team of

five Belgian researchers unlocked the genetics of the oil palm that led to the development of hybrid varieties that out-yielded wild palms by several hundred percent under farm conditions (Beirmaert, 1940).

3.6 The second colonial institutional innovation, commodity research networks, was a brilliant organizational device to interlink small clusters of scientists in various colonies into a global network. The roots of commodity research networks go back to 1921 when the Empire Cotton Growing Corporation, an independent body supported by the cotton industry and the Government of the U.K., was established under Royal Charter in the British colonies in Africa. The goal was to increase cotton production in the British Empire and reduce the reliance of the United Kingdom on cotton imports from the U.S.A. But the Corporation soon learned that it lacked a research base for cotton, so the emphasis of the Corporation shifted from promoting cotton production to research (Anthony et al., 1979). The Corporation recruited agricultural researchers of high caliber by offering career opportunities that involved a succession of postings in various colonies growing cotton in cooperation with the Corporation. The Corporation established cotton research stations in Trinidad, South Africa and later in Uganda in 1950. With fewer than 50 scientists in the global cotton research network and a modest budget, the Corporation promoted the exchange of material and experience among scientists working in Kenya, Malawi, Nigeria, Sudan, Swaziland, Tanganyika, Uganda, the West Indies, and Zambia (Bunting, 1963). The Cotton Corporation was a precursor to similar networks established by the Belgian government in the Congo, by French scientific organizations in other francophone countries in Africa and IRRI's highly successful cropping systems network in Asia.

3.7 Because of the large number of colonies in sub-Saharan Africa, the organization of research along national versus regional research lines was debated in agricultural research policy circles. The British and the French pursued sharply different approaches to this issue. In 1921, the Institut d' Agronomie Coloniale was established in France to guide overseas agronomic research and provide specialized training for research workers. The French then established regional research stations in Senegal and the Cote d'Ivoire to serve its colonies in West Africa.

3.8 After World War II, the British decided to increase its support for agricultural research in Africa and set up the West African Research Organization to coordinate regional research investments to serve its colonies: Nigeria, Ghana, Sierra Leone, Gambia, and the Cameroon. But instead of setting up new regional research institutes, the British broadened the mandate of some national research stations to serve two or more colonies. For example, the Cocoa Research Institute that was originally established in Tafo in 1938 to serve the cocoa industry in Ghana, was renamed the West African Cocoa Research Institute in 1944 and given a mandate to serve Ghana and Nigeria. In 1951, the oil palm research station that had been established in Nigeria in 1939 to serve Nigeria was reorganized in 1951 and renamed the West African Institute for Oil Palm Research (WAIFOR) to serve Nigeria, Ghana, Sierra Leone, and the Cameroon.

3.9 In East Africa, the German Colonial Administration established a research station at Amani, Tanganyika (later Tanzania), in 1902 to carry out basic research on tropical agriculture (Pereira, 1999). After World War I, the colony of Tanganyika was turned over to the British to administer as a League of Nations Trust Territory. The British broadened

the scope of the Amani station to serve the British colonies of Kenya, Uganda, and the British Protectorate of Tanganyika. During the 1930s, the Amani regional station did pioneering basic research on mosaic streak virus which was later used in IITA's development of the high-yielding cassava varieties (Story, 1950; Nweke, Spencer, and Lynam, 2002).

3.10 After World War II, the British Colonial Headquarters for regional research in East Africa was moved from Amani to Muguga outside Nairobi, and it was renamed the East African Agriculture and Forestry Research Organization (EAAFRO) to serve Kenya, Tanganyika, and Uganda. The decision to pursue both agricultural and forestry research in EAAFRO was another institutional innovation because it consolidated agriculture and forestry research, built trust among researchers, and reduced transactions costs in carrying out research on natural resource management issues.

3.11 The fourth institutional innovation--linking research, extension, and international marketing--was pioneered by the French colonial system and French textile companies immediately after World War II. The goal was to establish two new institutions to promote cotton production and marketing in French colonies. In 1946, an institute was established to conduct cotton research. Three years later, the French Company for Textile Development (CFDT) was set up to encourage each French colony in Africa to establish a cotton company to promote cotton production through a strategy of integrated technical, financial, and marketing assistance to farmers. The CFDT functioned as an autonomous extension and marketing organization (Casas et al., 1988).

Lessons from the Colonial Experience

3.12 Several strategic lessons emerge from the colonial experience that are relevant to the CGIAR, NARS, SROs, and donors today. The most important is that because of financial constraints, colonial research administrators adopted a strategic approach to deal with the immensity, diversity, and complexity of African agriculture. Instead of trying to build and manage one freestanding NARS in each of the forty-some colonies, they designed regional research institutes to capture economies of scale and address the small country problem by promoting research spillovers. The strategic approach was adopted to adhere to the guiding financial principle of colonial policy which forced colonies to pay their own way. Therefore, export crop taxes were used to finance the research stations and small pools of scientists.

3.13 Second, highly focused commodity research stations staffed with small teams of well-supported scientists were productive in developing new technology. Career incentives were introduced to encourage scientists to spend blocks of time at a research station before moving to a station in another country. Third, global commodity research networks promoted scientific cooperation and an exchange of germplasm. Fourth, colonial governments carried out research on both food and export crops. The role of export crops as a source of new income streams for smallholders is an idea that is now being debated in CGIAR circles. Presently, the IITA is carrying out research on cocoa with the financial assistance of an American candy manufacturer and USAID. Fifth, the imperial research establishments in the U.K., France, and Belgium backstopped the regional research organizations in Africa. Sixth, both agriculture and forestry research

were carried out in EAAFRRO in Eastern Africa rather than the CGIAR practice of setting up separate agro-forestry, forestry, and commodity research Centers.

3.14 But the most enduring shortcoming of the colonial model was its failure to train African scientists. The colonial governments trained and provided career incentives for the wrong group—i.e., colonial scientists—instead of African scientists. Since development is basically a process of learning by doing, this human capital decision slowed the development of African scientific leadership and continues to constrain the performance of CGIAR Centers.

3.15 To summarize, the colonial research planners introduced a number of innovations to develop lean and self-financed regional research institutes to serve a large number of small countries. This poses the question: what can be learned from the colonial experience to solve the three inherent problems in the current setting of 13 large NARS and 35 small NARS?

4. Post-Independence: Expansion of NARS and Dissolution of Regional Research Institutes: 1960-1980

Expansion of NARS

4.1 As African nations reclaimed their independence in the late fifties and sixties, most countries had:

- Small national and regional research systems that were focused on a limited number of export commodities;
- A paucity of African scientists in NARS and universities;
- Research systems with modest capacity in food crop research, with some exceptions such as the maize research programs in Eastern and Southern Africa;
- Disparate agricultural service institutions with little articulation between NARS, extension systems, and faculties of agriculture; and
- Access to bilateral and foundation assistance (the World Bank's first loan for agricultural research in Africa was extended to the Sudan in 1979).

4.2 On the eve of independence in 1960, there were roughly 21,000 extension agents and 2,000 researchers in sub-Saharan Africa. The 1960s were focused on the devolution of colonial-managed systems to African-managed extension and research services. At independence, false expectations were in abundance about the time that it would take for African nations to become industrial nations, the role of extension in boosting food output and the role of imported rural institutions (such as the U.S. Land Grant University model) in “bringing development to Africa.” These false expectations were based on a limited knowledge base about African agriculture in the 1960s and a lack of understanding of the nuances involved in building an agricultural science base in Anglophone, Francophone, and Lusophone countries.

4.3 The first false expectation concerned the role of industrialization and time span that it would take for African countries to join the ranks of industrial nations. The influential Ghanaian economist, Robert Gardiner, addressed the question and quipped, “there is no reason why the present level of (industrial) development should not be attained by Africa by the beginning of the next century” (Gardiner, 1968). Second, since Africa was a modest net food exporter at independence, increased food production was not a high priority goal in most National Development Plans of the 1960s. Technology was assumed to be on the shelf and food production was assumed to be easily expanded by importing technology from industrial countries and increasing the number of extension workers. This explains why extension rather than research was assumed to be the key to expanding food production in Africa in the sixties and integrated rural development was promoted in the 1970s (Lele, 1991; Binswanger, 1998). Third, it was assumed that Asia’s Green Revolution model could be easily replicated in Africa. These false expectations created the illusion that technology was available, extension was the key to increasing food output and many African nations could become industrial nations by the year 2000 (Rukuni, 1994b).

4.4 These assumptions explain why most new nations gave priority to industrialization, education, and the Africanization of their civil services. Only the exceptional new nation gave high priority to developing smallholder agriculture. To be sure, thousands of Africans were trained in local and overseas universities as part of the drive to Africanize the agricultural services (Venkatesan and Kampen, 1998). However, staff retention was a problem because of poor conditions of service and political turmoil. Both extension and research services had a high attrition rate because extension and research officers were often treated like second-class clerks.

4.5 During the devolution from colonial to locally managed institutions, the managers of agricultural services were forced to grapple simultaneously with three complex devolution shocks:

- Managerial transition from colonial to local managers of research and extension services;
- Scientific transition from expatriate to indigenous scientists; and
- Financial transition from colonial governments and large-scale farms to mobilizing support from new governments, donors, and smallholders.

4.6 Unfortunately, the academic community, donors, and TAC lacked practical experience in dealing with these transitions and the sequencing of investments in extension, research, and higher education. But some information was available to Africa from the Latin American and Asian experiences. For example, Nobel Laureate T.W. Schultz surveyed the evidence from Latin America and Asia in the 1940s and 1950s and concluded that: “Where the aim is economic growth from agriculture, there is no escaping from the fact that unless there is a supply of rewarding inputs that farmers can acquire, an agriculture extension service is an empty institutional gesture” (Schultz, 1965, pp. 65-66). Nevertheless, most newly independent nations in Africa gave priority to expanding the size of national extension services in the 1960s. The “extension first” strategy was based on the premise that technology was on the shelf, and that additional extension agents were needed to motivate African subsistence farmers to accept

improved farm practices. Besides, the “extension first” strategy had considerable political appeal in terms of providing local employment opportunities.

4.7 These factors help explain why African nations collectively hired an additional 36,000 extension agents from 1959 to 1980 (Judd et al., 1987). But doubling the number of extension agents failed to increase the agricultural growth rate. In fact, food production grew at half the rate of population growth from 1970 to 1985. In the 1970s, there was a growing consensus that the “extension first” strategy had not paid off. As a result, policy makers and donors turned their attention to strengthening agricultural research. But some of the Western advice on agricultural research expenditure norms turned out to be misguided and counter-productive. For example, the World Bank’s 1981 policy paper on agriculture research notes that a desirable investment target for research for many countries would be an annual expenditure (recurrent plus capital) “equivalent to about 2 percent of agricultural gross domestic product” (World Bank, 1981). But this norm was derived from industrial countries with a century or more of experience in mobilizing political and financial support from farm organizations, commodity groups, private firms, and state and federal organizations. Foreign aid meted out to NARS according to the 1% to 2% norm contributed to the expansion in the size of the NARS (staff, buildings and equipment) beyond the capacity to mobilize sustainable domestic financial support (Eicher, 1989).

4.8 Most new nations in Africa expanded the size of their NARS in terms of the number of staff, commodities, and research projects. This expansion was unplanned and unprecedented. For example, the government of Mali increased the size of its agricultural research staff from an average of 9 in 1965-69 to 275 by the mid-eighties. Likewise, Nigeria’s seven-fold expansion increased the size of its NARS from 136 scientists in 1960 to around 1,000 by 1980. But the expansion and the rapid turnover of administrators contributed to financial and program management problems. Within a short period of time, it became obvious that the aggressive expansion was creating recurrent cost problems.

