PART Two

25 Years–A Commemoration
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Providing accurate information on water flows is one of IIMI’s approaches to ensuring the adequacy, timeliness, and reliability of water deliveries to irrigated agriculture in these times of increasing water scarcity.
twenty-five years ago, a small group of visionaries met at the World Bank under the chairmanship of Dick Demuth for the first formal meeting of the CGIAR. They were committed to using science and technology to benefit the poor. Their vision has been fulfilled many times over. They continue to be a source of inspiration. We salute their foresight. We honor them and accept the solemn responsibility of continuing to build on the foundation they laid.

Ideally, twenty-five years on, we should be able to declare total victory, fold up our tents, and move on; but development is about life, and life is not like that. We are all familiar with the record of the past, the complexities of the present, and the problems as well as the promise of the future. Let me not repeat data and analyses which are only too well known to you. Let me only restate our common belief that, as Jawaharlal Nehru put it, in development “everything else can wait, but not agriculture.”

If we do not transform agriculture to be more productive, we will curtail food abundance, which is the basis of food security. Low-output agriculture cannot feed growing populations. If we do not transform agriculture to be sustainable, we will destroy natural resources, the foundation of productivity and human sustenance. If we do not transform it to benefit the poorest and focus especially on women, we will help to perpetuate the very inequities we want to dismantle.

Agricultural transformation in the world’s developing regions will require a thrice green revolution: green for productivity; green for environmental sustainability; and green for increased income as the entry point to improved living conditions, dealing with the access side of food security.

I am aware that modern agricultural technologies have their detractors. We would be doing ourselves a disservice if we did not respect their genuine concerns. These are many faceted, ranging from fears that new technologies harm the environment and erode biodiversity to claims that only large-scale, rich farmers benefit from modern, science-based agriculture.

When new agricultural technologies were introduced in Asia, the preeminent need was to produce more food, thereby saving millions from starvation or death. This was done. With the cushion of productivity in place, CGIAR policies and programs have evolved into a twinning of productivity-oriented research and natural resources management as the basis of sustainable agriculture. This is fundamental to all our work.
So I would say to our friends whose concerns are with the poor and with the environment: we share identical goals. Our hopes for the future are in complete harmony. We are committed to the new paradigm of development in which cutting-edge science can be combined with traditional knowledge; in which community-based action is recognized as essential for effectiveness; and in which empowerment of farm families, and primarily of women, is paramount. I say to all of you who share these objectives: whatever your present misgivings, come, join us, let us work together for these better tomorrows.

Research is the basis of agricultural transformation. Ours has to be a people-centered research agenda in which the results of research sustain the poor and the hungry. Within that focus, we can dare to dream, and dream again, of what is yet to come; but dreams must be tempered with realism. And realism tells us that we cannot act alone. We must combine forces with, and combine the forces of, a variety of partners in a global research system dedicated to food security, poverty alleviation, and agricultural sustainability.

New and deeper partnerships must be forged in a strong, global research system if all the building blocks are to fit together in a durable construct. Farmers and other resource users must have a much stronger voice in setting research priorities, the conduct of research programs, and the evaluation of research results. Research teams in universities and other advanced research organizations must be better mobilized by traditional agricultural research institutions. New arrangements for collaboration with the private sector must be developed. Opportunities must also be created for collaboration and synergies among all actors, especially including NGOs. The CGIAR, while functioning within the global research system, can serve, as well, as a catalyst to bring together all components in a common endeavor.

Economists tell us that we should get the prices right. I would emphasize that, equally, we must get the roles right. Toward that end, we have broadened our partnerships and deepened our collaboration with many. Our linkages with NARS, NGOs, and the private sector are strong and growing stronger day by day. We are moving ever closer to convergence of thought and action. Our strongest contribution to a global research system will, of course, be our research.
Research is the defining core of the CGIAR vision. Every contribution we make to making this world a better place to live is based on research: its relevance, its quality, its continuity, and its impact. Our vision could disintegrate into a nightmare if we do not support our research agenda fully and manage our affairs well. We cannot and will not substitute process for vision, unreliability for consistent support, bureaucracy for transparency, and administration for management. Coherence and cohesion shall be maintained, and enhanced.

International commitment to agricultural research remains in place. There has been a renewed interest in agriculture and rural development since the Lucerne Ministerial-Level Meeting. Many others share both our compassion and our optimism. Let us reach out to them. We have begun to do so in several ways. Our membership drive is rapidly turning the CGIAR into a fully South-North enterprise. After MTM96, sixteen of our fifty-two members will be from the South, up from zero in 1971. That characteristic must permeate every component of the CGIAR, demonstrating our sense of inclusion. The CGIAR is no longer one of the world’s best-kept secrets; but that is not enough. The CGIAR must become one of the world’s best-known examples of human achievement.

The past twenty-five years were a period of strenuous endeavor and also of great accomplishment. The years ahead will be no less arduous, no less significant, no less satisfying. So let us recommit ourselves to the ideals that have sustained us, and to the scientific efforts that have sustained others. In our commitment lies the seeds of hope for the disadvantaged and deprived of today and tomorrow.

Inspired by the record of the past twenty-five years and strengthened by renewal, we must face the future with hope, determination, and confidence in ourselves and our partners, however formidable the challenges of today and tomorrow might be. The magnitude of the tasks ahead seem awesome; but heights can be conquered, problems surmounted if, as a young American poet urged in another context, our spirits are ever-soaring, chasing heights swept by the winds of passion and promise, until we can one day say to those who will not dream and dare that we have:

*Soared where neither lark nor eagle flew...*
*Done a hundred things you have not dreamed of...*
A STAPLE FOOD IN INDIA, PIGEONPEA IS THE MAJOR SOURCE OF PROTEIN FOR HUNDREDS OF MILLIONS OF VEGETARIANS. FOR CENTURIES, PIGEONPEA HAS HAD A CRUCIAL ROLE IN SUSTAINING AGRICULTURE IN RAINFED, SEMI-ARID FARMING SYSTEMS. BESIDES ITS USE AS FOOD, IT IS ALSO A MAJOR SOURCE OF FIREWOOD AND LIVESTOCK FEED. ICRISAT PLANT BREEDERS, WORKING IN COLLABORATION WITH NATIONAL SCIENTISTS, HAVE DEVELOPED A HYBRID PIGEONPEA, ICPH 8, WHICH HAS A 30 TO 40 PERCENT HIGHER YIELD THAN CONVENTIONAL VARIETIES.
The birth of the CGIAR in 1971 provided both an organizational structure and a well-defined mission for international agricultural research designed for the public good. Prior to the CGIAR’s founding, there were several important initiatives in international cooperation in farm research. Research networks, such as the International Wheat Rust Nursery organized by the United States Department of Agriculture, played a valuable role in promoting symbiotic partnerships in the control of important diseases. International explorations and collections of genetic resources, such as the Commonwealth Potato Collection, helped national research systems obtain donors of resistance to biotic and abiotic stresses. FAO’s locust control program proved the effectiveness of organized collaboration in preventing the spread of serious pests.

While all of these initiatives were important, it was the efforts of the Ford and Rockefeller Foundations in organizing international agricultural research centers, starting with the establishment of IRRI in the Philippines in 1960, which really brought to light the power of a critical mass of mission-oriented, interdisciplinary science in solving the chronic problems of food insecurity and famine. In 1965 the two foundations converted a Rockefeller Foundation-sponsored program on the improvement of maize and wheat in Mexico into a well-organized international center—CIMMYT. Two more international centers—IITA in Nigeria and CIAT in Colombia—were also organized during the 1960s.

The history of the wheat and rice revolutions in Asia, triggered by the high-yielding varieties developed at CIMMYT and IRRI, is not well known. The factors which led to the transition of the Indian food economy from the position of “basket case” to one of “bread basket” have been chronicled in the book, *The Wheat Revolution—A Dialogue*.¹ The award of the Nobel Peace Prize to Dr. Norman E. Borlaug of CIMMYT in 1970 provided convincing evidence of the role of international agricultural research in promoting a hunger-free world.

**The Birth and Growth of the CGIAR**

Warren Baum has documented the history of the CGIAR in his book, *Partners Against Hunger: The Consultative Group on International Agricultural Research*.² He described the role of the Bellagio meetings in
articulating the vision for international agricultural research. The donors who decided to bring the CGIAR into existence in 1971 made four important decisions which led to the phenomenal success of this unique organization.

First, the CGIAR was designed as a non-bureaucratic, flexible organization with no written constitution, but with members coming together with a shared concern for the problems of hunger and poverty, and a shared commitment to provide sustained financial support to international agricultural research centers established with a clear vision and mission.

Second, the founders of the system decided to build on the model of the Ford and Rockefeller Foundations of institutional structure and to ensure the autonomy of centers under boards of trustees. Linking autonomy and accountability at the institute level provided an enabling environment for creative and socially relevant research.

