

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

17723

# The CGIAR at Twenty-Five: Looking Back and Looking Forward

MAURICE F. STRONG

Sir John Crawford Memorial Lecture  
International Centers Week  
October 28, 1996  
Washington, D.C.

*Published by the Consultative Group on International Agricultural Research, CGIAR Secretariat,  
1818 H St., N.W., Washington, D.C. 20433, United States of America, December 1996.*

# Sir John Crawford

## *Memorial Lectures*

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|------|---|
| 1985 | Robert S. McNamara, United States         |
| 1986 | Bukar Shaib, Nigeria                      |
| 1987 | Amartya Sen, India                        |
| 1988 | Helen Hughes, Australia                   |
| 1989 | Jacques Diouf, Senegal                    |
| 1990 | M. S. Swaminathan, India                  |
| 1991 | CGIAR Twentieth Anniversary Commemoration |
| 1992 | Enrique V. Iglesias, Uruguay              |
| 1993 | James Gustave Speth, United States        |
| 1994 | Alex F. McCalla, Canada                   |
| 1995 | Sir Shridath Ramphal, Guyana              |
| 1996 | Maurice F. Strong, Canada                 |

*The Sir John Crawford Memorial Lecture has been sponsored by the Australian Government since 1985 in honor of the distinguished Australian civil servant, educator, and agriculturalist who was one of the founders of the Consultative Group on International Agricultural Research (CGIAR). Sir John (1910-1984) was the first Chair of the CGIAR's Technical Advisory Committee.*

## About the CGIAR

The Consultative Group on International Agricultural Research (CGIAR) is an informal association of fifty-two public and private sector members that supports a network of sixteen international agricultural research centers. The Group was established in 1971.

The World Bank, the Food and Agricultural Organization of the United Nations (FAO), the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP) are cosponsors of the CGIAR. The Chairman of the Group is a senior official of the World Bank, which provides the CGIAR System with a Secretariat in Washington, D.C. The CGIAR is assisted by a Technical Advisory Committee, with a Secretariat at the FAO in Rome.

The mission of the CGIAR is to contribute, through its research, to promoting sustainable agriculture for food security in the developing countries. The CGIAR conducts strategic and applied research, with its products being international public goods. It focuses its research agenda on problem solving through interdisciplinary programs implemented by one or more of its international centers in collaboration with a full range of partners in an emerging global agricultural research system. Such programs concentrate on increasing productivity, protecting the environment, saving biodiversity, improving policies, and contributing to strengthening agricultural research in developing countries.

Food productivity in developing countries has increased through the combined efforts of CGIAR centers and their partners. The same efforts have helped to bring about a range of other benefits, such as reduced prices of food, better nutrition, more rational policies, and stronger institutions. CGIAR centers have trained more than 50,000 agricultural scientists from developing countries over the past twenty-five years. Many of them form the nucleus of and provide leadership to national agricultural research systems in their own countries.

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## List of Acronyms

CGIAR	Consultative Group on International Agricultural Research
CIDA	Canadian International Development Agency
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CIP	Centro Internacional de la Papa
FAO	Food and Agriculture Organization of the United Nations
IDRC	International Development Research Centre
IPGRI	International Plant Genetic Resources Institute
IRRI	International Rice Research Institute
NARS	National Agricultural Research Systems
OECD	Organisation for Economic Cooperation and Development
SIDA	Swedish International Development Agency
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WRI	World Resources Institute

*The 1996 Sir John Crawford Memorial Lecture was delivered by Maurice F. Strong<sup>1</sup>, Senior Advisor to the President of the World Bank, during the twenty-fifth anniversary commemoration of the CGIAR, on October 28, 1996, the first day of International Centers Week 1996 in Washington, D.C. Mr. Strong was introduced by Gelia Castillo, Professor Emeritus of Rural Sociology, University of the Philippines at Los Baños. She was the first woman chair of a CGIAR center, CIP, and has served on the boards of several CGIAR centers. She is on the IPGRI board.*

## Introduction by Professor Gelia Castillo

Friends and partners in agricultural research, good morning. Twenty-five years ago, our founding fathers brought forth into this world a most unusual facility, unusual for many reasons not unknown to this audience, but unusual also because they were unaided by founding mothers.

Among the great men was Sir John Crawford, in whose honor this memorial lecture has been sponsored by the Australian Government since 1985. To present this year's lecture is someone who is a founding father, who is also so distinguished that he does not need more than one page to summarize his credentials, earned through a lifetime of global leadership in issues of the environment, development, economics, natural resources, energy, power, and governance, and through a very successful career in private enterprise.