Dissolution of Regional Research Institutes

4.9 Soon after independence, many new governments nationalized or abolished the regional research institutes that had been set up by colonial governments. For example, at independence in 1960, Nigeria was the world’s largest oil palm exporter and it secured its oil palm technology from a regional research institute – West African Institute for Oil Palm Research (WAIFOR) – that was based in Nigeria. In 1963, just three years after independence, Nigeria nationalized WAIFOR and renamed it the Nigerian Institute for Oil Palm Research (NIFOR). However, from 1963 to 1988, NIFOR increased the number of senior research officers and managers from 15 to 283 (Eicher, 1989). Likewise, the West African cocoa research in Ghana was nationalized and renamed the Cocoa Research Institute of Ghana. Also, EAAFRO was discontinued when the East African Community was dissolved in 1968 because of political disagreements. Regional agricultural research also flourished for a decade (1953 to 1963) in the Central African Federation, which included Rhodesia (Northern and Southern) and Nyasaland. But that Federation was also dissolved in 1963 because of political dissonance.

Lessons From the Expansion of NARS and Dissolution of Regional Research Institutes

4.10 During Africa's first 40 years of independence, most of its NARS were expanded in size beyond their financial sustainability. However, the ready availability of foreign aid served as an "escape valve" for many administrators of NARS who were reluctant to make hard scientific and financial decisions on the number of scientists and support staff, number of commodities, size of commodity research teams, number of research stations, etc. The expansion era reveals that many African countries repeated some of the same mistakes of teams of Asian and Latin American countries in the 1960s and 1970s, when emphasis was placed on expanding the size of NARS to the extent that there were many research facilities and researchers "without programs" (Ruttan, 1987:78).

4.11 African nations and India pursued different approaches in the 1960s and 1970s to building capacity in extension, research, and agricultural higher education. India invited USAID and the Ford and Rockefeller Foundations to carry out joint studies on how to boost food production by building a strong agricultural knowledge system of research, extension, and universities. The Rockefeller Foundation was invited to help strengthen agricultural research while the Ford Foundation focused on extension and USAID helped develop, finance, and staff a number of State Agricultural Universities (Hopper, 1968; Lele and Goldsmith, 1989). The government of India, with the support of its three external partners, strengthened India's basic agricultural institutions and helped India achieve food self-sufficiency after 16 years of focused effort from 1965 to 1981 (Lele and Bumb, 1995).

4.12 By contrast, most African nations have pursued a tactical approach to institution building and expanded their research institutions with an assortment of donor assistance. Three examples illustrate the ad hoc tactical nature of donor assistance to NARS. During the rapid build-up of donor projects for NARS in the mid-eighties, USAID financed an \$18 million agricultural research and diversification project in the Gambia for a six-year period, 1985 to 1991 (Alex, 1997). The Gambia project was not renewed. This parachute type of project assistance was repeated in a number of countries. Senegal is the second example. USAID financed a U.S. university team to help strengthen the NARS of Senegal from 1981 to 1986. However, in 1986, USAID shifted from production focused research support to NRM assistance. As a result, USAID replaced the U.S. university team with a NRM team from another university (Eicher, 1982, 1985). The third example is Zambia. In the mid-nineties, a dozen donors were financing 140 different agricultural projects in the Ministry of Agriculture. Needless to say, these three African examples stand in marked contrast to the disciplined approach to capacity building in India.

4.13 Without question, the rapid build-up in human capital and the Africanization of NARS were major achievements of independence (Eicher, 1990; Idachaba, 1991; Rukuni, 1994a). But in the early nineties, growing concerns about financial sustainability of NARS, led to renewed emphasis on regional research networks, regional competitive grants, expanding the role of the private sector, and exploiting spill-ins from regional and international research programs.

4.14 Today, the overall picture of NARS in Africa is opaque (FARA, 2000; Eicher, 2001; Rukuni, 2001; Ndiritu, 2002). Promising reforms are underway in the NARS of

Senegal, Benin, Mali, Kenya, Uganda, and South Africa. Increased attention is being given to developing alliances and partnerships with universities and the private sector. Competitive grant schemes have grown rapidly over the past decade (Elliott and Echeverria, 2000). However, the most distressing factor is the heavy dependence by NARS on donor support. An average of 40 percent of all NARS expenditures on research in Africa is funded by donors. In a few countries, this share is around 60 percent (Pardey, Roseboom, and Beintema, 1997).

4.15 The revitalization and financing of NARS is of great concern to the SROs and the NARS of Africa. Byerlee and Alex (1998) have prepared an excellent “good practice” manual, Strengthening National Agricultural Research Systems: Policy Issues and Good Practice (1998). But financing the implementation of good practices is bleak. Donor support for agriculture has waned. Pardey and Beintema (2001) report that public investment in agricultural research in Africa was flat from 1991 to 1996 and that USAID support for agricultural research in 1996 was only 42 percent of its level in the mid-1980s. Why are donors cutting support to agriculture while they are urging African governments to increase support to agriculture?

4.16 The unbridled expansion in the size of national research systems has led to a flurry of studies about sustainable funding of the NARS. But instead of asking the hard question about how to reduce the size of NARS, in terms of the number of scientists and staff and the number of research stations, most of these studies looked through the other end of the scientific telescope and addressed the question: how can African nations mobilize sustainable financing for the already expanded NARS? Most studies of sustainable funding have been of limited value because they have not addressed the following issues:

- How can NARS be streamlined and downsized while retaining the five to ten percent of the top scientists who set the direction and the tone of the organization and make the hard decisions to produce relevant technology and maintain the quality of the scientific enterprise?
- How can NARS be made more accountable to their primary stakeholders – African smallholders? (Byerlee & Echeverria 2002).
- How can domestic financial support be mobilized to replace donor aid over a 10 to 20 year period (Eicher, 2001)?

The Growth of Sub-Regional Organizations: SACCAR, CORAF, and ASARECA

4.17 The 1980s witnessed the rebirth of regional research as a way of addressing what we earlier referred to as the problems inherent in the 80/20 paradigm in which 80 percent of the agricultural scientists are located in 13 countries (370 scientists per country) and the other 35 countries have 20 percent of the scientists with an average of 34 scientists per country. In order to tackle the small country problem and the acknowledged weak position of NARS in Africa in the early eighties, a group of donors decided at the 1985 Tokyo MTM to create the Special Program for African Agricultural Research (SPAAR). SPAAR was charged with improving the coordination of donor aid to agricultural research in Africa and helping to strengthen the capacity of NARS to utilize new technology from the CGIAR System (SPAAR, 1997). Membership in SPAAR was initially restricted to donors and the

Donors' Club, as it was called, set in motion a series of activities to exchange information, ideas, and experiences to avoid duplication of donor effort

4.18 Drawing on the acknowledged success of regional research during the colonial period, SPAAR launched a new initiative in 1990 to promote regional research. SPAAR, in cooperation with a number of African organizations, prepared regional Frameworks for Action (FFAs) in agricultural research in the main eco-political regions in Africa. The FFAs represented the first serious attempt to bring together all of the stakeholders in a sub-region to discuss a framework for research partnerships and joint action. In 1995, a team of consultants led by Dunstan Spencer concluded that "Under FFA guidelines, SPAAR members have agreed in principle that regional research has considerable potential in overall strengthening of NARS" (SPAAR, 1995:42). In 1997, an EPMR team led by Francis Idachaba lauded the performance of SPAAR and the prominent role that it played in helping guide the evolution of CORAF from a network of researchers in francophone countries to a sub-regional research organization representing the Directors of NARS from 21 countries in West and Central Africa (SPAAR, 1997). Likewise, the Spencer and Idachaba reports noted the contribution of SPAAR in helping launch ASARECA in 1994.

4.19 SPAAR has also helped establish FARA (Forum for Agricultural Research in Africa) as an apex organization consisting of the three SROs. FARA is in the process of taking over the functions of SPAAR and setting up its Secretariat in Accra.

4.20 We shall now analyze the unexpected renaissance of regionalism in the form of three Sub-Regional Research Organizations (SROs) that were established in Africa in the 1980s and 1990s: SACCAR (Southern Africa), ASARECA (Eastern and Central Africa), and CORAF/WECARD (West and Central Africa). The rebirth of regional research initially came from African Heads of State in the ten majority-ruled countries in Southern Africa who decided in 1980 to form an economic union known as the Southern Africa Development Coordination Conference (SADCC). In 1984, SADCC established the Southern African Center for Cooperation in Agricultural Research (SACCAR) and charged it with coordinating agricultural research, training, and promoting cooperation among member states in the region. SACCAR quickly garnered donor support and it added staff and programs for about a decade. But SACCAR turned out to be a cumbersome political organization because it had to seek approval for all major decisions from the Heads of State at their annual meeting.

4.21 In 1997, the Council of Ministers of SADC (Southern African Development Community) directed the Government of Botswana to transform SACCAR into a Sector Coordinating Unit effective December, 1998. The Government of Botswana agreed to assume the leadership of SACCAR and to pay all of the recurrent costs of the Sector Coordinating Unit based in Gaborone. However, funding mechanisms were not put into place to ensure the sustainability of SADC's regional programs (SACCAR, 1999). Gage (1996) reports that "SACCAR did not emphasize "the financial aspects of the organization because of the continued flow of funding from international donors." SACCAR has had difficulty in securing financial support from its member states and donors over the past five years.

4.22 In 1987, CORAF (the Council for Agricultural Research and Development in West and Central Africa) was launched by French research institutions (ORSTOM, CIRAD, and INRA) with the aim of forging research cooperation among French and African scientists (SPAAR, 1997:17). In 1990, CORAF moved its Secretariat to Senegal and appointed the first African Executive Secretary. In the 1990s, the membership was opened to anglophone and lusophone countries. Currently, CORAF is composed of the Directors of NARS in 21 countries in West and Central Africa.

4.23 CORAF manages an array of research networks including rice, maize, cassava, vegetables, and cotton. The 21 member countries are currently paying 2 percent and donors 98 percent of the cost of the 1.9 million Euro budget for CORAF's Secretariat in 2001 (Nwalozie, 2001). (The budget for the networks, base Centers, and special projects is not included.) In 1999, a Strategic Plan was adopted which, among other things, recommends that CORAF:

- Cease to be a “club of Directors of Research Institutes” by opening it up to other members of NARS;
- Initiate a competitive research fund; and
- Recommend that member states should increase their contributions to the funding of the organization (CORAF, 2000).

4.24 SPAAR has been extremely helpful in guiding the evolution of CORAF over the past 15 years. CORAF has a difficult task ahead in mobilizing financial support from its member countries in West and Central Africa. CORAF has the largest mandate in terms of size (West and Central Africa) and the largest number of countries (21) of the three SROs in Africa and it is functioning in the most politically unstable part of the continent.

4.25 The third and currently most influential SRO in Africa is ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa). ASARECA was set up in 1994 by the ten Directors General of agricultural research in eastern and central Africa. The secretariat for ASARECA is located in Entebbe, Uganda. The founders of ASARECA studied the rise and decline of SACCAR and vowed that ASARECA would be an apolitical organization.

4.26 The goal of ASARECA is to promote regional cooperation in agricultural research in Eastern and Central Africa through seminars, workshops and a competitive regional research fund. Currently, 19 research networks are being generously supported by a large number of donors. In 1999, the European Union approved a grant of 29.3 million Euro over the 2001-2004 period. Other donor commitments include US \$15 million from USAID, US \$4 million from SIDA and US \$7 million from several other donors. These collective pledges bring the total commitments by various donors to ASARECA's regional research program to over US \$50 million from 1999 to 2005 (ASARECA, 2002).