Third, the support structures designed to ensure adequate financial support and policy and technical oversight helped to accelerate rather than hinder progress. The formation of a Technical Advisory Committee, and the location of the CGIAR Secretariat in the World Bank and the TAC Secretariat in FAO, the formation of a core cosponsor group (initially consisting of FAO, UNDP, and the World Bank, and now including UNEP), and the organization of an annual International Centers Week to monitor progress and to effect midcourse corrections were all acts of foresight and vision.

Finally and most importantly, it was agreed that support for the centers should not be at the expense of support to national agricultural research systems, since it was realized even then that the stronger the NARS, the greater its capacity to benefit from the work of the centers. It was also decided that the centers should, as a rule, be located in developing countries, unless there were special reasons or advantages to locating them in industrial countries, as was the case with IFPRI, IPGRI, and ISNAR.

I have watched with admiration the CGIAR system develop during the last twenty-five years. Prior to the establishment of the CGIAR, Indian agricultural scientists had extremely beneficial collaboration with IRRI and CIMMYT, a partnership whose fruits led to the coining of the term “green revolution” in 1968 by Dr. William Gaud of the United States Department of Agriculture. In 1971, I was invited to serve as Vice Chair of the first
TAC, when Sir John Crawford was Chair. In 1975, I served as the Chair of the quinquennial review of IRRI, the first of its kind to be undertaken by the CGIAR. Since then I have served as Board Chair or Trustee of several centers, and also as Director General of IRRI. Therefore, the balance sheet I shall attempt here is based on a fairly close interaction with the system at different levels during the past twenty-five years.

**THE CGIAR: A TWENTY-FIVE-YEAR BALANCE SHEET**

**Beneficial Impact on Food and Livelihood Security**

The significant contributions the CGIAR has been able to make to strengthening global and national food security systems and to improving the livelihood security of farm families with smallholdings and those living in arid and semi-arid environments can be grouped into seven broad categories. The findings I have chosen are illustrative and not exhaustive.

**New Ideas and Concepts**

The plant type concept developed and promoted in wheat and rice, to enable the plant to respond to good water and soil fertility management, had a far-reaching impact on the productivity and production of these two major staples in developing countries. High-yielding varieties of these and other crops have helped to promote a climate of confidence in the human capacity to build a sustainable global food security system.

Another major concept first developed for wheat, and later adopted for several other crops, was the value of “shuttle breeding” for incorporating the character of photo-insensitivity in crop varieties. Growing different hybrid generations under diverse environments for the purposes of selection has proven to be an effective method of developing varieties with broad adaptation.

Similarly, several other findings in land, water, and pest management, and the analysis of constraints and consequences in relation to new technologies and policy research, have had great influence on contemporary agricultural research methodologies and strategies. It is also important to recognize that the research done in the mandate crops of the centers has had a ripple effect on other crops and farming systems. This helped to
impart a higher degree of scientific excellence and relevance in the work of many NARS in both developing and industrial countries.

Interdisciplinary Research

CGIAR institutions have demonstrated clearly the value of multidisciplinary, mission-oriented research in both finding solutions to complex field problems and in accelerating the pace of progress in reaching the desired goal. Most centers were able to make a significant impact on science and society within a few years after their establishment only because of their ability to mobilize interdisciplinary science and inter-institutional collaboration to study and solve problems on a system basis. This approach of harnessing science for solving a problem rather than for worshipping a discipline has had far-reaching influence on the research strategies of NARS.

Social Science and Policy Research

The work of the centers, and particularly of IFPRI and ISNAR, has shown the vital role of the integration of social, biological, and physical sciences in moving agriculture forward. The human dimensions of the problem, including the very important component of gender equality, often tended to get ignored under a “technological quick-fix” mind-set. Fortunately, centers have tried to integrate social science research with mainstream technological activity, so that the packages of services and public policies, needed for providing the substrate conditions under which new technologies can strike roots and help to achieve the desired impact, also receive concurrent attention. Quite often, production programs initiated without attending to the preconditions essential for success, such as rural communication and energy supply, land leveling and consolidation, water harvesting and management, input and output pricing, marketing, and land ownership and tenurial relationships, come to grief.

Networking

The work of several centers has demonstrated that, irrespective of the individual strengths of NARS, the collective strength of NARS and their partner centers can be considerable. It is this collective strength, whether it be in the case of new material, or management practices, or public policy formulation, which has helped to rapidly spread the benefits of new
technologies. The networks of the centers have by and large been very successful, since all partners see benefits for themselves. Above all, such networks, which often involve traveling workshops, have helped to foster a spirit of cooperation and personal rapport among scientists working on a crop or a common problem, irrespective of political frontiers.

*Capacity Building and Organization and Management of Research for the Public Good*

The work of the centers has demonstrated that, without an adequate research and training backup, the success of large agricultural development projects will be short lived. As mentioned earlier, the stronger the NARS, the greater is the benefit it derives from the centers. This realization, in turn, has stimulated governments of developing countries to accord greater social prestige to agricultural scientists and to provide enhanced financial support to national agricultural research, education, and extension programs. ISNAR, in particular, has been playing an effective role in strengthening the management of NARS. Training has always received high priority in the work of the centers, and today CGIAR alumni constitute a dominant force in shaping the global agricultural destiny.

With the integration of environmental sustainability considerations in the research agenda, it has become obvious that location-specific and participatory research with farming families is vital for achieving sustainable advances in the productivity and profitability of major farming systems. Hence, the CGIAR’s role in strengthening NARS, either directly or indirectly, can be regarded as one of its most enduring contributions.

*Fostering Coalitions of the Concerned*

The CGIAR has been instrumental in bringing about several valuable coalitions for organizing research for the public good. Notable among them are the alliances between advanced laboratories working on frontier science both in industrial and developing countries and centers, on the one hand, and the specialized agencies of the United Nations and centers, on the other. The collaboration between IRRI and the Rockefeller Foundation in organizing the Rice Biotechnology Network is a good example of the value of the involvement of advanced scientific institutions in solving chronic food problems. The CGIAR-FAO partnership, in dealing with the complex issues of equity in sharing the benefits of genetic conservation,
evaluation, and utilization, illustrates how centers can contribute to the implementation of the decisions made at inter-governmental forums.

_Filling the Gaps and Reordering Priorities_

Finally, the process of continuous self-evaluation, adopted by the CGIAR system from its very inception, has helped to fill major gaps in ongoing research efforts at the global and national level. For example, the very first institute established after the founding of the CGIAR was ICRISAT, to serve the needs of semi-arid, rainfed areas characterized by agricultural instability and poverty. ICRISAT came into existence within nine months of the establishment of the CGIAR. ICRISAT, together with ICARDA, established a few years later, addressed the research challenges of ecologically and economically handicapped farm families.

The inclusion of IIMI, ICRAF, and ICLARM into the CGIAR system, and the establishment of CIFOR, have helped centers to introduce a farming systems and agroecological perspective in agricultural research. These steps have, in turn, stimulated the adoption of a farming systems approach in the research strategies and organizational structures of NARS. Without such an approach, the two major threats to sustainable food security, namely degradation of the natural resource base and growing rural poverty and unemployment, cannot be addressed.

While the above are just a few examples of some significant beneficial transitions in agricultural research and development brought about by the CGIAR during the last twenty-five years, there have also been some major concerns worthy of mention.

_Concerns_

The major concerns expressed by several developing countries and by non-governmental organizations with reference to the research strategies and contributions of the CGIAR fall under seven major categories. I would like to refer to them briefly.

_Ecology_

Much has been written about the dangers of genetic homogeneity, excessive use of mineral fertilizers and chemical pesticides, and the prob-
THE DEVELOPMENT OF SIMPLE, COST-EFFECTIVE, AND RELIABLE CRITERIA AND INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT IS ONE OF CIFOR’S IMPORTANT GOALS. THIS WOMAN, ON HER WAY TO MARKET, IS FROM APPOISSO, A COMMUNITY IN EASTERN CÔTE D’IVOIRE, WHERE THEY ARE EXPERIENCING PRESSURES FROM NATURAL POPULATION INCREASE, FROM MIGRATION INTO THE COMMUNITY, AND FROM NEW, STRICTER ENFORCEMENT OF FORESTRY LAWS. SHE IS ONE OF MANY COMMUNITY MEMBERS CIFOR SCIENTISTS ENCOUNTERED DURING A FIELD TEST OF THE SOCIAL ELEMENTS OF SUSTAINABLE FOREST MANAGEMENT.
lems of soil degradation and groundwater pollution associated with high-yield technologies. Several of these concerns are genuine, and, in later years, centers have developed and actively promoted techniques such as integrated pest management and integrated soil health care. The largest global ex situ collection of crop genetic resources, which is also value-added in terms of information, is also a contribution of the CGIAR. This is a contribution of inestimable value to safeguarding the future of global food security.