If "royal" means royalty, he is very royal indeed—Royal Society U.K., Royal Society, Canada, and even Royal Architectural Society of Canada. To accommodate all of his honorary degrees he needs a sizeable museum; he has thirty-seven of them. But for men of distinction it is a privilege not to mention such mundane details as date of birth and schools attended.

As senior advisor to the World Bank President and to the Secretary-General of the United Nations, and as chairman of The Earth Council, these are just about as close as one can get to the corridors of influence on policies and actions which affect us all.

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<sup>1</sup>See About the Speaker, p. 28.

A recent *Time Magazine* article about influence could very well describe our featured lecturer. It said, "Being influential is the reward of successful salesmanship, the validation of personal passion, the visible sign of individual merit. It is power without coercion, celebrity with substance."

However, from where I sit, what is of significance is a statement our speaker made on the occasion of the IDRC's twenty-fifth anniversary. He said, "Our global environmental future will be largely determined by what happens in the developing world."

As the CGIAR System moves toward a partnership mode in a world of interdependence, where no one is too poor to give and no one too rich to receive, we also begin to recognize that even in an era of globalism, individuals do make a difference. If our lecture today were a project being proposed for approval in the World Bank's priority portfolio for funding, this project would be endorsed as environment friendly, agriculturally sustainable, power generating, productivity enhancing, equitable in impact, international public goods and products, welfare rich in benefits—but private sector-led, with exceedingly high rates of return.

Friends and partners, it is my great pride and pleasure to present the Honorable Maurice F. Strong, privy counselor, Officer of the Order of Canada, doctor of law, but most of all, a wonderful human being who is dedicated to human causes.

Mr. Strong.

# The CGIAR at Twenty-Five: Looking Back and Looking Forward

MAURICE F. STONG

Professor Castillo, Chairman Serageldin, President Wolfensohn, good friends, I can't tell you what a relief and a pleasure it is to be introduced by such a generous friend. There are many in this audience who might add some footnotes that are just as well omitted, and I thank them for that.

As I look out over this audience, I see that past, present, and future are truly merged in the composition of the group that you have brought together here today, Ismail (Serageldin). I can't help but feel that this is a great and promising portent for the future of this group.

Looking back is always useful and instructive, but I think most of us live busy lives, and only on occasions like this can we look back, yes, with a touch of nostalgia, but also with a sense that we have all learned from the past that we have shared.

I count it a very signal honor, one of the most important that has ever been accorded me, to have been invited to deliver this Crawford Memorial Lecture. I had the privilege of knowing Sir John Crawford and of benefiting immensely in the early stages of my own career from his wise counsel and guidance and many acts of friendship. I was just a young, impulsive person at that stage, and he was already a wise and respected world leader—and isn't it amazing how many leaders come from Australia? He took a great interest in me and really kept me from falling off the cliff several times, guiding me in the early stages in which Canada was very much involved in the development of agricultural research.

In addition, because I was present at the creation of the Consultative Group on International Agricultural Research, I am especially pleased to be able to join you in this way in marking its twenty-fifth anniversary. In doing so I want to pay my own special tribute to Sir John Crawford, whose leadership during the early, formative years of the CGIAR established the foundations and set the direction for the remarkable contribution it has made to the world com-

munity. His name is not a household word, though few people in any age have done more to relieve the suffering and improve the lives of millions of people.

I must admit to you that my great pleasure in accepting this invitation was accompanied by a very real sense of trepidation, not a quality, I think, for which I am too well-known. I felt this sense of trepidation because the lecture platform is not my natural habitat, and I am neither an expert nor a policymaker in the field of agriculture. Now, if I were addressing a lay audience, that wouldn't give me any particular concern. But when I am addressing an audience composed of some of the most distinguished policy leaders and technical professional leaders in the world community, it does make me a little reluctant and nervous.

So I want to make clear that the views I wish to share with you are those of a layman and a practitioner who has tried to learn from all of you and who has had the privilege over the years of being involved in a range of development and environment-related activities, closely attuned to the work and mission of the CGIAR.

### **Looking Back**

Anniversaries are a time to look back, not with nostalgia, but with reflection on what has been done and what we can learn from it. Certainly, the CGIAR's accomplishments in its first twenty-five years have more than exceeded the expectations of those who founded it. I know of no better example of the important role of private foundations in our society than the vision and pioneering work of the Ford and Rockefeller Foundations which led to the establishment of the CGIAR. It has proved to be a prescient and invaluable investment for them and for the world community.