4.27 ASARECA is the shining star in the galaxy of seven SROs in the world today. ASARECA has enjoyed outstanding leadership and it has gained financial support from donors at a time when support for both agriculture and agricultural research is flagging. Why is ASARECA enjoying such a generous level of donor support? First, donors believe that ASARECA is an aggressive and well-managed, apolitical organization that

has delivered results. Second, in our opinion, we believe that donors are quietly realizing that they do not have the resources, fortitude, and staying power to build 48 strong NARS in Africa. ASARECA has the potential of helping some countries reduce their research outlays on some crops and increase their capacity to borrow technology from ASARECA networks and the CGIAR System. Third, the ASARECA Secretariat and the Committee of Directors of ASARECA are providing intellectual leadership on the critical agricultural research policy issues facing the NARS and CGIAR in Africa today.

4.28 ASARECA is providing an “African voice” in such key organizations as SPAAR, FARA, the World Bank, and the CGIAR System. The challenge ahead is awesome: how can the SROs mobilize African financial support for their regional programs after donors fold their tents and slip off to other parts of the world such as Afghanistan and Pakistan?

5. The CGIAR in Africa

5.1 We shall review the major CGIAR policy decisions, System reviews, and analyze the performance of about half the Centers that have active programs in Africa. Barrett (2002) has reviewed the CGIAR natural resource management Centers and Gardner (2002) has analyzed the regional and global impacts of the CGIAR System.

5.2 The CGIAR did not have a grand strategy when it established a foothold in Africa in the late-sixties. Instead, pragmatism ruled the day. Each new CGIAR Center that was established in Africa moved through a painful startup phase that generally lasted a decade or longer. We shall review the unforeseen difficulties and achievements of the Centers starting with their date of inception.

Establishing CGIAR Centers and Programs: 1970-1989

5.3 In 1962, two years after the Ford and Rockefeller Foundations helped launch IRRI in the Philippines, the Foundations began discussing the possibilities of a Center concerned with improving the yield and quality of tropical food crops other than rice. The International Institute of Tropical Agriculture (IITA) was opened in 1967 near Ibadan, Nigeria. The research program was launched in 1970 (IITA, 1992; 1993).

5.4 The intellectual blueprint for the IITA was a paper prepared by Will Myers of the Rockefeller Foundation entitled “International Institute of Tropical Agriculture: Tentative Scope of the Scientific Program” (Myers, 1966). Myers was a brilliant soil scientist and he generated an ambitious “wish list” of commodities and problems for scientists to tackle. Unfortunately, the list was accepted to a large degree by the IITA as its mandate. The large number of mandate crops endorsed by the IITA was partially a reflection of the inexperience of the early IITA managers and scientists. However, subsequent reviews by TAC (1978) urged IITA to consolidate its activities and leave a number of commodities to be addressed by NARS. Later, another TAC team admonished the IITA for getting involved in too many downstream agricultural development projects (TAC, 1983).

5.5 Myers' "Tentative Scope" paper is an unpublished but influential document because it was 20 years ahead of the Brundtland Report in stressing the need for research on sustainability and the importance of incorporating tree crops and livestock into research on alternative farming systems. Myers called for research on natural resource management because of his conviction that IITA's research on food crops in the humid tropics would hinge on maintaining or increasing soil fertility in the transition from shifting to settled agriculture.

5.6 Looking back over the past 35 years, it is painfully clear that the number of IITA's mandate crops was too large relative to rice at IRRI, wheat and maize at CIMMYT, and sorghum and millet – the two major crops of the five in ICRISAT's agenda. In 1974 when the IITA was seven years old, IITA researchers were carrying out research on "cassava, yam, sweet potato, cocoyams, maize, rice, cowpea, soybean, lima bean, pigeonpea, winged bean, African yam bean and velvet bean" (IITA, 1992:9-10).

5.7 Despite an over-ambitious research agenda, the frustrations of the 1967-70 Nigerian civil war and subsequent coups d' etat, IITA researchers carried out several important research programs on cassava in the 1970s and 1980s. The first thrust was genetic research to boost cassava yields. Under the direction of the S.K. Hahn, a cassava research team drew on mosaic-resistant varieties that were developed at the Amani research station in Tanzania in the 1930s (Story, 1950) and crossed them with West African varieties. After only six years of research (1970-76), IITA released high-yielding TMS varieties that increased farm yields by 40% without fertilizer (Nweke, Spencer, and Lynam, 2002). The new TMS varieties were widely adopted in Nigeria and in Ghana and Uganda after a time lag. Hahn devoted his 23-year career at IITA (1970-93) to cassava improvement. Without question, the development of the TMS varieties in the 1970s represents an important contribution to Africa's food security, especially among the poor. Cassava is starting to replace maize in the diets of the poor in Malawi and Zambia. The IITA partnership with cassava researchers in national programs has helped transform cassava from a famine-reserve crop into a high yielding and cheap source of calories for both urban and rural consumers. Nweke, Spencer, and Lynam conclude in *The Cassava Transformation* (2002) that cassava is a powerful "poverty-fighter." Starting in 1979, IITA, in cooperation with CIAT and a large number of national and international organizations, mounted a large-scale control campaign to destroy the cassava mealybug. By 1990, the wasp – the predator of the mealybug – had been released by airplane and by hand sprayers in 24 countries in the cassava belt (Zeddies et al., 2001). The control of the cassava mealybug is an important success story. In the 1990s, IITA and ASARECA's rootcrops network jointly tackled the African cassava mosaic virus in Eastern Africa. This partnership has been identified as a good example of collaborative work by the donors involved – USAID, IDRC, Gatsby, and the Rockefeller Foundation.

5.8 IITA has made important contributions in soybean development, cowpeas, short rotation fallow, and streak virus and downy mildew resistance in maize. But in Nigeria, the unavailability of fertilizer is a major constraint on seed trade and the adoption of new varieties. Fertilizer use in Nigeria fell from 450,000 tons in 1993/94 to 100,000 tons in 1999/00, a decline of 80 percent (IFDC, 2001:5). In short, poorly functioning input markets are a major constraint on the performance of CGIAR Centers in Africa (Kherallah et. al. 2002).

5.9 IITA's budget constraints are having a dampening effect on the quality of science and peer-reviewed research output. The fifth external review points out that because of budget constraints, the number of internationally recruited staff fell from 103 in 1996 to 81 in year 2001, a loss of 22 percent in 5 years (TAC, 2001:81). The loss was partially offset by the employment of post-doctoral fellows, associates, and visiting experts. The bottom line is that IITA is under financial stress.

5.10 ICRISAT was established in 1972 and given a mandate of five crops: sorghum, pearl millet (cereals), groundnuts, pigeonpeas, and chick peas (legumes). Sorghum and millet are of major importance in the semi arid tropics of Africa (Ryan and Spencer, 2001). ICRISAT has pursued a "learning-by-doing approach" to developing a research program and gaining credibility among the NARS of Africa. ICRISAT's West African program was launched in mid-1975 by posting scientists in Burkina Faso (Upper Volta), Senegal, and Nigeria and later in Niger and Mali. ICRISAT imported improved sorghum varieties from India because it assumed this material would diversify the genetic stock in West Africa and speed the process of developing high yielding varieties appropriate to the needs of smallholders.

5.11 After eight years of disappointing experience with imported varieties from India and the dispersion of its scientists throughout West Africa, ICRISAT introduced a new research strategy for Africa and developed a Sahelian Center outside of Niamey, Niger. Multidisciplinary teams were assigned to carry out basic and applied research to develop varieties that were resistant to disease and insects and had agronomic superiority, yield stability and food quality traits preferred by local consumers (Matlon, 1987). Starting in Southern Africa in 1980, ICRISAT concentrated on three crops – sorghum, millet, and groundnuts. Drawing on its West African experience, ICRISAT established, on behalf of SADCC, a Sorghum and Millet Research Center for Southern Africa at the Matopos research station outside Bulawayo in southern Zimbabwe (ICRISAT, 1983).

5.12 ICRISAT is now 28 years old and it has experienced a difficult start-up period in Africa in the seventies, followed by a period of consolidation in the eighties and sharp budget cuts and several changes of senior managers in the 1990s. A TAC (1995) study led by John McIntire was critical of the work of ICRISAT in West Africa. In looking to the future, a recent report offers a valuable insight into the changing demand for two important cereal crops—sorghum and pearl millet—in ICRISAT's mandate. Ryan and Spencer (2001) report that the "share of these cereals in the food budgets of the rural poor in the semi-arid tropics in India fell from around 14 percent in the early 1970s to nearly 4 percent in the early nineties" (p. 59). These consumption shifts away from sorghum and millet raise questions about the relevance of ICRISAT's continuing role in helping the rural poor in South Asia.

5.13 The fourth external review of ICRISAT observed that "ICRISAT is undoubtedly one of the most complex Centers to manage in the CGIAR System (TAC, 1996). ICRISAT currently has its headquarters in India while the majority of its resources are spread over six sites in Africa. ICRISAT is doing some valuable work in Africa, but funding for this work is heavily influenced by donor priorities. ICRISAT's projected 2002 budget of \$22 million is 21 percent lower than its \$28 million of core funding in 1992. In facing the future, ICRISAT has to generate more funding to deliver on its global

mandate or consider making an “exit from Asia with grace” and concentrate its managerial and scientific attention on the rural poor in Africa. To summarize, ICRISAT has learned that developing a research and training program appropriate to the diverse agro-ecological environments of Africa is a long and difficult process.

5.14 We now turn to WARDA. Although rice is a minor crop in Africa (3 percent of the world’s acreage under cultivation), it is an important crop in West Africa where urban consumer preferences are rapidly shifting from millet, sorghum, cassava, and yams to rice and wheat. In 1971, the West African Rice Research Institute at Rokpur, Sierra Leone, that had been set up by the British colonial office was nationalized and it became the main rice research station for Sierra Leone. Also, in 1971, the West African Rice Development Association (WARDA) was set up as an autonomous intergovernmental research association by 11 countries in West Africa. WARDA joined the CGIAR in 1974. In 1975, Robert Chandler, the founding Director General of IRRI, conducted a study of rice in West Africa and concluded that:

5.15 It is my opinion that the ecological conditions of West Africa are different enough from those of Asia to justify fully a sizable rice research program that is operated primarily by organizations located in West Africa. However, it is important that the work of these agencies be completely coordinated with that of each other and with that of the national programs. (Chandler, 1975:16)

5.16 WARDA’s headquarters was established in Monrovia and it was given a mandate to carry out training programs, feasibility studies, and variety trials in cooperation with national programs in 15 member states. It was assumed that IRRI’s high-yielding (irrigated) rice varieties that were developed for Asian farmers could be imported by IITA and WARDA and screened through variety trials carried out by WARDA in West Africa. It was also assumed that IRAT’s research on rainfed rice at Bouake, Cote d’Ivoire, would develop improved varieties for WARDA and national programs. But, after seven years of trials of 4,000 imported mangrove swamp rice varieties, WARDA found that only two yielded as well as the best local varieties. Although some of IRRI’s irrigated rice varieties performed well under irrigated conditions in West Africa, rainfed rice accounts for 95 percent and irrigated rice only 5 percent of the area under rice cultivation in West Africa. Because of its disappointing experience with the direct importation of new rice varieties from IRRI, WARDA launched Special Research Projects in the mid-1970s in Liberia, Sierra Leone, Mali, Senegal, and the Cote d’Ivoire. But WARDA was criticized for keeping too many research scientists at its Monrovia headquarters rather than in the countries where Special Research Projects were being carried out (Chandler, 1975).