Equity

The green revolution technologies have been described by some as having built-in seeds of social discrimination leading to the rich getting richer and the poor getting poorer. Since inputs are needed for output, those who have no access to credit or water or other production inputs will not be able to take advantage of new technologies. It is now widely realized that the solution to this problem does not fall in the realm of science, but in resource-poor, farmer-oriented public policies. Countries which have not promoted active agrarian reform leading to the poor having access to production assets like land, water, credit, new skills, and markets will certainly deny the resource-poor farming families the technological opportunity to enhance productivity and, thereby, household income.

The gender insensitivity of the CGIAR’s research agenda during the 1970s has been a subject of criticism. This situation changed dramatically with IRRI’s initiative in 1983 to promote organized research related to women in rice farming systems.

Economics

Farmers make decisions both on the choice of technologies and on investment in inputs based on the cost-risk-return structure of a particular farm enterprise. Where investment is high, the risk is also high, particularly in regions prone to floods, drought, and cyclonic storms. The resource-poor farmer chooses risk-minimizing technologies, while those with resources prefer profit-maximizing technologies. Scientists face the challenge of achieving reduction in the cost of production without lowering yield, while public policymakers should introduce the necessary credit, marketing, and insurance policies which can enable all farmers, irrespective of their innate input-mobilizing and risk-taking capacity, to derive benefit from technological progress. At the same time, centers can help to enhance farm income and employment
by adding to their research agenda the triple goals of environmentally sustain-
able yield intensification, market-driven farming systems diversification, and value addition to every part of the biomass. There is currently a mismatch between production and postharvest technologies in the research priorities of both centers and NARS. Unless the mismatch is ended, neither producers nor consumers will benefit fully from higher yields.

Energy

The birth of the CGIAR coincided with an era of escalating fossil fuel energy prices. Several articles entitled “The Death of the Green Revolution” appeared in the media during 1972 to 1975. Farmers, however, proceeded vigorously with the adoption of new technologies, with the result that the pace of agricultural progress was not only not inhibited, but was accelerated. For example, India’s wheat production, which was about 20 million metric tons at the time the price of petroleum products went up in the early 1970s, has now reached a level of 65 million tons.

The increase in the cost of inputs derived from fossil fuel-based feed-
stocks stimulated centers and NARS to intensify research on energy use efficiency [I am using the term energy in a generic sense, including fertil-
izers and pesticides], and on substituting renewable and farm-grown bio-
logical energy sources for petroleum-based inputs.

Ethics

In an address to the FAO General Assembly in 1983, delivered in my capacity as Independent Chairman of the FAO Council, I urged that: “We should avoid eternally living rich and talking poor.” This principle applies equally to the CGIAR. There is a genuine feeling among NGOs that the CGIAR has not been aggressive enough to prove its “pro-poor” mandate at the field level. There is also the feeling that gender and social equity have not been high on the agenda of many centers, since their concern has been more on commodity production than on the equitable distribution of economic benefits.

Regional Imbalances

In the coming millennium, the food security challenge is more likely to be national and regional, and less global. It is in this context that there
is concern about the situation in Africa, where many countries have not managed to improve their food situation, in spite of the work of the centers. It is becoming clear that such a situation can be altered only through more location- and culture-specific technologies and public policies.

Unevenness in the Control of Policymaking Bodies

A growing concern relates to the uneven distribution of key positions like TAC and Board Chairs, Directors General, and senior staff, with an unduly large proportion going to industrial countries. This has resulted in the demand for the UN principle of “one country-one vote” in the governance structures of the CGIAR.

MALTHUS AND THE CGIAR

In 1798, when Thomas Malthus warned about impending famines due to an adverse balance between population and food supply, the global population was about 920 million. This is the population of India today. More than 86 million people are likely to be added to the world’s population every year, taking the global population to nearly 8 billion by the year 2020. Nearly 50 percent of them will be living in urban areas, with a higher consumption capacity and more diversified food habits. IFPRI’s 2020 Vision for Food, Agriculture, and the Environment indicates that the challenge of feeding 8 billion people can be met, provided investment in agricultural research for the public good is enhanced, and provided research is supported by appropriate public policies and programs in the area of training, techno-infrastructure, and trade.

The steps taken during the last three years to “re-engineer” the CGIAR, both to maximize its impact and effectively address the concerns I have listed, indicate that the CGIAR will continue to be the flagship of the “Science for Sustainable Food Security Movement.” The major aim of the re-engineered CGIAR should be to promote an “ever-green revolution” based on a pro-nature, pro-poor, pro-woman, and pro-employment orientation to technology development and dissemination.

The CGIAR has been a major factor in keeping the Malthusian specter of food scarcity at bay during the past twenty-five years. With the continued commitment of donor nations to supporting international agricultural research designed for the public good, and with enhanced alloca-
tions for national agricultural research and extension systems by developing countries, the long-cherished goal of a hunger-free world need not remain a dream. According to experts like Lester Brown, 1996 may mark the beginning of an era of dwindling grain stocks and escalating food-grain prices. There is, thus, no time to relax, and “we have to run twice as fast to stay where we are.” The CGIAR’s mission and programs remain not only as relevant today as they were twenty-five years ago, but are even more urgent and significant under the prevailing conditions of gross economic and gender inequity, where “orphans will remain orphans” in terms of scientific priorities unless conscious efforts are made to orient science for the public good.

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*seventy-five*
Daniel Marchena, President of the El Chaupi Association of Agricultural Producers near Vilcabamba in Ecuador’s Loja Province. One of the association’s main activities is the production of high-quality seed of improved common bean varieties. In establishing this small-scale enterprise, the association received technical support from the CIAT-sponsored Regional Bean Project for the Andean Zone (PROFRIZA), funded by SDC. The support was channeled through Ecuador’s National Institute of Agricultural Research (INIAP).
What a pleasure it is to be asked to share recollections of the start and early years of the CGIAR, which I served as the first (designated) Chairman and which is now celebrating its twenty-fifth birthday. The current participants in what has become the world’s principal sponsor and coordinator of international agricultural research will doubtless find it difficult to appreciate the excitement and trepidation with which my colleagues and I awaited the initial meeting of the CGIAR two and a half decades ago. We had no mandate to guide us and no precedents to rely on for organizing and operating what, at the time, was a unique gathering of diverse and powerful members. Although we were then dealing with only four existing centers, with annual financial requirements of around $10 million, we faced a number of difficult issues the solutions to which were far from clear. Yet, despite our fears and uncertainties, the start made by the Group at that first meeting laid solid foundations for the remarkable entity we know today.

In thinking back to those early years, the first thing that comes to mind is the outstanding character of the personae involved: George Harrar, Dave Bell, Frosty Hill, Sterling Wortman, Ralph Cummings, and Lowell Hardin, among others, from the Ford and Rockefeller Foundations, the originators of the wonderful center concept; Norman Borlaug, Bob Chandler, and many other outstanding scientists, who proved that the center concept worked; John Hannah from USAID and Bill Mathiessen from the UK ODA, who provided critical financing; the late, beloved Jim Evans, Director of the World Bank’s Agriculture Department, and Mike Lejeune, of the Bank staff and the CGIAR’s first Executive Secretary; Myer Cohen and Bill Mashler from UNDP and Peter Oram from FAO, the Bank’s fellow cosponsors; and always Sir John Crawford, Chair of TAC, who provided constant and stalwart support.

The second thing that comes to mind is the remarkable cooperative spirit that permeated the several meetings of the CGIAR which I was privileged to chair. Members wanted the Group to succeed and joined together to find innovative solutions to problems which might otherwise have caused divisive debate. They did this with an extraordinary informality that permeated all of our meetings. I can recall no other official grouping in which the participants were so united to achieve a common goal.

We did have a number of difficult problems. One was, of course, representation of the developing countries. Another was whether to establish
a central fund to finance the Group’s sponsored research or to function through voluntary coordination by participating donors. A third which I recall was how to deal with the political sensitivities raised by a request for support from a vegetable research center located in Taiwan. And there were procedures to establish for reviewing the budgets of the system’s centers, while still maintaining the necessary independence and authority of their boards of trustees for analyzing proposals for new programs, and formeshing the deliberations of TAC and of the CGIAR. All of these issues, however, were resolved harmoniously.

The Group had a number of substantive achievements, too, during those early days. I remember with particular satisfaction the decisions to accept CIP into the system and to establish as new entities ICRISAT, ILRAD—now ILRI, and IBPGR—now IPGRI. Their many accomplishments to date have contributed much to the CGIAR’s success.