5.17 Although WARDA received high praise for its training program in the seventies, its research program came under heavy attack by TAC (1979). In 1986, the CGIAR informed WARDA that CGIAR support could not be continued unless WARDA’s member governments agreed to transform WARDA into a research Center controlled by a board with powers comparable to boards of other CGIAR Centers. WARDA agreed to these demands and a new Director General was appointed in June 1987. WARDA’s new research strategy focused on developing varieties that could perform well under West African conditions because of the lack of success of imported rice varieties from Asia.

5.18 WARDA has been especially productive and innovative over the past decade. In 1991, WARDA introduced task forces (WARDA, 1991) as a novel approach to building partnerships with the NARS in the 17 member countries. The task force approach has now been adopted by the unified CORAF/WARDA rice research and development network. This is a major achievement and it is being studied by a number of countries in Africa (Walsh, 2001).

5.19 WARDA's second big achievement is the development of a new type of rice for Africa that is based on long-term collaboration with rice scientists in Guinea. Scientists call the new type NERICA, for NEw RICE for Africa. The NERICAs have a radically different plant type that combines the hardiness and weed suppression with the productivity of the rice of Asia. TAC's recent external evaluation noted that:

“WARDA is now firmly recognized as a strong scientific research institute, a leader in its own right in rice research, which attracts scientific interest worldwide. Progress through the rice inter-specific hybridization project and in other areas has transformed WARDA from a premier rice development organization on a regional basis to a centre of excellence in rice research.” (TAC, 2000:9)

5.20 Without question, WARDA has come of age in the CGIAR System. Today, WARDA is supported by 17 member countries in anglophone and francophone West Africa and a number of donors.

5.21 The International Livestock Center in Africa (ILCA) was established in Ethiopia in 1974. ILCA's first decade was filled with promise but it turned out to be constrained by many unforeseen difficulties. The 1973 task force report, commonly known as the Tribe Report, played a critical role in establishing the research direction for ILCA (CGIAR, 1973). When ILCA was established a year later, social scientists were hired and charged with carrying out socio-economic and monitoring studies in a range of livestock producing countries in Africa. The monitoring of livestock production projects under induced change was designed to prepare a monitoring guideline and find out how to remove the socio-cultural constraints on some of the technology that was assumed to be available for extension services and pastoralists.

5.22 But eight years after ILCA was established, a TAC Review Mission identified technical – not socio-economic – constraints as the critical factors limiting livestock improvement in Africa. The TAC mission was critical of ILCA's lack of progress in improving the technical research base on livestock production, its young and inexperienced staff and its over-emphasis on socio-economic baseline studies. The TAC Mission advanced 53 recommendations, including an urgent appeal to increase the scientific capacity of ILCA by hiring six senior scientists to deal with problems such as animal nutrition, health, forage legumes, etc. (TAC, 1982). ILCA's new Director General took aggressive steps to implement the 53 recommendations and to build ILCA's senior scientific staff. To summarize, ILCA's first decade – like that of the other new Centers in Africa – was spent in trying to come to grips with the realities and complexities of African agriculture.

5.23 Soon after ISNAR was established in 1979, it dispatched teams of experienced research managers to Africa to diagnose the managerial and financial problems of NARS and to prepare comprehensive country reports on how to improve the management of the NARS (ISNAR, 1988). Since many of the NARS had expanded in size in the sixties and seventies, they did not have financial controls in place to oversee large inflows of donor aid. Many of ISNAR's senior scientists were effective because they had substantial experience as managers and scientists in NARS in Africa and other parts of the world. ISNAR and SPAAR drew on these country studies and produced a valuable report, Guidelines for Strengthening National Agricultural Research Systems in Sub-Saharan Africa (ISNAR and SPAAR, 1987).

5.24 At the CGIAR's MTM in 1986, ISNAR's first external review was tabled and "ISNAR was accepted as a full-fledged institution of the CGIAR System" (CGIAR, 1986a:1). Moreover, during the MTM discussions, it was agreed that "the strengthening of NARS was confirmed as the primary objective"...and that it "strongly emphasized the need to concentrate attention on Africa (CGIAR, 1986a:2). During the eighties and early nineties, ISNAR was highly regarded for the quality of its country studies, its intellectual leadership in strengthening NARS and its research on the economics of agricultural research. But later in the nineties, ISNAR seemed to lose its way, especially in Africa.

5.25 CIMMYT pioneered some of the earliest IARC interactions with scientists in Africa. By the time that the CGIAR was founded in 1971, 14 national wheat and 9 national maize programs in Africa were members of CIMMYT's international nursery networks (CGIAR, 1989:1). CIMMYT responded to Africa's food crisis of the 1980s by expanding the size of its staff in Nairobi for Eastern Africa, in Addis Ababa for the Horn of Africa and in Harare for southern Africa. Since maize is Africa's most important food staple, CIMMYT has given staff and budget support to maize and secondary attention to wheat. In the mid-1980s, CIMMYT and IITA were engaged in a minor turf battle in southern Africa over the merits of open pollinated versus by hybrid maize. But this issue was resolved and IITA is focusing on maize breeding and agronomic research in west and central Africa and it has been praised for its work on maize streak virus. By contrast, CIMMYT has deployed most of its field staff to eastern and southern Africa where maize is the primary food staple. CIMMYT is spending about 40 percent of its budget in Africa, amounting to around \$15 million per year. Over the past decade, CIMMYT researchers have developed a number of "synergistic partnerships" with researchers in NARS, the private sector, and smallholders. The Soil Fertility Network (Soil Fert Net) is a widely praised partnership. Soil Fert Net was launched in 1994 as a partnership between agronomists and economists. Today, with support from the Rockefeller Foundation, the Soil Fert Net is focused on developing a range of organic and inorganic soil fertility technology options for smallholders. CIMMYT's research networks in eastern and southern Africa are the outgrowth of a learning process whereby CIMMYT-directed research programs have been replaced by research networks embracing a wide range of participants. Overall, CIMMYT has been effective in developing good working relationships with the NARS of the region.

Insights From the 1970-1989 Experience

5.26 The experience of the early CGIAR Centers in Africa illustrates the complex and unforeseen issues that Center managers and scientists have had to address: the number of

mandate commodities, research priorities, centralization versus decentralization of research stations, inter-Center and donor conflicts over research priorities, and relationships with NARS and SROs. Also, Centers were buffeted by unexpected political disasters such as the 1967 Civil War in Nigeria and subsequent coups d'état in other countries.

5.27 The first insight that flows from this early experience is that it took at five to ten years before most of the new Centers became established and productive. Second, two of the Centers, IITA, and ILCA, inherited overly ambitious research agendas from consultants who completed their reports before the managers and scientists were hired. Third, TAC had great difficulty in becoming a credible and effective partner in guiding the evolution of the CGIAR System in Africa. For example, in the mid-eighties, TAC had an opportunity to prepare a CGIAR strategy for Africa when it carried out a 30-month global study of priorities under the leadership of Guy Camus. The TAC report, CGIAR Priorities and Future Strategies, acknowledged that “a clear strategy will be required to guide the CG System’s approach towards Africa’s technology requirements...Due to the limited time available, no attempt was made in this paper to develop such a strategy” (TAC, 1987:98). Fourth, until the introduction of the SROs in the 1980s, most Centers established their own research priorities, commodity networks, and training programs. It seems fair to conclude that the 1970-1989 period was a “breaking-in period” for the CGIAR in Africa.

The CGIAR Expansion in the 1990s

5.28 The expansion of the CGIAR from 13 to 18 Centers in the 1990s had its genesis in the 1985 impact study that was completed under the direction of Jock Anderson and presented at ICW in 1985. The Anderson study lauded the collective performances of the CGIAR but it had little to say about the impact in Africa because of the early stage of the CGIAR’s work in Africa (Anderson et al., 1985; Anderson, Herdt, and Scobie, 1988). The Anderson report of some 800 pages was a monumental piece of work and it urged the CGIAR System to devote greater emphasis to the “sustainability of agricultural production systems.” Further, it discussed the CGIAR’s relationship with the dozen or more non-affiliated international agricultural research centers. Both of these issues were debated extensively in the late eighties and they were the core issues motivating the expansion of the CGIAR System in the early nineties.

5.29 The African portion of the 1985 Impact Study was subcontracted to a German consulting firm which was charged with preparing nine African country studies. The authors reported that there had not been many studies of research impact on agricultural production in tropical Africa and concluded that: “In general, the performance of research and the adoption of new technologies on this continent have not been impressive, and the role of IARCs has been rather modest. Hence, IARCs cannot identify themselves with many success stories but they cannot be held responsible for widespread failures either” (Jahnke, Kirsehke, and Lagemann, 1987:119).

5.30 In the early nineties, the CGIAR added natural resources management as a core objective of the System and increased the number of Centers from 13 to 18. But this decision to expand turned out to be an egregious management error from a financial point of view, as it proved to be a fundamental mismatch between the donors’ propensity to add Centers and unwillingness to assume the responsibility of increasing funding for the

18 Centers. The results of this mismatch were corrosive. At ICW'93, the CGIAR Chairman reported that:

“Over the past three years donor support for the CGIAR as expressed in dollars and cents has declined. CGIAR centers have tightened their belts as a result, curtailing programs and reducing staff strength. A recent review indicates an overall reduction of at least 110 international scientists and some 2,000 host country employees, as well as a drop of about 45 percent in training activities” (Rajagopalan, 1993:2).

5.31 CIMMYT, for example, reduced its core-funded senior international staff by 23 members from 1989 to 1993 (Winkelmann, 1993). In addition to staff cutbacks, the World Bank made a “one-time only” grant of \$20 million to be dispersed on a 1:2 ratio with the new funds provided by donors to close an estimated gap of \$60 million over 1994 and 1995 (Anderson and Dalrymple, 1999:86).

5.32 But when the expansion decision – i.e., increasing the number of Centers from 13 to 18 – is viewed from a political point of view, it is obvious that the System had to join the growing worldwide environmental movement in the early nineties. Besides, the green movement of the early nineties held promise of generating increased financial support in the same way that the Challenge Programs of 2002 are assumed to be capable of attracting new sources of financial support.

5.33 But closer examination reveals that the seeds of the expansion decision were planted by the Myers report of 1966 which recommended that IITA pursue research on soil fertility and sustainability. The environmental issues were discussed at ICW 85 during informal discussions about the future of 12 non-affiliated international agricultural research centers. Two years later, G. Edward Schuh, Head, Department of Agriculture and Rural Development at the World Bank, addressed ICW 87 and argued that:

“The scope of the CGIAR System could productively be expanded to include a greater range of food crops, attention to the growing environmental problems around the world, making more effective use of natural resources, and the emerging problems of diversification and adjustment associated with the successes of its programs. There is also much to be gained from expanded work on cash crops, which are so important in generating the income and employment for the rapidly growing agricultural labor force around the world” (Schuh, 1987:15).

5.34 In March 1988, Schuh hosted a meeting of representatives of seven non-affiliated international research organizations that address problems of natural resources and their sustainability. The participants concluded that the seven centers were “lean, efficient, and innovative,” that “most of them were grossly under-funded” and that adding the natural resource centers “to the existing CGIAR System would add a vibrant new component to the existing System” (Hubert H. Humphrey Institute of Public Affairs, 1988). In 1988, TAC was charged with assessing the possible expansion of the CGIAR to incorporate some of the non-associated international agricultural research centers into the CGIAR

System (TAC, 1990). TAC presented its report at the 1990 annual CGIAR meeting, and the Group reached three major decisions:

- The concept of natural resource management was added to the mission of the CGIAR System.
- The concept of the ecoregional research activities was added to the mission of the CGIAR in order to increase research on agroecological zones, regionally defined.
- Three of the non-associated research centers and a new center for forestry research were added to the CG System to carry out the CGIAR's expanded mandate in natural resources, forestry, agroforestry, and fisheries. The following four Centers were added to the CG System in 1990: IIMI, ICRAF, CIFOR, and INIBAP.

5.35 In March 1992, the Philippines-based fisheries Center ICLARM (the World Fish Center) was added to the System, bringing the total to 18 Centers. In 1994, the total number of Centers was reduced from 18 to 16 by merging four of the Centers into two Centers. At the 1994 San Juan MTM, the Group decided that livestock research should be entrusted to a single institution. As a result, two Africa-based Centers – ILCA and ILRAD – were merged and a new institute – ILRI – was given a global mandate and became operational in January, 1995. The Group also decided to include INIBAP under the governance and administrative structure of IPGRI. With these two decisions, the CGIAR has had 16 Centers since the mid-nineties.

Lessons From the Expansion Decision

5.36 Without a doubt, the expansion decisions of the early 1990s have been in the foreground and background of CGIAR policy decisions and reviews for the past decade. Two strategic questions flow from the expansion of the System through the addition of NRM Centers. The first is: did the addition of NRM Centers divert donor funds away from some of the commodity Centers? The second question is: what has been the performance (payoff) to investments in the NRM Centers?

5.37 In our opinion, the answer to the diversion question is clear-cut. Donors did not ante up the anticipated additional funds for the NRM Centers. As a result, the commodity Centers such as IITA and CIMMYT and the livestock Centers were forced to cut a number of activities. For example, the decision to enlarge the CGIAR System in the early nineties was followed by a sharp decline in the combined ILCA and ILRAD budgets from \$34 million to \$22.1 million during this period. Likewise, because of budget cutbacks, IITA reduced the number of internationally recruited staff by 22 percent from 1996 to 2001. When ILRI was formed in 1995, it acquired a large part of the previous ILCA and ILRAD research activities and was given a global mandate. The managers and scientists in ILRI are being asked to shift from an African to a global mandate on a smaller real budget and with scientists based on campuses in Ethiopia and Kenya. With a \$30 million budget for 2002, ILRI is under-funded relative to its global mandate. But there are some promising research results emerging from ILRI's socioeconomic program and its cooperation with IFPRI and the FAO in the study in the growing demand for meat, milk, and eggs in developing countries. The Policy research group at ILRI is

productive and well regarded by technical scientists in ILRI. But it is too early to form a judgment about the future productivity of this global Center.

5.38 The answer to the second question – what is the payoff to NRM research – is unclear. This issue has been addressed in a broad study by Barrett. He reports that “There is no quantitative impact assessment evidence on NRM research within the CGIAR– indeed more broadly – so it is difficult to state definitively whether or not NRM research has been effective within the CGIAR System.” (Barrett 2002)

5.39 Despite CGIAR budgetary problems, it is refreshing to note that IFPRI and IPGRI prospered in the 1990s. From 1900 to 2000, IPGRI more than doubled its share of the total CGIAR budget. IFPRI expanded its staff, programs, and doubled its budget during the 1990s. IFPRI’s increased stature and visibility over the past decade is partially due to the leadership of the Director General and his hard working staff, the astute packaging of IFPRI’s programs under the banner of 2020 Vision, and the increased demand for research on trade, globalization, poverty, and environment. But there are three issues of concern. First, the reduction of IFPRI’s core budget has forced IFPRI’s senior staff to become more entrepreneurial and more focused on responding to donors – like Washington-based consulting firms. The demise of core funding has reduced the degrees of freedom for taking on strategic research topics and pursuing them for five to eight years. Second, IFPRI has been unable to recruit and retain a core of senior African researchers for leadership positions in its Washington D.C. headquarters. Third, IFPRI has had limited success in capacity building in Africa. For example, IFPRI has had a number of post-docs on three-year stints in Africa, but it has never deployed scientists on five- to ten-year assignments in Africa. The end result is that IFPRI does not have a proven capacity building model in Africa. How many more decades will it take to develop a few financially sustainable Food Policy Research Centers in Africa?

5.40 *The third System review.* We now turn to recent reviews of the CGIAR. The Third System Review of the CGIAR, prepared under the leadership of Maurice Strong, is not of much value to Africa. Perhaps because of time constraints, the Strong report devotes only one of its 29 recommendations to Africa. However, the Africa recommendation consists of eight banal “assignments” to CGIAR Centers, without either identifying which Center activities should be shelved in order to finance an expanded program in Africa or, alternatively, citing a source of additional financial resources for the proposed assignments. The eight assignments to the CGIAR were as follows:

“The Panel recommends a special collaborative focus on Africa that incorporates the following elements...(1) Promote national/regional consultative processes for agricultural research and development; (2) Set up an African Capacity Building Initiative for Sustainable Food Security as a major inter-Center initiative; (3) Set up a task force to develop a special focused program for African food security; (4) Launch a well-planned Lab to Land Programs; (5) Develop research programs in urban and peri-urban agriculture; (6) Emphasize modern ecological farming methods; (7) Set priorities on staple or relevant food crops; and (8) Promote partnerships between strong NARS from various parts of the world and strategic African NARS.” (CGIAR, 1998)

5.41 Vernon Ruttan (2000) reviewed the report of the Strong Review Panel and noted that:

- The CGIAR has made a major contribution to the growth of the most important food commodities in developing countries:
- Without the increase in the production of basic food commodities resulting from CGIAR research, basic food prices in many of the poorest countries would be substantially higher. But agricultural research has been a blunt instrument to address the problems of resource-poor families in rural areas.
- The review panel failed to confront the governance and structure of the CGIAR System. The CGIAR has found it difficult to reallocate resources from unproductive to more productive research objectives and almost impossible to reorganize or close the several Centers that have been unproductive or whose missions are no longer relevant (Ruttan, 2000:27-29).

5.42 The introduction of Global Challenge Programs has raised questions about the wisdom of setting global research agendas for agriculture. While one can readily agree on the need for agricultural researchers in Africa to be concerned about global issues such as global warming, there are legitimate concerns about the level of CP transition costs and a possible reduction in unrestricted core funding. There is also a concern that Center Directors can block change by trying to use the CPs to raise new resources while holding onto old mandates and activities. If this happens, the result may be less focus, stretching stagnant funding even further and deepening donor cynicism.

5.43 Nobel Laureate, T.W. Schultz, was skeptical of setting international research priorities for agriculture because of the heterogeneity of agriculture even within a single country. In fact, he observed that:

“...national research priorities are a noble objective and international research priorities would be still nobler...Let the United Nations establish them...The critical flaw is...(the) failure to comprehend the specific nature of the research requirements of agriculture...Priorities and control of agricultural research vested in Washington would be akin to the Gosplan (the Soviet Union Planning Organization). It would be a disaster.” (Schultz, 1985:16)

5.44 It is encouraging to note that the GCP (Global Challenge Program) has been renamed the Challenge Program because of the recognition that GPCs ran the risk of preventing researchers from addressing problems of a uniquely regional character, especially in Africa. The debate over the Challenge Program flags the need to examine the process of agenda and priority setting for Africa. It is evident that the Challenge Program is of keen interest to scientific communities in large NARS, such as China, India, Brazil, and in industrial countries. But it is unclear how the comparatively weak – the African NARS – will contribute to and benefit from the CPs. Our interviews and electronic mail raised the following questions:

- Where was the African voice in the identification of the CP topics?
- Will the CPs address the priority problems of Africa?

- Will CPs increase or decrease donor support to Africa?
- Will the partnerships between the strong and the weak lead to win-win outcomes?

5.45 There has been limited participation of Africans to date in terms of problem specification of the CP; needs of African farmers and stakeholders; thoughts and insights about institutions and connections between food production, hunger, and poverty. The danger is that by the time the full proposals are developed, Africans will have lost a leadership role in the CPs that affect them most and that the CGIAR/SRO/NAR partnership will once again be dominated by the Centers.

Impact of the CGIAR

5.46 What has been the impact of CGIAR activities in Africa and what lessons can be gleaned from the past 35 years of experience in Africa? We bring two types of evidence to bear on this question. First, we summarize studies of the impact of the CGIAR on food crops and livestock in Africa because other papers in the meta review are covering NRM, impact assessment, and intellectual property rights. Second, we draw on critical assessments of the CGIAR in the 1990s by Binswanger, Eicher, and McIntire because they have raised some issues that are often overlooked or glossed over in rate-of-return studies and in external reviews of Centers. Some of the issues raised 5 to 10 years ago are still unresolved by CGIAR management. The impact studies and the three critical perspectives will help set the stage for addressing the future of the CGIAR in Africa.

5.47 There are several reasons why the impact of the CGIAR research in Africa is an underdeveloped area of study. First, the African database is weak and unreliable. Second, rate of return studies are biased toward win-win cases such as hybrid maize in eastern and southern Africa where commercial farmers helped develop the institutional foundation (e.g., seed, credit) for subsequent adoption by smallholders. There are few, if any, rate of return studies carried out in countries such as Chad, Eritrea, Angola, and Zaire. Third, the newness of the CGIAR's natural resources Centers in Africa makes it difficult to evaluate the NRM impacts in Africa. Finally, there is a lack of methodological work on the impact of alternative institutions on capacity building, human capital formation, and performances of NARS (Goldsmith, 1993).

5.48 The first published study of the rate of return agricultural research in Africa was a study of cocoa research by Abidogun (1992). Over the past decade, approximately 40 African rate-of-return studies have been published (Oehmke and Crawford, 1996; Pingali, 2001).

5.49 Evenson and Gollin (2001) carried out a global study for TAC on the production and diffusion of modern varieties for 11 major food crops covering the 1965 to 1998 period. The major findings are:

- Developed countries made very few direct or indirect transfers of technology to developing countries because of differences in agro-ecologies.
- Although significant numbers of modern varieties of the major food crops were produced in Africa in the 1960s and 1970s, there was little adoption by African farmers except for wheat. There was little increase in yields from new varieties in

the 1960s and 1970s in Africa because of research time lags, cropping mix, and inherited stock of germplasm.

- Varietal improvement picked up in Africa in the 1990s and “technological momentum is high for the region.”

5.50 The impact of food crop research in Africa has recently been summarized:

“As a result of this growing evidence, the impacts of agricultural research in Africa can no longer be denied. The generation and diffusion of improved, higher-yielding maize OPVs in Western Africa and hybrids in Eastern and Southern Africa, higher yielding wheat in Eastern and Southern Africa, hybrid sorghum in Sudan, semi-dwarf rice for irrigated regions in West Africa, early maturing cowpeas in West Africa, and disease-resistant potatoes in Eastern and Central African highlands are now cited as outstanding success stories of technological change in food crop production in sub-Saharan Africa. However, there are three qualifications to the crop improvement research success. First, the results are patchy by country and over time. Second, despite the introduction of new varieties, there have been less than expected impacts on yields. Third, returns to research (and extension) investments are reported to be quite high but represent variable performance across countries and crops.” (Maredia, Byerlee, and Pee, 2000:554)

5.51 Maize is Africa’s most important food crop and it is the best documented crop in terms of the payoff to research on food crops (Byerlee and Eicher, 1997). Daniel Karanja (1990) tallied up the cost and returns of investments in hybrid maize research in Kenya from 1953 to 1988 and found that the annual rate of return on the investment in hybrid maize research in Kenya was 68 percent over the 35-year period. However, when Karanja completed his study in 1990, Kenya’s maize research program had lost its momentum in terms of the release of new hybrids. But in 2000 and 2001, KARI, the NARS of Kenya, released ten new varieties (both hybrids and OPVs) (Kiome, 2002). Kupfuma (1994) documented the high returns to maize research in Zimbabwe. Pingali (2001) and Hassan, Mekuria, and Mwangi (2001) have summarized the literature on maize research.