A final word on a more personal note. In 1973, when I turned over the chairmanship to the highly competent hands of my successor, Warren Baum, I knew I had just completed the most rewarding assignment of what had been an altogether fascinating twenty-seven-year career at the World Bank. The CGIAR has more than fulfilled the hopes which I and my colleagues in the Bank, UNDP, and FAO had when it started twenty-five years ago. May it continue to flourish for many years to come.
The Evolution of the CGIAR

My introduction to the CGIAR took place at the Virginia farm of Haldore Hanson, then-Director General of CIMMYT, in October 1974, immediately before my inaugural session as Chairman of International Centers Week. I was struck by the collegiality of those present (mostly agricultural scientists) who knew each other well, from their common educational backgrounds at Cornell or Iowa State University or their association with the Rockefeller or Ford Foundations. It was the first time I felt that my graduate education at Harvard University placed me at a disadvantage! I was also struck by their down-to-earth and friendly spirit and the warmth of their welcome to someone of whom they knew nothing except that he was clearly of a different breed—a warmth that never flagged in the ensuing years.

The CGIAR was then three years old, and all of the component parts were already in place. It was off to a strong start under the capable leadership of the Group and TAC Chairs, Sir John Crawford and Ralph Cummings, both highly experienced, and with the full support of the two foundations.

In the next ten years the CGIAR went through a whole cycle of activity. By the end of 1973, three additional centers (ICRISAT, CIP, and ILRAD—now ILRI) had joined the original four. In the next three years, through 1976, four more centers were added (IBPGR—now IPGRI, WARDA, ILCA—now ILRI, and ICARDA). Some of these were already in existence; others were the fruits of studies launched at Bellagio in 1970. The total now stood at eleven, with several additional centers or programs denied admission because of their location, the character of their programs, or other considerations. The years 1977 to 1979 were officially designated as a period of consolidation, during which no new activities were adopted so that the existing centers, and their mounting financial requirements, could be absorbed. Work proceeded, however, on new proposals, and ISNAR became operational in November 1979, precisely at the end of the period of consolidation.

IFPRI, which presented several unique problems, was accepted the second time around, in 1980. This brought the number of centers to thirteen, where it was to remain for ten years. Worldwide economic difficulties beginning in 1980 had their impact on the financing of the system, introducing a period of constrained resources with serious issues of resource allocation, which continued far beyond my tenure.
The growth in the number of donors, and in the funds provided, followed a similar pattern. In 1972, the CGIAR’s first full year, sixteen donors contributed $21 million. In 1974 the number of donors stood at twenty and their contributions at $35 million. Ten years later, at the end of the period I am discussing, there were thirty-five donors and the funds contributed were $165 million. Funding increased in nominal terms every year, and in real terms every year but one. By any standard, the first thirteen years were ones of impressive growth, despite the slowing down and maturing of the system.

From the beginning my principal preoccupation was how this novel enterprise was to be governed. Early references to the CGIAR as a “forum,” “an arrangement for consultation,” or “a loose federation of centers” were disingenuous and undoubtedly aimed at placating the doubters. The term “Consultative Group” was itself something of a misnomer, since it bore little resemblance to the Bank-chaired Consultative Groups from which it drew its name. For an international activity that immediately began to function on its own, the organizational structure and procedures were extraordinarily loose and informal. Decisions had to be made without any voting system, and none was ever devised; these decisions had to be binding within an organization that had no legal identity; and funds had to be pledged and commitments honored without any method of cost-sharing, since as in the case of voting, no formula could fit so diverse a collection of international, regional, national, and private donors. Under other circumstances, these characteristics could be a recipe for failure, but for the CGIAR they have generally been sources of strength.

Decisionmaking by consensus presented a continuing challenge to one steeped in the hierarchical traditions of the World Bank. But even the largest donors seemed to enjoy the collegial and egalitarian spirit. My task was to ensure that the necessary staff work was done in advance; to lead (but not manage) the discussion in an impartial manner, allowing everyone who wished the opportunity to speak, while moving the discussion along; and then to identify and formulate a consensus that could command majority agreement or general consent, without ever defining the “majority,” and implicitly recognizing on rare occasions that all donors were not created equal. Committees were established only for special purposes; the donors preferred to act as a Committee of the Whole, from which no one was excluded. I, too, felt that this was appropriate, even though it made the job more difficult.
The TAC Chair, who was always respected, played a major role in presenting issues such as consideration of new centers, research priorities, and center programs and budgets. The three cosponsors, including a World Bank representative separate from the Chair, always provided support, often behind the scenes, and a legal foundation to the whole enterprise. Goodwill, based on a common perception that an important and clearly focused objective was being effectively pursued, was the amalgam that made all this possible.

Fundraising, a particular responsibility of the Chairman, was one to which I did not look forward. But as the international character of the CGIAR became increasingly apparent, I found that I, often accompanied by the TAC Chair or one or more Center Directors, took pride in recounting its success story, usually to a receptive audience. I believe that many donors contributed more generously then they would have under a quota system. The public process of voluntary pledging exercised some moral suasion. USAID held steadfast throughout these years at the 25 percent share that John Hannah had promised in Bellagio, and this combined with the World Bank’s 10 percent, later raised to 15 percent, provided a financial anchor. Even during the period of financial stringency, the CGIAR fared well compared with other aid activities.

Frosty Hill and George Harrar had established IRRI and CIMMYT as models of “international centers of excellence,” with an independent staff of internationally recruited scientists reporting to an autonomous and international board of trustees. Donors all agreed that the independence and autonomy of the centers were to be prized and preserved. But autonomy had to be reconciled with accountability. The foundations had once provided this stewardship, but now accountability became a major preoccupation. The ever-growing number of donors had to be satisfied, to satisfy their parliaments, that their contributions were being used wisely and productively. Over time a comprehensive system of reviews was introduced, including: annual program and budget reviews of each center; quinquennial program reviews of each center, starting appropriately with IRRI and then CIMMYT; periodic management reviews of each center; five-year reviews of the CGIAR system itself; “stripe” reviews of across-the-board issues; and several studies of the development “impact” of the collective work of the centers. The list seems formidable, and Center Directors and Board Chairs may have found it so, but it met the needs of the donors.
What were my regrets? That, despite the growing number of developing country donor members, we were not able to increase sufficiently the participation of the South at group meetings, representation through the UN regions not having proved successful. That we were not able to bring the practice of donor-financed “special projects” under better control. I thought that our efforts at annual aid allocation through program and budget reviews left something to be desired, but then I have never met a program and budget review system that I liked. While we were certainly aware of environmental concerns, it was not to the extent that is prevalent today.

What did I enjoy most about my CGIAR experience? Many things come to mind, but particularly: enabling the CGIAR to win the King Baudouin Prize; receiving the beneficent title of “Chairman Emeritus” on retiring; having the opportunity, thanks to a World Bank sabbatical, to write *Partners Against Hunger*, with a fellowship from the Rockefeller Foundation to work as a “resident scholar” at Bellagio; and a handwritten note from the ailing Frosty Hill enthusiastically welcoming the book’s publication. But above all I valued the occasional comments of participants that CGIAR meetings were the international gatherings that they liked most (sometimes the only one!) since they gave me some assurance that the collegial spirit had not been lost during the decade in which the CGIAR came of age.

Others are better equipped than I to talk about the future, but the broad outlines seem clear. The experts inform us that food production will have to double by the year 2025 to keep pace with the inexorable growth of population. Most of this increase will have to come from existing land. Research must play a vital part in making possible the necessary increases in productivity. The CGIAR, now renewed and revitalized thanks to the efforts of its present Chairman, remains strategically placed to play a central role.
FROM “HUNTING” TO FARMING FISH

Within fifteen years, fish farming and sea ranching could provide nearly 40 percent of all fish for the human diet and more than half of the value of the global fish catch. Fish is the fifth most important agricultural commodity and accounts for 7.5 percent of total world food production. More than one billion people in developing countries depend on fish as their primary source of animal protein.

Global fish catches increased five-fold between 1950 and 1989 to some 100 millions tons, but overall production has stagnated since then as fishers have exhausted new sources of supply. Nine of the world’s seventeen major fishing areas are in serious decline, with four depleted commercially. The main reason is too much fishing.

Between aquaculture and captive fisheries there is a great range of technologies whose possibilities have barely been tapped. These include: sea ranching; the capture and resettlement of fish larvae; and marine feedlotting. A number of examples demonstrate the opportunities possible in cultured fish, including: breeding improved tilapia fish; cultivating giant clams; and seeding sea scallops spat into the natural environment.

ICLARM believes that one of the best ways to expand aquaculture in the developing world is to integrate fish farms with land-based agriculture, improving both in a process called Integrated Resource Management. IRM brings farmers and scientists together to transform existing small-scale farms into integrated agriculture-aquaculture systems. IRM seeks to develop systems for “new entrants” into aquaculture among the poorer groups of farmers in less favorable environments, and to rehabilitate water sources and increase incomes and food security of small farmers.