5.52 Ahmed, Sanders, and Nell (2000) report that although there has been a substantial introduction of new sorghum and millet cultivars in semi-arid sub-Saharan Africa, there has been a minimum impact on yields because of the lack of fertilizer, irrigation, or improved water retention. The authors contend that the introduction of new cultivars by themselves is unlikely to generate a sustainable increase in yields. Cassava, Africa’s second most important food crop, has recently been studied by Zeddies et al. (2001) for mealybug control and by Nweke, Spencer, and Lynam (2002) for genetic improvement.

5.53 But the impact studies cited above raise many questions about appropriate plant breeding strategies to deal with the agro-ecological variation in Africa and the vast array of crops, cropping patterns and farming systems. Peter Timmer, an American agricultural economist with decades of experience in Asia, reflected on the complexity of African agriculture by recalling his first visit to Kenya in the 1980s:

“I can drive from Jakarta to Krawang, the rice bowl of West Java. It’s 60 miles, 70 miles, out and back, and its rice fields. And it’s one variety or

another, but its rice all the way out. Come back a different road and it's rice all the way back. I haven't been in Africa much, but the one time I was in Kenya, I remember driving up one hill and down the next and seeing twelve different agroclimatic zones and twelve different cropping patterns, and fifty different crops. I couldn't believe the complexity of the farming systems as they varied up and down the hills." (Timmer, 1991)

5.54 Two big questions emerge for further debate. First, how dependent should African NARS be on global breeding Centers such as CIMMYT, IITA, and CIAT? Should African NARS concentrate on their own breeding programs to deal with the local diversity or should they hone their skills to become smart borrowers of germplasm from neighboring countries, SRO networks, and global Centers? The second question is what can be done to address the small country problem where 35 countries have an average of 34 scientists per NARS, a human capital base that makes it difficult to achieve a critical mass of research talent on anything except for one or two commodities or problems?

5.55 DeVries and Toenniessen (2001) address the first question in their new book. They argue that because of the wide variation in environmental conditions in Africa over time and space, the objective of plant breeding programs in Africa is not high-yield potential but the reduction of yield losses. They argue that, over time, yield-enhancing genes can be added. The authors call for priority to be given to developing well-financed and -staffed crop-breeding programs at the national level rather than at the international Centers. The IARCs will still be needed but they can focus on biotechnology, biodiversity, etc. This is a very cogent argument but how does one ensure that crop breeding programs in 35 small countries are well-financed and staffed?

5.56 The second question – the small country problem – has recently been addressed in a CIMMYT study by Maredia and Byerlee (2000) which sheds light on how global research spill-ins diffused new wheat varieties to small countries and countries with a small area of wheat under cultivation. The authors carried out a global study of 69 wheat breeding programs in 35 developing countries from 1961 to 1991. The internal rate of return to wheat improvement research in the NARS in Africa was estimated to be 23 percent. But the most important finding is that the international agricultural research System can develop new varieties more efficiently than can be done by individual NARS.

5.57 Maredia and Byerlee studied wheat research programs in eight African countries and concluded that four of the eight countries were unwisely concentrating on adaptive breeding instead of importing improved varieties from CIMMYT. Moreover, two of the eight NARS were projected to have negative net profitability to wheat research investments because the area of wheat in the country was too small to justify hiring even one wheat breeder. For example, one country had four full-time scientists engaged in wheat research and only 14,000 acres of wheat under cultivation. The findings of the Maredia and Byerlee study should be examined by SROs and NARS because they point up the need for some of the small countries to shift their research emphasis from adaptive breeding to testing imported varieties and developing the scientific capacity to become "smart borrowers" from regional crop improvement networks and from CGIAR Centers.

5.58 Where do we come out on the centralized (global) vs. decentralized (national) breeding debate? Maredia's and Byerlee's study of wheat breeding provides convincing evidence on the benefits of global breeding to small countries or countries with a small area of a crop under cultivation. But many argue that wheat is a special case because it is more robust than maize or other crops in terms of international technology transfer. However, a recent study of maize adoption in Ghana reveals that 54 percent of the national maize area was planted to maize modern varieties (with some CIMMYT germplasm) in 1997 (Morris, Tripp, and Danyki, 1999). Still skeptics argue that Africa requires different germplasm pools from which to generate breeding programs. A knowledgeable commentator on the first draft of this paper contends that "germplasm development in Africa requires its own dedicated research programs that in turn, require minimal interaction with global centers."

5.59 The debate has been joined. ICRISAT's and WARDA's experience makes the case that Africa may require different germplasm pools than Asia. But the wheat and maize examples show that some cereals such as wheat and maize are robust and can be transferred and used effectively by numerous countries in Africa. To summarize, a global breeding program requires good African screening sites. Likewise, an African breeding program by itself is less likely to be effective than an interlinked global/national system. And with the flow of increased bio-technology research in the future, it seems logical that Africa needs more than minimal interaction with global public and private research centers.

5.60 In the early nineties, the CGIAR was at its high water mark. New NRM Centers were being added and the prospects of new and larger sources of funding appeared promising. Nevertheless, in the early nineties, Hans Binswanger, Carl K. Eicher, and John McIntire raised a number of troubling issues about the "quiet crisis" facing the CGIAR. We shall summarize the issues flagged by these three commentators because many of them have not been resolved as of 2002.

5.61 Binswanger summarized the results of an Airlie House Conference on agricultural technology in a pithy note that is of enduring value (1994). Despite the high rates of return on research, he observed a sense of disappointment among donors about the achievements of the System. Binswanger contended that many donors were dissatisfied because of ignorance, misinformation, and exaggerated expectations about the role of the CGIAR in addressing sustainability and poverty problems. Binswanger had the following to say about governance, sustainability, and poverty:

5.62 On the governance issues, Binswanger observed that "Some international centers have never become productive or have gone through prolonged periods of crisis. Neither the Boards nor the external review process seem capable of taking the hard decisions quickly, despite the multiple review process" (627). He added that because the real core resources of the System have stopped growing "This requires much harder and tougher decisions . . . There is, therefore, a new role for the Bank—to ensure that the System acquires the ability to make hard decisions quickly." (628)

5.63 On the sustainability issue, Binswanger reported that he was personally skeptical about the CGIAR Centers in solving NRM problems: "My own judgment is that the increase in funding for resource and sustainability issues should be concentrated into the

local and provincial stations. The advocates of expansion at the international level (at the Airlie Conference) did not bring any examples or evidence on how strategic research had helped solve some specific resource management or sustainability issue over a broad geographic range. As long as the core budget resources of the CGIAR institutes are stagnant or declining, it would be too risky to divert resources from the fairly steady generation of commodity-based advances to an area where the experience of the international centers has not been nearly as positive” (Binswanger, 1994:626). On poverty, Binswanger contended that “the power of technological solutions to solve poverty problems is extremely limited in the absence of economy-wide growth and rural-urban migration” (Binswanger, 1994:626).

5.64 In 1991, Carl K. Eicher undertook an independent assessment of the CGIAR for a conference in Bellagio that was organized by Vernon Ruttan (Eicher, 1992, 1994). The highlights of his assessment are as follows: The CG members rejected TAC’s sound recommendation to set up one Center to carry out an integrated approach to agroforestry and forestry research. Instead, two CGIAR Centers were agreed upon: one for agroforestry and one for forestry research.

5.65 The 1990 and 1992 decisions to add five new Centers to the System were driven by a combination of scientific, political, and technical forces. The expansion is controversial among some scientists and administrators in the 13 established Centers because they have been forced to downsize their programs . . . the core funding for almost all for the old Centers declined over the 1990-1992 period.

5.66 The CGIAR System is facing a quiet crisis of confidence. The CGIAR has added Centers, scientists, commodities, and new challenges, including natural resource management, while retaining an outmoded management structure that is unable “to take the required hard decisions quickly.” Because donor support is not growing in real terms, it is already proving difficult to finance the old Centers and implement the expansion plan.

5.67 A new management structure is needed for the CGIAR System in the 21st century. The CG should move quickly on this issue because it needs to protect the proven Centers as they are forced to lay off scientific and support staff because their core budgets are being trimmed in real terms. The alternative is to continue to make marginal changes in the present System, allow some of the proven Centers to bleed to death and wait until the world economy improves and donor support for research is increased. This course of inaction is clearly unacceptable. There is an urgent need for the chairman of the CGIAR System to appoint a high-level commission of four eminent scientists and four CGIAR members to study alternative management structures for the 21st century. “The commission should be financed by a foundation (or foundations) and given 24 months to prepare a white paper with a recommended management structure. A new management model should be in place by Centers week of 1994” (Eicher, 1992:24).

5.68 John McIntire and Bakary Ouayogode were members of a TAC Panel that produced a critical report on the CGIAR in West Africa in the mid-nineties. McIntire chaired the Panel that was charged with investigating CGIAR commitments in West Africa, given the rapid expansion in the NARS in the region, lagging agricultural growth,

and concerns about the efficiency of the CGIAR System. The major findings of the Panel (TAC, 1995) are as follows:

- In view of the growing strength of national programs, the Panel recommends shifting more Center effort to basic and strategic research.
- Although ICRISAT has produced many advanced lines of sorghum, millet, and groundnuts in West Africa, there has been a lack of farm-level production impact, i.e., “the improved varieties are not better than locals under field conditions, even in farmer managed trials with extension, input supply, risk, or marketing.” The Panel noted that “a grave problem in ICRISAT’S culture in West Africa was the “domination of Hyderabad” (the headquarters of ICRISAT in India), which forced the selection of Niger for ICRISAT’s research station in West Africa, an agro-ecological zone that turned out to be too dry for sorghum and groundnut research.
- There is too much crop and livestock management and characterization research in the IARCs that “has little expectation of additional benefit because it often duplicates what farmers already know, what they can easily learn without research, what is a matter of extension, or what national programs can do.” The Panel concludes with the “we get the profoundly depressing feeling that the CGIAR needs yet another rethinking of what it is trying to do with livestock research in West Africa.”
- Because of the small number of economists in the IARCs in West Africa relative to Latin America and Asia, the Panel recommended that IFPRI be named as a strong convening Center for socio-economic, policy, and public management research in West Africa in order to integrate the microeconomic focus with its own policy focus.
- The IARCs’ neglect of institution building as such is wholly justified because, with the exception of ISNAR, “the IARCs have no comparative advantage in institution building which requires greater resources, a wider perspective, and political reforms that they cannot affect.”

5.69 The McIntire report generated an intense debate within the System. ICRISAT responded with a 20-page reply. The CDC (Center Directors Committee) circled its wagons and issued a 27-point reply and noted that “The Panel’s conclusions seem to be needlessly provocative (CDC, 1995). The cool reception to the McIntire report illustrates the power of the CDC to stifle debate and erect a firewall around Centers and the System. A knowledgeable African research manager recently commented on the McIntire report as follows: “This was the very first honest evaluation made by an independent Panel on the System and impact on the African continent.”