Excerpted from CGIAR Press Release May 14, 1995
ITA scientists have overcome a major threat to plantain cultivation by developing new varieties from a cross between plantain and a wild banana. These are resistant to the devastating black sigatoka leaf spot disease which reduces bunch yields by 30 to 50 percent. After a period of widespread and successful evaluation at testing sites in major plantain and banana growing regions, extensive distribution of the new varieties to farmers will take place in three target countries—Ghana, Nigeria, and Uganda—during 1997 to 1998.
The Consultative Group on International Agricultural Research is perhaps the most successful development initiative of the last fifty years. It has brought together scientists, research centers, foundations, international organizations, and governments in developed and developing countries to increase food production in developing countries. The results are beyond the expectations of its founders. The international research centers have made an invaluable contribution to the impressive increase in food production and rural employment in developing countries, particularly in Asia. They have helped to prevent mass hunger, considered inevitable as recently as in the early 1970s.

The work of researchers is never done. So is it with the CGIAR and the centers supported by it. Population continues to grow rapidly in developing countries. The strain on natural resources is heavy. Progress on African agriculture and arid and semi-arid lands is inadequate. Above all, our physical capacity to produce is increasing faster than our social and organizational capacity to manage, and deal with the consequences of, physical change. The risk to developing countries is that the current fatigue with international development efforts may weaken the capacity of the invaluable system that has developed during the last twenty-five years. A coordinated effort is needed to maintain the CGIAR’s strategic focus on food while incorporating in its work the crucial issue of the environment. We must, at all cost, resist the temptation for proliferation.

I have worked on development issues for nearly forty years. Nowhere else have I seen the skills and dedication that the scientists of the CGIAR system have brought to bear on their endeavor. My four years as Chairman of the CGIAR were the most stimulating and rewarding years of my working life. I admire the strategic vision of Robert McNamara and Sir John Crawford in sponsoring the establishment of the CGIAR and supporting its work. As one from a developing country, I am deeply grateful to them and to the many others who have contributed to our system.
When CGIAR Chairman Ismail Serageldin asked me to prepare a few brief remarks for this twenty-fifth anniversary occasion, I found myself with two temptations: to reminisce about the past—something former Chairmen love to do—or talk about my vision of the future as “guidance” to the present Chairman. With a strong exertion of self-will I have resisted either temptation and have done both.

While we now celebrate the twenty-fifth anniversary of the CGIAR, it is an anniversary in the formal sense only. In fact, the CGIAR had its beginnings almost four decades ago by one count, or over fifty-three years ago by another. CIAT, CIMMYT, and CIP emerged in the 1960s as new incarnations of old Rockefeller Foundation programs, whose origins can be traced to 1943. These institutes, in their new guise, reflected a 1957 joint enterprise between the Rockefeller and Ford Foundations to jump-start global food production. The formal institutional structure began with the first of the Ford and Rockefeller joint ventures: IRRI. It was designed in 1958 and opened in 1962. By the mid-1960s the joint venture had been followed with three additional institutes: CIMMYT; CIAT, from older Rockefeller Foundation initiatives; and IITA, a new venture in tropical Africa. By the late 1960s the research findings and newly released varieties from these four institutions, supported by appropriate governmental policies, had launched a transformation in food agriculture from traditional agrarian to modern, science-based, intensive crop production in South and Southeast Asia and in parts of Latin America.

The influence and promise of the joint venture, coupled with a still disquieting longer-term outlook for world food, led the foundations to seek a wider inclusion of donor participation. With the added sponsorship of UNDP, the World Bank, and FAO, the leaders of the major donor agencies met in 1969 at the Rockefeller Foundation’s Bellagio Conference Center to review the global prospects for agricultural development in the tropics. By mid-1971 the CGIAR was launched at the World Bank under the sponsorship of UNDP, FAO, the World Bank, and an initial group of just over twenty donors.

The new CGIAR was a lusty infant. The friendly takeover by the CGIAR of the joint venture institutes gave it a spectacularly successful worldwide research establishment—an establishment that grew quickly under the new management.
It is fair to ask what this close to fifty years of history has brought to those who built the substructures and now support the CGIAR.

In my view the most important accomplishment of the second half of this century was the work of joint venture and CGIAR scientists in raising the yield potential of the world’s major cereals in the tropics to the levels of those attained during the first half of the century by agricultural scientists working in the temperate regions—levels that were double or quadruple traditional tropical yields. Innovative farmers did the rest. They were backed by the enlightened help of imaginative governments with the necessary institutional and infrastructural support for their innovation.

Farmer, private sector, and government willingness to grasp and subdue the risks of change together assured the daily bread and bowl of rice for a world population that has almost trebled in the last fifty years. Not a small accomplishment! And one that can be attested to by hundreds of millions of people who have never heard of the CGIAR.

This is the past. My real concerns in this note are the next fifty years. Global population will double, food demand will more than double as people shift their consumption patterns to higher-value foods that concentrate and convert large quantities of carbohydrate into protein, or claim acreage from cereals for vegetables, fruits, and other, more exotic, food products. Is there a role for a CGIAR system in this environment?

I think some of the founders of the CGIAR would argue that there is not. A rapid doubling of the “pile of rice” was the founding focus of the earlier joint venture and the CGIAR system. It was a focus that stressed the short- and intermediate-term; the meeting of the food needs of poor people within a ten- to fifteen-year horizon. And while it was a focus that today draws the occasional outburst of ire from those who see the single-minded pursuit of enhanced yield as a threat to the sustainability of the natural environment that is cultured for food production, the CGIAR has already moved a considerable distance beyond this early purpose with the inclusion of “factor” or “input” or “system” centers among the “crop” or “production” or “output” centers. But this concern aside (for that is how the founders would probably view it), what, now, is needed for the CGIAR scientists to justify their continued claim as the frontierspeople of tropical agriculture?
To me the overwhelming answer is not Asia, or Latin America; it is Africa, and especially Sub-Saharan Africa. This gigantic landmass is the only region in the world where food production per capita is falling. Here our science has been found wanting. Except for some limited agroecological areas with favorable soils and rainfall, we do not have the technology to back the innovative farmer. In addition, too often even in these limited areas, a lack of infrastructure, available factors of production (including credit), and vibrant product markets militate against any cultivator incentive to risk resources on a proffered new technology.

The CGIAR magic has yet to prove itself in Africa. Providing that proof must and should be the major focus for the Group in the early decades of the next century.

The Sub-Saharan problem is fraught with issues of neglected rural development. For many African intellectuals there is a dismaying sense that their countries have come to the table of international assistance “too late” to benefit from the largess that was lavished on Asian agricultural and concomitant rural development. Tight aid budgets from the industrial nations predispose these observers of Africa’s food outlook to argue that there must be an emphasis on agricultural development that is based on low inputs to crop production and low inputs to the infrastructures needed to promote rural development.

The present Director General of FAO, however, articulates arguments to this outlook that many of us who participated in or witnessed the Asian agricultural transformation would support. I recall a comment Dr. Jacques Diouf made two years ago on the occasion of the launching of the FAO Special Programme for Food Security in Low Income Food Deficit Countries: “We have tried the low input approach for several decades and it has brought us only a 2 percent decline in food output per person. That approach must be reversed. In the immediate-term we must focus on the areas of high production potential for which we have proven technologies. We must assure the farmers of these areas the full array of inputs and policies that will support their adoption of a modern, science-based system of intensive crop and livestock production. And, for the longer-term, we must develop the technologies that will bring a true transformation of agriculture to the whole of the African continent and to the other world nations that are food deficit because of lagging or backward agricultural and rural economies.”
The Special Programme has already revealed many nuances of the constraints to the agricultural advance in food deficit African and Asian nations. For these nations, most of which are part of Sub-Saharan Africa, the help of the CGIAR frontiersmen is an imperative need. Indeed, it is a need that reaffirms the founders’ single purpose focus.

While the immediate threat of hunger is most acute in Africa, in the longer-term of a fifty-year perspective the ability of global agriculture to meet the tripling of world food demand (due to a doubled population and a continued rise in the economic prosperity of the world’s peoples) must tax and shape the superb instrument of world food research that the CGIAR has become. The complex of sunlight-plant-water-nutrient-soil relations that are the foundation of agricultural science remains still a relative mystery. The recent CIMMYT-ORSTOM work on asexually propagated maize is a demonstration of the continued power of traditional plant breeding techniques underpinned now with the sophisticated knowledge of modern genetics and biotechnology. This combination of the traditional arts of agricultural science and the new horizons of biology, chemistry, and plant and soil sciences holds the high promise of establishing the firm scientific underpinnings that, over the next decades, will transform global food production science and technology. On this transformation rests the next “green revolution.”