5.70 To summarize, the commentaries by Binswanger and Eicher and the McIntire report raise some sensitive issues that have been glossed over in external reviews and impact studies and call into question the objectivity and lack of candor in a number of external and System reviews.

6. CGIAR in Africa: Looking Ahead

Strategic Planning and Accretionary Capacity Building

6.1 In looking ahead, it is always important to keep an eye on the past. Africa's historical experience has generated a number of valuable insights that can be used by research managers to help shape their agendas, priorities, and relationships with the CGIAR. We have analyzed the creativity of the colonial research managers in utilizing strategic planning to develop a system of regional research institutes, research networks, and career pathways for scientists to serve the needs of 40-plus colonies in the first half of the 20th century. Today, Africa has 48 independent nations with NARS of varying sizes and scientific capacity. However, 35 of the NARS have an average of only 34 scientists. This startling statistic is one that should be kept in mind as donors attempt to address the problems of small NARS over the next 20 to 30 years.

6.2 The creation of the SROs represents a brilliant "institutional experiment" to inter-link NARS of varying size and capacity in a specific agro-ecology. The SROs also serve as the interface between the NARS and FARA. The future evolution of the SRO experiment is of strategic importance to the NARS of Africa and the CGIAR. But it will be difficult for the three existing SROs to meet the needs of 48 NARS. We recommend adding two or three more SROs to enable each SRO to serve a cluster of eight to ten NARS.

6.3 In discussing the future of the CGIAR, we note that the CGIAR has historically pursued a tactical approach to working in Africa. New Centers have been added and dropped; mandate commodities have shifted over time. ISNAR reduced the number of its projects from 18 to 12 and more recently to six. Four Centers in Africa have been merged into two and further mergers are under discussion. But these changes in the CGIAR are partially a reflection of a lack of strategic direction, a withdrawal of core support and increased project support which in many cases, is pulling the Centers downstream.

6.4 Amid the growing calls for pluralism and greater private sector participation in extension and research, it is important to examine the past for guidance. We are of the opinion that private sector research will continue to represent the "tip of the iceberg" in terms of transforming and modernizing agricultural research systems in Africa over the next 30 years. Brazil's experience is instructive. In 1972, the government of Brazil made a political decision "to modernize the research system to accomplish the newly defined national goals of accelerating agricultural growth" (Pastore and Alves, 1977). After 30 years of massive human capital investment programs, experimentation and innovative use of partnerships and alliances, The Brazilian Agricultural Research Corporation (EMBRAPA) is currently mobilizing around US\$ 300 million dollars a year for agricultural research from indigenous sources. But 79 percent of the \$300 million is coming from public funds and the balance from private sources (Macedo et al., 2002). To be sure, vigorous attempts should be made to mobilize private sector participation in agricultural research in Africa through competitive grant schemes and alliances but public sector funds are crucial for meeting the accretionary capacity building challenge.

6.5 We do not encourage FARA or the CGIAR to prepare an African strategy of agricultural research. To our knowledge, the CGIAR does not have an Asian research

strategy? Africa is too large, diverse, and complex to yield to the preparation of a research plan and implementation strategy for the entire subcontinent. Instead, FARA should focus on developing agricultural research policy guidelines on critical issues such as distilling the competitive grant experience in Asia and Latin America and making it available for African NARS and SROs, interacting with the Global Forum for Agricultural Research (GFAR) and laying the groundwork for special projects such as helping generate bilateral support for lusophone countries to enter into South/South training programs and research partnerships with NARS such as EMBRAPA.

6.6 The current CGIAR reorganization displays a subtle shift in power relationships both within the CGIAR System as well as with its partners in terms of shaping the future direction, organization, priorities and financing of CGIAR programs in Africa. The CGIAR Center Directors remain a powerful group, taking the lead in establishing CPs (Challenge Programs), while still holding onto previously mandated activities. It is not clear if the conversion of the TAC (Technical Advisory Committee) into a Science Council will be of help to Africa. Within the group of financiers, including multilateral and bilateral donors, foundations, and developing country members, repositioning of individual members is taking place through their participation in the Executive Council. Other large stakeholders include SROs, NARS, NGOs, gender specialists, environmentalists, and the private sector. Within this stakeholder group, there is a growing countervailing power of African research managers and scientists and the articulation an African vision through the SROs and FARA (SPAAR/FARA, 1999; FARA, 2000; CGIAR, 2001d; WARDA and ISNAR, 2001).

6.7 What does this mean for the CGIAR? The Africa Committee of Center Directors should abandon its efforts to develop a CGIAR Strategy for the entire region of Africa (CGIAR 1999a, 1999b). Instead the appropriate CGIAR Centers in each of the five or six subregions of Africa should be encouraged to develop research priorities and partnerships and alliances with the SROs and the NARS. The recent CGIAR/SRO meetings in eastern and southern Africa and a similar meeting in West Africa have been very productive (CGIAR 2001 a, 2001b). Likewise the WARDA Task Forces that were started in 1991 represent a novel approach to building partnerships with the national agricultural research programs of West Africa. These examples represent a gradual and accretionary learning process and they should be lauded.

6.8 The devolution of leadership is under way from the Africa Committee of Center Directors to SRO/Center working parties within a sub-region. This is a healthy evolutionary development. Attention is now appropriately focused on sub-regional planning and an accelerated devolution of responsibility from the CGIAR to the SROs. We are well aware that we are placing a lot of responsibility on the SROs to evolve and serve as the interface between the NARS and the CGIAR. We hope that the SROs can avoid being flooded with foreign aid. But at the end of the day, Africans must play leadership roles in shifting the paradigm from a “CGIAR first” to African-led partnerships, networks, and alliances. In short, the strategic vision must originate in the African political and scientific communities with an eye on generating scientific advances both at home and through “smart borrowing” from African and global sources.

6.9 Institutional capacity building is a critical problem in Africa and the future success of the CGIAR in Africa is critically dependent on developing effective and sustainable NARS. We agree with the opening quotation of this paper by Nyle Brady that the CGIAR has a dual responsibility of bringing good science to bear on important problems and helping develop the scientific capacity of national research services. But the CGIAR is not a development agency and it neither has the mandate, comparative advantage, or resources to underwrite long term institutional capacity building programs for the NARS of Africa. Fortunately, Hans Binswanger and Moctar Toure in the World Bank stepped forward and prepared a proposal in 2002 to address effectiveness and sustainability in African agricultural research. The draft proposal argued that because of the modest role of private sector research in Africa (currently around 10 percent of total agricultural research expenditure in Africa), it is important to increase public financing of agricultural research in Africa given its public goods nature and its crucial role in poverty reduction. The proposal adopts a realistic 20- to 25-year time frame. The proposal calls for the Bank to play a lead role in the preparation of a Multi-country Agricultural Research Program for Africa (MARF). The Bank proposal is timely and it makes repeated reference to the need to coordinate the proposal for MARF with the ongoing renewal of the CGIAR System.

6.10 But the World Bank proposal raises some issues. The first is conceptual. The proposal discusses an integrated approach to building research, extension, and agricultural higher education, but the thrust of the proposal is devoted to strengthening NARS. Although the proposal can be praised for adopting a realistic time period – 25 to 30 years – it does not include an explicit human capital replenishment strategy. The lack of concurrent investments in agricultural higher education is an important shortcoming of the proposal because the bulk of Africa's future scientists will have to be trained in Africa even though the quality of higher education has been falling in many countries, especially over the past 10 to 15 years. We believe that the Bank should review its standoffish position on agricultural higher education and incorporate this as a central component in the proposal. Second, it is unclear whether the proposal will adopt a strategic or tactical approach to strengthening NARS? The draft proposal will be followed by the preparation of a MARF (Multi-country Agricultural Research Program). We are of the opinion that the MARF should address the 80/20 research paradigm and figure out how both the large and small NARS can reinforce each other through technology sharing. Third what can be done to persuade African governments to elevate agricultural research to a national political priority and funding for agricultural research? Fourth, can the Bank get other major donors to support this Bank-led initiative at a time when the Bank and many donors have reduced their support for agriculture?

Strengthening the Pillars

6.11 The task ahead is for the CGIAR to assist Africans in helping strengthen the four pillars of agricultural research systems:

- Pillar 1: Building African political leadership, ownership, and responsibility for investing in agricultural research to increase agricultural productivity and economic growth.

- Pillar 2: Strengthening SROs and NARS and building agricultural science bases.
- Pillar 3: Strengthening postgraduates training in African agricultural universities and faculties of agriculture.
- Pillar 4: Crafting mutually productive research partnerships, networks, and alliances, research priorities in order to deliver a stream of new technology to serve the smallholders and other clientele groups in Africa.

Pillar 1: Building African Political Commitment

6.12 The first pillar is building African political will and commitment for science and technology and sustained funding of agricultural research (Brazil, 1977). There is an urgent need for African political leaders to take a stand and elevate agricultural research to a national priority and move aggressively to pay the recurrent budget of research on a timely basis for years and decades to come. But to achieve this goal, a political decision has to be taken to elevate agricultural research as a national priority (Lipton 1977). This is what Brazil did 30 years ago. To our knowledge, only five African countries are paying the recurrent budget of their NARS from national sources: Nigeria, South Africa, Botswana, Ethiopia, and Mauritius. It should be noted that the World Bank's proposal to revitalize agricultural research in Africa does not address this important issue (World Bank 2002). We realize that this is a delicate issue but Brazil, India, Malaysia and other developing countries made hard political decisions several decades ago and the payoff has been impressive.

Pillar 2: Strengthening SROs, NARS, and Building Agricultural Science Bases

6.13 The implications of 35 small NARS are clear: the donor community should pull back from the tactical approach of offering project assistance to African NARS and adopt a strategic planning approach which supports the creation of five to ten national agricultural science bases that will be linked with clusters of NARS in five to six sub-regions of Africa and recharged by a two-way flow of technology between technology-generating and technology-borrowing NARS. Donor assistance is needed to underwrite the accretionary process of building scientific capacity over the next 30 years.

6.14 Attention should be given to emerging South-South research and training partnerships. Brazil provides a preview of the scope for new South-South partnerships. Currently, about 100 African agricultural scientists (mainly from Mozambique and Angola) are enrolled in training programs in Brazil (Macedo, Porto, and Contini, 2002). Moreover, several dozen African countries have requested The Brazilian Agricultural Research Corporation (EMBRAPA) to help them build scientific capacity to plan and execute agricultural research programs. But as EMBRAPA neither has the mandate nor the resources to finance large-scale capacity building programs in Africa, bilateral donors are needed to help underwrite institution building.

Pillar 3: Strengthening Postgraduate Training in African Universities

6.15 After 40 years of independence, many NARS in Africa are scientifically weak, oversized, financially unstable and heavily dependent on erratic project aid. But this is

not a fault of the CGIAR that it has never had the mandate or the capacity to be a major actor in building scientific capacity in Africa. Without question, CGIAR Centers played a major role in short-term training from 1970 to 1990. However, budget cuts have curtailed training and capacity building in many Centers over the past decade. The challenge ahead is to design a strategic (20- to 30-year) program to build Africa's scientific capacity (Eicher, 2001; Rukuni, 2001). Capacity building should be a primary mission of development agencies and a secondary mission of CGIAR Centers. USAID has recently made a commitment to increase its support for long-term training in U.S. universities and help strengthen post-graduate training programs in developing countries (BIFAD 2003).