In truth, we have barely begun to unlock the deep scientific secrets of food agriculture. We still cannot deliberately manipulate the most basic chemical processes of the plant: photosynthesis and carbon fixation. A doubling of photosynthetic efficiency in cereals, bringing it closer to the efficiencies attained by sugarcane, would hold the potential to more than double yields of usable carbohydrate. Greater understanding and, eventually, manipulative control of the plant’s “dark” reactions after photosynthesis could open many new paths for enhancing food production. For example, moving carbohydrate fixation from C₃ to C₄ pathways in our most common cereals would likely increase water use efficiency and provide greater drought protection. Genetically engineering the quality and composition of the protein-fat-carbohydrate components in the grain sink would open many opportunities for custom designing grains to match consumer needs. But all of these opportunities are dependent on cracking the codes of how the plant handles its most fundamental processes: the capture and conversion of daylight (the mechanism of its capture is well known) to the basic foodstuffs of humankind.
I realize that in selecting the fundamentals of photosynthesis and carbohydrate fixation I am neglecting adequate reference to pests and pathogens, to ruminants (of vital concern to both Sub-Saharan Africa and Latin America) or other ungulates, to forestry and agroforestry, to aquaculture, and even to sustainable agricultural methods and practices—all matters of interest and importance; all matters that are among the vigorous research agenda of today’s CGIAR; and all matters that will be critical in the decades ahead. But for this neglect I can only plead that, except for fisheries, the deep substructure of all that we call “agriculture” rests on this complex interaction of nucleotides, photobiology, chemical reactions, and physical designs. Understanding, unlocking, and eventually manipulating this extraordinarily complicated set of processes will be the central jewel in the crown of that “Queen of the Sciences”: agriculture.

The CGIAR at twenty-five years of age is the successful culmination of a chain of events begun five decades ago. It has brought food abundance to millions by transforming traditional agriculture in most of the world's tropical regions; indeed, all the farming areas of the globe, except for parts of Sub-Saharan Africa, have benefited from this transformation. The immediate task at hand is to determine the most effective means of modernizing the traditional agrarian food production systems of these neglected areas of Africa. However, the longer-term goal of CGIAR scientists must be to unlock the many secrets of the sunlight-plant-water-nutrient-soil relations that are the fundamental blocks upon which agricultural science rests.
HALF OF REMAINING TROPICAL FORESTS CONSIDERED AT RISK

Nearly half of the Earth’s remaining two billion hectares of tropical forest could be lost to agriculture, mostly due to harmful farming practices. Much of the remaining one billion hectares of tropical forest, on land generally not suitable for agriculture, are endangered by potentially harmful logging.

The annual rate of tropical forest loss is not diminishing, despite rising global awareness, sharply increased aid for tropical forestry, and a decade of international efforts to shape coherent global strategies for saving tropical forests. Some twenty-nine hectares of tropical forest are lost every minute, or 15.4 million hectares per year.

A major threat to tropical forests comes from poor farmers, who have no other option in feeding their families than to slash and burn a patch of forest and grow food crops until the soil is exhausted after a few harvests, which then forces them to move on to a new patch of forest. Slash-and-burn agriculture results in the loss or degradation of some ten million hectares of land per year.

ICRAF, CIFOR, and national and international institutes, NGOs, and universities have joined forces in a global effort to combat unsustainable slash-and-burn practices in a CGIAR systemwide program, Alternatives to Slash-and-Burn. In the long-run the program will help to reduce global warming, conserve forest biodiversity, alleviate poverty, and increase food security by developing sustainable alternatives to slash-and-burn agriculture. The program has research projects in the tropical forest margins of Indonesia, Thailand, Cameroon, Brazil, Peru, and Mexico.
SMALL-SCALE DAIRY FARMING NEAR EMBU, ON THE SOUTHERN SLOPES OF MOUNT KENYA. ICRAF IS WORKING TO INTEGRATE CALLIANDRA CALOTHYRSUS TREES, WHICH PRODUCE HIGH-QUALITY FRESH FODDER FOR CATTLE, ON FARMS IN THIS AREA. RESEARCH RESULTS SHOW THAT CALLIANDRA FODDER CAN INCREASE BOTH MILK PRODUCTION AND THE QUALITY OF MILK. IT IS PARTICULARLY IMPORTANT AS A SUBSTITUTE FOR DAIRY CONCENTRATE, WHICH FARMERS CANNOT AFFORD. THUS, BY GROWING CALLIANDRA TREES ON THEIR FARMS, FARMERS ARE ABLE TO INCREASE THE PRODUCTION AND/OR PROFITABILITY OF THEIR SMALLHOLDER DAIRY OPERATIONS.
At the end of my tenure as CGIAR Chairman, I said in a public address—the Sir John Crawford Memorial Lecture—that I shared the sentiments of one of my predecessors, Warren Baum, who once told me: “Of all the jobs I have had, the one I enjoyed most, the one that was most rewarding, was the one of Chairman of the CGIAR.” I left the chairmanship five years ago, when the CGIAR was commemorating its twentieth anniversary. Today, as the CGIAR looks back on the challenges, triumphs, and, of course, problems of its twenty-five-year-old history, my view remains unchanged. I will always remember the chairmanship of the CGIAR as stimulating, challenging, and satisfying.

The CGIAR is both a successful support mechanism for international agricultural research and a successful exercise in creative management of the development enterprise. It is something of a cliché now to say that the CGIAR does not actually exist. Some other institutions, too, have survived for several years without a formal charter, a legal personality, a corporate structure, or an empowered CEO. What makes the CGIAR special, however, is that, despite the loose arrangements under which it functions, it has been able to synthesize a broad range of views into a commonality of purpose that consistently supports agricultural research on behalf of the world’s poor. That commonality has endured through changes of research emphasis, structural alterations in the configuration of centers, financial uncertainties, and changes of Chairmen.

From the Chairman’s vantage position, I noted three important strengths that contributed to the effectiveness of the CGIAR. These were:

- the commitment of members who, despite divergences of views, worked at reaching consensus on major issues, and mobilized support for the centers, despite difficulties;
- the competence and enthusiasm of scientists at CGIAR centers who carried out their work with visionary zeal; and
- the analytical apparatus of the Technical Advisory Committee, which provides the CGIAR with an underpinning of options for strategy and operations.

These strengths were particularly evident and effectively combined in several key decisions that were made during my chairmanship. One of
these decisions resulted both in a new emphasis on natural resources management and on an expansion of the CGIAR system. TAC had earlier been asked to review the desirability of drawing a number of non-CGIAR centers into the CGIAR family. TAC's review was based on the premise that the CGIAR, which was initially established to help increase the productivity of tropical agriculture, should now adopt productivity and natural resources management as twin pillars of research. Following from that premise, which the CGIAR fully endorsed during a two-year deliberative process, TAC recommended that agroforestry/forestry, banana improvement, and soil and water management should be included within the CGIAR agenda. The immediate result was that some existing centers entered the CGIAR—ICLARM (fisheries), ICRAF (agroforestry), IIMI (irrigation management), and INIBAP (bananas)—and that a new center, CIFOR was established for forestry research.

These were major changes in the CGIAR research agenda. Henceforth, all CGIAR activities, including germplasm improvement designed to increase crop productivity, would be characterized by environmental objectives; for example, breeding for pest and disease resistance to minimize the use of chemicals, as well as integrated pest management where chemicals are still indispensable. The fact that CGIAR members and scientists were equally committed to transforming a strongly productivist orientation to one which gives equal emphasis to natural resources management testified to their ability to keep abreast of, perhaps ahead of, changing needs. For the revised emphasis was not simply a matter of nomenclature, but of research methodology and funding. TAC provided the foundations for a new methodology in prescribing that CGIAR-supported research should fall into two clusters: global commodity activities, and ecoregional activities. Each of these clusters was explicitly defined and described by TAC, as follows:

- **global activities** would be focused on commodities and selected subject matter areas, such as policy, management, conservation of germplasm, and the maintenance of biodiversity; and

- **ecoregional activities** would focus on applied and strategic research on the ecological foundations of sustainable production systems, commodity improvement in collaboration with global commodity activities, and interaction with national partners.
The operational and organizational significance of the ecoregional approach would be far reaching and, I gather, is still evolving.

The wisdom of the “founding fathers” in creating a mechanism for independent scientific advice, and the enduring quality of that advice, were evident in these developments. TAC is the core of the CGIAR’s analytical capacity for system options. TAC’s major responsibility is to come up with options that are scientifically sound. To do this, TAC draws together the best available talent. Under the skilled and stirring leadership of TAC Chair Alex McCalla the Committee was a source of wisdom and strength. Alex McCalla himself was a star who added his own special luster.

When consensus was reached on options presented by TAC, the onus of putting new research emphasis fell on the centers, while it was up to CGIAR members to provide the necessary support. Indeed, the continuing support of the donor community became a critical issue during my chairmanship because the CGIAR system was going through a period of expansion based on scientific criteria at a time of disenchantment with ODA. In a political world that was transforming itself almost out of recognition, many major donors had their own agendas which did not embrace international agricultural research. The diplomatic task of holding donor support for the CGIAR fell on the Chairman. I enjoyed the challenge, and very much appreciated the response of donors who, after grueling discussion, maintained their commitment. An important result of the expansion exercise was that new financial systems were introduced. These involved a balance between supporting new approaches to research and ensuring full accountability. In this situation I welcomed the effort by all concerned to pull together.

Overall, I found the CGIAR vibrant and justly proud of its achievements. It has made many changes in recent years, and will face the need for more as the development equation changes. I am confident that it will continue to be as effective in the future as it has been in the past. I wish it well.
t was with great trepidation that I accepted the chairmanship of the CGIAR when Wilfried Thalwitz passed on the gavel to me at the concluding session of International Centers Week 1991. My only direct contact with the CGIAR until then was through two visits to IRRI and ICRISAT as a World Bank staff member. I was, of course, familiar with its record of achievement, and with its formidable reputation.

Sitting through the closing stages of that International Centers Week, I asked myself what contribution a Chairman was expected to make toward continuing the achievements and maintaining the reputation. My reverie was disturbed by expressions of goodwill, congratulations, and introductions. I found myself being introduced to a number of Chairs of this board or that, including the TAC Chair. So many Chairs...and the CGIAR Chairman as well...it was somewhat bewildering. How did the role of the CGIAR Chairman differ from that of other Chairs? Was it purely ceremonial? To preside over meetings, read prepared speeches, and present awards? Or was it different—something more substantial?

As CGIAR Chairman, the briefings provided by the CGIAR Secretariat and discussions with TAC Chair Alex McCalla soon after I took over as Chairman gave me a good start. In my final address to the CGIAR I described McCalla as a “class act.” I realized that in the first few minutes of a visit with him in Davis (University of California), at that time his academic home. I found that his knowledge was as strong as his commitment was deep. Subsequently, with every visit to a center, I began to understand and appreciate better the mission, activities, and structure of the CGIAR and the major issues confronting the Group. I also began to see the Chairman’s role primarily as that of a catalyst, and realized that one could spend as much or as little time as one chose to in fulfilling this role.

From the visits to the centers I came away with some strong impressions. First, I was fascinated by the range of work done at the centers and by the dedication of the staff. Second, the staff were clearly concerned about the declining trend in overall funding and its impact on their work programs. Some rightly worried that the quality of science was being eroded by the uncertainty over funding. Scientists were also concerned about their career development. Third, the Center Directors were so engaged in resource mobilization efforts that their quality time for research management was getting drastically reduced. Fourth, the centers
were not seen by most developing countries as playing a bridging role between them and researchers in the developed countries.

However one dealt with these impressions, it was clear to me that given the collective wisdom and goodwill in the Group, certain aspects of governance, such as decision by consensus, the autonomy of the centers, and the collegial informality and nonpolitical character of the Group’s deliberations, must be protected. And so, the first steps toward strengthening decisionmaking and bolstering fundraising efforts were taken at the 1993 Mid-Term Meeting in San Juan, Puerto Rico, with the setting up of an Oversight Committee and a Finance Committee from among the members of the Group.

I also felt very strongly that it was foolhardy to try to continue to support an international, multiyear, high-quality research effort on uncertain, annually pledged funds, as has been done in the past. I strongly believed that new approaches to funding were long overdue and that vigorous steps must be taken to attract trust funds from nontraditional sources and the private sector. I appealed to the donors to make multiyear commitments and exhorted the Group to establish a Trust Fund as a stabilization mechanism. My only regret has been that my term was too short to follow-up on these initiatives, but it is tempered now with my knowledge that considerable progress has been made in the last two years especially in increasing overall funding. This is a significant achievement that should be commended.

Another issue of concern to me throughout my tenure as Chairman was the weak linkage between the centers and the agricultural research systems in developing countries. I am very pleased that this issue is currently being addressed. I was distressed that the World Bank itself was not making much use of the research findings of the CGIAR centers in its agricultural pursuits. I pointed out to Bank management the need to rectify this situation and am very pleased that the new position of Director for Agricultural Research, which would provide a better link between the CGIAR and the Bank for systematic use of research findings, is now fully operational.

Essential as is the generation through research of new knowledge and technology, it is the transfer of such knowledge and technology to developing countries that would ultimately justify the existence of the CGIAR.
That this aspect needs to be constantly monitored and continuously nurtured cannot be overemphasized. It is here that the cosponsors have a special responsibility and a major role to play in enabling technology transfer through their agencies' regular activities. It will also help to deal with the concern that the CGIAR is moving away from scientific solutions and becoming more involved in technical assistance or development per se.

Clearly, in the years ahead, the focus of CGIAR research should be on expanding food production in low-income, food deficit countries where the majority of the world's hungry people live. Since in a number of these countries land will remain the major provider of food for increasing populations, research should help to increase the productivity of small plots and address the specific problems of poor farmers in Africa, Asia, and elsewhere. In particular, research leading to the improvement of “orphan commodities” such as cassava, coarse grains, pulses, and tropical vegetables, which are in many instances critical to the survival of poor farmers, should be specifically protected from funding cuts because they would otherwise be ignored or neglected.

The need for continuing aggressive research in all of these areas and across many disciplines by the CGIAR and national research centers is self-evident. Farmers are the first to notice when yields decline despite the ever-increasing application of inputs. They are increasingly voicing their concerns that current technologies are less and less satisfactory over time. Are current research systems sufficiently sensitive to these concerns? Today's farmer requires far more knowledge in order to make environmentally appropriate decisions and to cut costs of production. Information resources will need to substitute in the future for the all too frequent current excessive use of physical resources.

Meeting these challenges should be the future agenda of the CGIAR as it celebrates its twenty-fifth anniversary and prepares itself to continue to contribute through research to promoting sustainable agriculture for food security in developing countries.
EARTH FACES WATER CRISIS

Some eighty countries with 40 percent of the world’s population are experiencing water shortages that threaten their agriculture, industry, and health. One billion people lack access to clean drinking water in the developing world and 1.7 billion do not have adequate sanitation facilities.

Agriculture consumes 90 percent of all water utilized in developing countries. “Some 45 percent of all irrigation water does not reach the plants it is intended for, which demonstrates how extremely inefficient irrigation is under current technology and conditions,” said CGIAR Chairman Ismail Serageldin. “However, that does not mean the water is totally lost. Part of it replenishes the groundwater tables and can be used again by methods such as pumping.”

Effective water-saving efforts can be costly for farmers, both in the labor and capital they must invest. To facilitate these efforts, adequate technology and management practices will be needed, including: drought-tolerant crop varieties; better irrigation management practices; and better soil moisture management practices. For Africa, where poverty and rising food demand are pushing farmers increasingly into marginal lands, drought-resistant maize varieties will have to be developed as an alternative to typical dryland crops such as sorghum, millet, and cassava. New water-conserving technology and water management are now important components of CGIAR research.

Globally, the World Bank estimates that $600 billion must be spent over the next ten years on water-related investments. Most of that total amount will be raised by the countries themselves, but $60 billion must come from abroad for the developing world.

Excerpted from World Bank Press Release August 6, 1995
WORKERS AT THE COASTAL AQUACULTURE CENTRE (CAC) IN THE SOLOMON ISLANDS GATHERING JUVENILE GIANT CLAMS FOR THEIR TRANSFER TO OCEAN NURSERIES. GIANT CLAMS HAVE BEEN INVESTIGATED BY ICLARM AT THE CAC SINCE 1984, WHEN THEY WERE ON THE VERGE OF EXTINCTION. THIS TREND HAS BEEN SUCCESSFULLY REVERSED THROUGH RESEARCH. NEW TECHNIQUES FOR GIANT CLAM CULTURE HAVE BEEN DEVELOPED, AND MARKETS FOR THEIR PRODUCTS IDENTIFIED.
he twenty-fifth anniversary of the CGIAR marks the first year following the “end of the beginning,” as Chairman Serageldin described the renewal process which he so skillfully led.