Pillar 4: Crafting Mutually Productive CGIAR/SRO/NARS Partnerships, and Alliances

6.16 Change comes slowly in Africa. Colonial governments dominated research from the time of the establishment of the early research stations around 1910 to independence in Anglophone countries around 1960 and in lusophone Africa in 1975. With research getting under way at the IITA in 1970, the CGIAR became operational in Africa. CIRAD, the CGIAR and donors dominated agricultural research decision making in Africa in the eighties and the nineties. In fact, the first review of the CGIAR in 1977 viewed the interface between the CGIAR and NARS from a narrow perspective: "The central thrust of each center should be...to cooperate with national research and production programs to the extent necessary to further the center's own research activities." (CGIAR 1989). Four years later the Second CGIAR review in 1981 stated that "while acknowledging that loss of control over work programs was a justifiable worry,...effective participation in the official national decision making process on research programs far outweighed the negative considerations". But it was only in the CGIAR Priorities paper in 1987 that "the need to accommodate national priorities when working in a particular country" was explicitly recognized (TAC 1987).

6.17 The logjam was broken when a CGIAR African Task Force headed by Guy Camus met eight times from 1986 to 1989 and laid out a pragmatic and politically realistic devolution strategy. The Camus Task Force reported in 1989 that "the concept of regional research, particularly where there are many small countries, is an extremely powerful one." The Task Force recommended regional interfaces driven by the national systems, supported by donors, and assisted by the CGIAR, for improving the collaborative process between national and international systems" (CGIAR 1989:14). The operative words in the recommendation are "assisted by the CGIAR". The key words "assisted by the CGIAR" furthered the devolution in the nineties, culminating in the preparation of the African Vision for Agricultural Research, the Durban Statement and the establishment of FARA as the apex organization for the SROs.

6.18 To further the devolution, the Centers have held a number of useful discussions with SROs and NARS. The report of the inter-Center preparatory meeting held at ILRI in Kenya alludes to the challenges and realities stating, "The recognition that the CGIAR System on its own cannot make a difference, but can only fulfill its goals through collaborative alliances and based on genuine collaborative advantage, was central to all discussions" (CGIAR, 2001:1). At the AGM 2001, ICRAF was assigned the responsibility by the Committee of Center Directors to play a facilitating role in this

regard with respect to East and Southern Africa, the region that has the highest concentration of Centers in Africa.

6.19 Currently there are 16 Centers operating in 17 countries in East and Southern Africa, with 13 in Kenya alone. We believe that this concentration of CGIAR personnel and resources is excessive in East and Southern Africa. In fact this concentration of status and privilege may have stimulated the stinging critique of the CGIAR in the FARA/SPAAR reports (SPAAR/FARA, 1999; CGIAR, 2001d). In West and Central Africa, a Workshop on Integration of Agricultural Research in West and Central Africa was held at IITA, Ibadan, 10-12 September 2001. An audit showed that a total 187 scientists are posted in 10 countries in the sub-region, and the Centers have 90 ongoing projects in 22 countries (IITA, 2000). FARA (2000) made an important contribution to the CMDT exercise and flagged the lack of congruence of priorities between CGIAR Centers, NARS, and the SROs. The FARA report has been well received within the CGIAR and donor communities and it is a barometer of the growing countervailing power of the African scientific community. But further dialogue is needed at the sub-regional level in order to determine what services are needed by the SROs, gaps in CGIAR programs, validity of the Center mandates, appropriateness of CGIAR structures, and the number of scientists in the region.

6.20 ASARECA's success in garnering U.S. \$50 million of donor funds for the 1999-2005 period underlies some of the current tension over who sets priorities in East and Central Africa (ASARECA, 2002). But this tension is healthy and necessary in order for Africa to move from partnerships between the strong and the weak to African-led research partnerships. Africa has much to learn from the experience of Asia and Latin America in this regard. Professor Gelia Castillo has studied many different types of partnerships and found that the North-South partnerships have tended to follow the North-South patterns of colonial history (Castillo, 1997).

Conclusions

6.21 We began this review of the CGIAR in Africa with a conviction that the future of the CGIAR is closely intertwined with the performance of NARS and SROs. As a result, we have analyzed the evolution of NARS, SROs and the CGIAR in historical perspective (CGIAR, 1999a; 1999b; 1999c; 2001e; Herdt, 2000, 2001). At the heart of the matter are a number of unresolved issues about research priorities, research organization, financing research in a continent of 48 countries with vast differences in the capacity of NARS, and an unhealthy tension between the NARS and universities.

6.22 Six main conclusions flow from our analysis: First, despite some difficult start-up problems, the CGIAR Centers have made major contributions to African agriculture. Although there are fewer impact studies to document these contributions in Africa than Asia, virtually every African informant agrees that the CGIAR varieties have been an important contribution to African agriculture and that this pipeline of new technology should be continued.

6.23 The second conclusion is that funding constraints have encouraged the CGIAR Centers to become more development-oriented. This has both disadvantages and

advantages. The Centers have been encouraged to show more direct impact on the welfare of poor farmers. This is a positive outcome because it has forced Centers to become more client-oriented. But on balance, the Centers are being stretched too thin and not enough time is now available for Center scientists to publish their results in peer-reviewed journals, take sabbaticals, and rebuild their human capital. To summarize, the centers in Africa are under-funded and over-stretched. The quality of science is being threatened as Centers are pulled downstream and cajoled and/or seduced into adding more pet projects of donors.

6.24 The third conclusion is that the CGIAR will not achieve its full potential until the NARS of Africa are productive and financially sustainable. Currently, most NARS in Africa have limited national political support and recurrent funding to promote technological change as an ‘engine of growth.’ In some respects, the CGIAR institutes are being called upon to compensate for the failures of national systems. For example, most NARS breeding programs remain little more than variety testing efforts. If the CGIAR shuts down their applied breeding tomorrow, this will sharply reduce the Centers’ germplasm available to NARS. But then do the CGIAR Centers pursue variety development forever? The question remains, do the CGIAR Centers in Africa provide the germplasm for national variety testing for another 20-30 years? The bottom line is that ways must be found for Africa’s leaders to provide leadership, ownership, and responsibility for public financing of its NARS and SROs. This is a complex and costly process and it will take decades. But Africans must take the lead.

6.25 The fourth conclusion is that there is an urgent need to abandon the prevailing tactical approach of scattering donor projects over Africa’s landscape and to shift to a strategic paradigm which focuses on building a strong agricultural science base in five to ten countries. The agricultural science hubs will require incentives to develop new technology and diffuse it to neighboring countries. Each agricultural science base (ABS) should have a critical mass of scientific expertise. All NARS, large and small, would be eligible to become technology producers and/or technology borrowers and be able to compete for ten year ASB grants as well as competitive research grants. Although a number of African commentators are skeptical of this proposal on political grounds, what are cost effective alternatives to strengthening Africa’s 35 small NARS?

6.26 The fifth conclusion is that the combined efforts of the NARS, SROs, CGIAR, and the private sector represent an incomplete and unsustainable model of technology generation and transfer because consideration is not presently being given to human capital replenishment and universities. Without question, most of Africa’s future scientists will have to be trained in African universities because of the sharp decline in donor assistance for overseas study. Yet there is a high degree of tension surrounding over whether universities should be full –fledged members of SROs. Four questions should be addressed: What can be done to get universities to become full-fledged members of the SROs? Second, what needs to be done to improve the quality of M.Sc. training in traditional fields such as agronomy, plant breeding, animal science, crop management, and agricultural economics? Third, which universities and faculties of agriculture in Africa should be assisted in developing the human and physical capital to train future African scientists in new areas such as biotechnology, intellectual property rights, WTO, and agribusiness? Fourth what can be done to extract more research output from universities?

6.27 The sixth conclusion is that the NARS, SROs, CGIAR, and donors are involved in a gigantic learning process of trying to figure out how to solve some of the same organizational and financing problems that colonial governments so skillfully overcame. WARDA's Task forces provide an excellent example of an institutional innovation that has garnered the support of both NARS scientists and political leaders in the 15 member states. WARDA, in our opinion, has much to teach other CGIAR Centers about the process of forging "ideal CGIAR/NARS/SRO partnerships" and crafting new institutional innovations and incentive structures (e.g., small research grants to NARS scientists).

6.28 Research is urgently needed by social and technical scientists during this ongoing learning process on three important problem areas. First, how to help NARS craft partnerships and alliances that are pluralistic, decentralized, participatory, and accountable to African farmers, herders, and various clientele groups. Second, how to help CGIAR Centers develop mutually productive partnerships with NARS, SROs, NGOs, and the private sector. Third, how to help SROs become an honest broker and serve as an effective interface between NARS, the CGIAR, and private firms. Much of the CGIAR's future in Africa will be determined by its ability to evolve productive working relationships with the SROs and NARSs and the ability of donors to mount and sustain massive institution building programs over the coming 30 years. In his recent farewell speech, the outgoing Executive Secretary of ASARECA, Geoffrey Mrema, called for more research on these issues and the strengthening of analytical capacity at SROs and FARA to influence the agendas of the NARS, SROs, and the CGIAR. He expressed concern that the advent of GCPs (Global Challenge Programs) will undermine the role of Africans in setting research agendas and that the GCPs will lead to a reduction in donor support to African NARS. Mrema concluded that the capacity of Africans "to challenge the arguments behind such (GCP) proposals is rather weak. (Mrema 2001a)

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Zeddies J., R.P. Schaab, P. Neuenschwander, and H.R. Herren. 2001. "Economics of Biological Control of Cassava Mealybug in Africa." *Agricultural Economics* 24:209-219.

Annex 2: List of Working and Background Papers, Authors, and Peer Reviewers

Working Papers

Barrett, Christopher B. 2002. *Natural Resources Management Research in the CGIAR: A Meta-Evaluation*.

Peer Reviewers: Jock Anderson, Derek Byerlee, Dana Dalrymple, Hans Gregersen, Ted Henzell, John Lynam, Vernon Ruttan, Meredith Soule, Joachim von Braun, Usha Barwale Zehr

Eicher, Carl K. and Mandivamba Rukuni 2002. *The CGIAR in Africa: Past, Present, and Future*.

Peer Reviewers: Malcolm Blackie, Dana Dalrymple, Bob Herdt, Alain de Janvry, Romano Kiome, John Lynam, Eric Tollens, Geoffrey Mrema, Wilfred Mwangi, Cyrus Ndiritu, Emmy Simmons, Moctar Touré

Gardner, Bruce 2002. *Global Public Goods from the CGIAR: Impact Assessment*.

Peer Reviewers: Jock Anderson, Dana Dalrymple, Osvaldo Feinstein, Paul William Glewwe, Hans Gregersen, George Norton, Scott Rozelle, Vernon Ruttan, Sara Scherr, Sudhir Wanmali

Lesser, William 2002. *Reviews of Biotechnology, Genetic Resource and Intellectual Property Rights Programs*.

Peer Reviewers: Ronnie Coffman, John Dodds, Robert Evenson, Brian Ford Lloyd, Anatole Krattiger, Steve Kresovich

Spielman, David 2002. *International Agricultural Research and the Role of the Private Sector*.

Macedo, Jamil, Marcio C. M. Porto, Elisio Contini, and Antonio F. D. Avila 2002. *Brazil Country Paper for the CGIAR Meta-Evaluation*.

Katyal, J.C. and Mruthyunjaya 2002. *CGIAR Effectiveness — A NARS Perspective from India*.

Background Papers (Available upon request)

Ndiritu, Cyrus 2002. *CGIAR-NARS Partnership: The Case of Kenya*.

Romano, Luis 2002. *Colombia Country Paper for the CGIAR Meta-Evaluation*.