The process clearly demonstrated the urgency and magnitude of the task ahead in terms of world poverty trends, food requirements, and natural resource degradation. At the same time it provided unprecedentedly wide opportunities for discussion involving experts from a variety of backgrounds all over the world. A large body of literature was generated on a variety of scientific and operational themes. Views were expressed on the kind of research which should be done, where and how it should be carried out, and who should be the major groups of beneficiaries. Productivity increases, natural resource protection, biodiversity conservation, gender concerns, marginal versus high-potential lands, rural versus urban poor, farmer participation, institutional strengthening, and partnerships with many other types of institutions are some of the key words which capture the variety of the issues considered. In addition, by the time this Annual Report is circulated, TAC’s latest recommendations on priorities and strategies for research in the CGIAR will have been published.

**The Challenge for the International Centers**

Little more, it would seem, can be added at this stage to any one of these themes by an ordinary observer. Each theme in itself presents a challenge for experts. The following reflections are, therefore, concerned with a topic which, curiously, seems to have received less attention throughout the discussions, and is arguably the greatest challenge of all—namely, the task which the sixteen international centers now face of constructing the program of work which forms the CGIAR’s response.

This anniversary year is particularly significant because the Medium-Term Plans covering the period 1998 to 2000 must now be written. Since the renewal process highlighted the urgency and complexity of the problems so clearly and focused the attention of a wider, more varied audience on the system, expectations are higher than ever. It is fair to add that the centers face this task at a time when many of them have had their scientific staffs reduced to a minimum, and are still dealing with the repercussions on their science programs of financial cutbacks, which the renewal process was able to alleviate, but not halt entirely.
A BALANCED RESEARCH AGENDA

To meet the challenge the centers must sift through the existing evidence and recommendations, combine them with their own very considerable experience, and craft the result into a research program which maximizes the likelihood of progress toward CGIAR goals. Deviations from the path of maximum progress are not acceptable because human misery continues and even grows. But the difficulties of achieving the optimum balances in the design and execution of the centers’ work are formidable, despite their long experience in choosing criteria for decisionmaking and weighting them appropriately. So many important elements have been brought into the discussion in the renewal process that it will be a major achievement to refocus activities selectively and prevent a dilution of efforts.

Because they have occupied important places in recent discussions, two specific issues are chosen for further consideration here as examples of the complexity of the problem of balancing the research agenda. The first issue concerns the integration of research directed toward increasing productivity and protecting the environment. The second issue refers to working in partnership.

SPECIFIC CHALLENGES

The Balance of Productivity and Resource Protection

Concerns for resource protection have increasingly permeated the research carried out across the system. There is general consensus as to why this must be so, and productivity increase and natural resource protection objectives are being merged into a continuum in the design of the research projects. This lays a particularly heavy onus on the centers to ensure an appropriate overall balance in progress toward both kinds of objectives.

But the balance is difficult to strike for several reasons. One reason is that international research in the area of natural resources management is relatively new. Standard indicators of progress are not widely accepted, and changes may take many years to manifest themselves. A second reason is that available evidence suggests that some degree of resource degradation may be inevitable if the rate of increase in global...
food production required over the next decade or two is to be achieved. A third reason is that the critical dimension refers to the relative timing of realizing the benefits of research in the productivity and resource protection areas.

The case of Latin America, which is so rich in natural resources, may illustrate the point. The soils of 200 million hectares of land are now estimated to be moderately or severely degraded by misuse. The region has the highest rate of deforestation in the world (7.3 million hectares a year), with its consequent loss of biodiversity. At the same time, the number of poor rose 44 percent from 1980 to 1990, and the proportion of the population so classified also increased (from 41 to 46 percent). This proportional increase still continues in countries as nominally rich as Venezuela. The effect of the rise in poverty on the degradation of resources is well recognized. Significantly, too, the land area devoted to the cultivation of coca more than doubled in the decade of the 1980s.

Whatever advances in natural resource protection are potentially available through research, degradation and land misuse are likely to continue to escape control until greater progress is made to improve the welfare of the most disadvantaged of the local populations. This seems to imply that the productivity and resource protection components of research programs must be balanced in such a time frame that opportunities for increasing productivity in the shortest possible term are not foregone. Otherwise, degradation will continue and the cost of future increments will be far greater.

Balances in Partnership

The second example refers to the complexity of working effectively in partnership, a theme to which the Lucerne Action Program gave considerable prominence.

Cooperation between the CGIAR centers themselves has been brought into the limelight recently by the emergence of systemwide programs. These seek a clear additional benefit from cooperative work, beyond that likely to be obtained by the centers working separately, yet in coordination. The livestock program is a particularly good example which was designed to draw out from center crop and livestock programs new research themes which would be mutually beneficial.
Formal programs of this kind are obviously not required for continuing improvement in the cohesion and complementarity of research work across the system. Center scientists are already extremely conscious of the need for this and improvements are being made all the time. Any important gaps will continue to be identified by the types of review which are regularly carried out on given topics across the system.

The recent proliferation of proposals for systemwide program funding may, therefore, be partly explained by the interest expressed in program funding by several donors. The challenge for the centers is to define those which really enrich their own programs and enhance the likelihood of achieving their mission, thus justifying the extra time and effort required. Any tendency for program funding to take place at the expense of institutional support will undermine the long-term health of the system. The success of the program depends directly on the strength of the centers involved. If their individual essence and initiatives are diminished, they will cease to attract and retain top quality scientists and science managers.

The other level of partnership which has been given wide prominence discussed recently is that between the CGIAR and national partners in the “South.” That these links are vital to the implementation of the CGIAR’s work, and to ensuring its permanent relevance, has never been in doubt. Important steps are being taken to institutionalize interactions at the level of TAC and the CGIAR itself, a process which will surely be assisted by the recent admission to the Group of new “Southern” members.

These processes can be distinguished, however, from that of partnership in the actual execution of research. Most recent external reviews suggest that the international centers take this responsibility extremely seriously and that relations with their national partners are very good. Yet the incessant calls for improved partnership suggest that expectations have somehow not been met.

In this era of “openness,” those of us who work in national research systems in the “South” have a special responsibility to help dispel any note of idealism from these discussions. The complexity of establishing fruitful cooperative arrangements for research must not be underestimated and expectations must be realistic. The process the centers face of becoming acquainted with, and making themselves known to, the new and changed institutions which are their potential partners is slow, despite the amount of information
the centers regularly publish. The rest of the problems which national institutions have to solve before they can play their part as effective, stable partners in research are well documented, even in regions like Latin America where lack of training is not an obviously limiting factor. We in the national systems have much to learn from the CGIAR’s renewal process and, in the same vein of severe self-evaluation, must seriously assume our own obligation to go continuously further to meet the CGIAR in its endeavors.

The challenge here for the centers is to ensure sensitive dialogue. This can be done without compromising the leadership which their long, stable, and independent experience often confers, and which can be used to great advantage by the NARS in their attempts to obtain greater political and economic support. Once it is clearly recognized by national partners that they and the CGIAR share the same overall goals, but have different, complementary roles in progressing toward them, then it is easier to find imaginative ways to foster joint endeavors of mutual benefit.

**CONCLUSION**

Reflections such as these suggest that the most important immediate challenge is for the international centers to distill out the richness of the renewal process and strike the necessarily judicious balances in the design and execution of their research programs. Those who have been privileged to be associated with any of them will be convinced of their ability to do so. But after the last turbulent years, time is now needed for thought and for intensifying research activities. This requires the rest of the system to provide a period of supportive stability. It is also essential that profound insights and a full degree of realism are brought to bear in the evaluation of the results. Boards of trustees and center staff, management, scientists, and partners will certainly march together now, as never before, to ensure success.

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1995 WORLD FOOD PRIZE

The 1995 World Food Prize was awarded to Dr. Hans R. Herren for work he conducted while an entomologist at IITA on the biological control of the cassava mealybug. The World Food Prize is considered the foremost international award recognizing the achievements of individuals who have advanced human development by improving the quality, quantity, or availability of food in the world.

At IITA, Dr. Herren led a project, from its conception in 1979, which rescued cassava—one of Africa’s most important staple food crops and consumed by 200 million people on the continent—from total destruction by a pest accidentally introduced to Africa from South America in the early 1970s. The cassava mealybug thrived in Africa because it had no natural enemies. By the late 1970s, the pest was destroying as much as 80 percent of the cassava crop in some areas, and was spreading rapidly.

Following the discovery of the cassava mealybug in Paraguay by Dr. Anthony Bellotti of CIAT, a tiny wasp that was the mealybug’s natural enemy was identified. The predator wasps were brought to Africa, mass bred, and released by airplane over the cassava growing belt—an area one and a half times the size of the United States. At the end of seven years, the wasps had brought the mealybug problem under control in thirty African nations.

The benefit of this project to African farmers has been estimated at about $3 billion. Also notable is that this large-scale pest control effort was achieved without the use of chemicals pesticides.

Dr. Herren left IITA in 1994 to become Director General of the International Centre for Insect Physiology and Ecology in Nairobi, Kenya.