In the late 1960s I was the new head of Canada's external aid program. I was approached by the two foundations to see if Canada might take a lead in mobilizing the support of Official Development Assistance programs for the research and development of new varieties of food grains, particularly rice. These research and development programs needed to be expanded beyond the capacities of the two foundations to continue to be their sole source of support. And I clearly recall David Bell, who was then in charge of the Ford Foundation's international programs, visiting me in my living room in Ottawa, telling me very convincingly why Canada should take the lead in joining in the effort that they had pioneered.

I am pleased to say that Canada responded enthusiastically, together with USAID and Sweden's SIDA, under its Director-General Ernst Michanek, who I am pleased to see is also here today. SIDA was then and still is one of the best of the bilateral development assistance agencies. Both SIDA and the IDRC are now permanent supporting members of the CGIAR.

Results continued to be highly encouraging. This led to growing recognition of the promising potential of food research and development programs for meeting the rapidly increasing food needs of developing countries. This in turn led to a discussion at the Rockefeller Foundation's Conference Center in Bellagio in 1970 and 1971. Here again, as has been pointed out, the founding fathers, many of whom are with us today, were then the main sources of leadership in the development community—David Bell, Ernst Michanek, Paul Marc Henry, Sir Geoffrey Wilson, Robert Chandler—all were present at the creation. I guess I was the new and most junior boy around that table.

Leading the discussion was Robert McNamara, then the new President of the World Bank. He was quick to appreciate the seminal importance of food research and development and the need for a broader, more reliable, more structured framework for supporting it, both financially and technically. Someone raised the question, well, look, you have in the World Bank consultative groups on countries—why can't you have a consultative group on a particular function?

Bob McNamara said, Yes, there is no reason why not; why not? I think that in fact was the moment when the idea actually crystallized. The idea to create the CGIAR was born around that dinner table at Bellagio.

Out of that discussion came the proposal to establish the CGIAR under the leadership of the World Bank. The first formal meeting of the CGIAR was held at the Bank on May 19, 1971.

There is no need to remind this audience of the many events that have marked the rapid development of the CGIAR System since then. The network has grown to sixteen international agricultural research centers, supported by fifty-two public and private sector donors. At the core of the System are some 1,000 highly skilled and experienced scientists from many disciplines and nationalities who can draw on an even wider range of experts and specialists as required.

## **CGIAR Accomplishments**

While the CGIAR did not inaugurate the green revolution, it played an indispensable role in extending and sustaining it and ensuring that the lessons learned and the experience gained from it were widely disseminated and applied. The CGIAR became the custodian of the green revolution as one of the most important and influential technological developments of our time, or indeed of any time.

The fact that the CGIAR was primarily responsible for approximately the doubling of the yield of rice, wheat, and maize between the 1960s and the 1990s is evidence of its success in increasing food production and in avoiding the massive food shortages that were predicted and feared in the 1950s and 1960s.

But success always has its costs, and the green revolution is no exception. Critics point to the environmental and health impacts from the massive increase in the use of chemical pesticides and fertilizer which the green revolution entailed, and to the vulnerabilities which may arise through the spread of monocultures in which indigenous plant stocks are replaced by new, genetically engineered varieties.

There has been concern, too, that the green revolution favored the large and more wealthy farmers who could afford to take advantage of it, and exacerbated the plight of the smallholders, the landless, and farm laborers. While there is clearly some validity to these concerns, they do not outweigh the benefits that have been achieved in sparing millions of people from hunger and malnutrition, and relieving major food deficit nations, notably India, from their dependence on imports of food grains.

## **Problems and New Directions**

The success of the green revolution in increasing the production of basic food grains has exacted another cost which has ominous implications for the future. I speak of the complacency that has replaced the alarmist predictions of food shortages and massive starvation which drove early support for the green revolution and the work of the CGIAR. This complacency has undoubtedly played a part in the lower priority that many developing country governments and development assistance agencies have accorded to agricul-

ture during the past two decades. It seems likely also to have been a factor in declining support for the CGIAR in the early 1990s.

This complacency, together with a certain amount of the kind of creeping institutional sclerosis that affects most successful organizations, produced a crisis of confidence which called into question the very future of the CGIAR. Thanks largely to the vigorous and enlightened leadership of the World Bank's Ismail Serageldin, now CGIAR Chairman, a rapid and decisive response from the CGIAR membership has revitalized the CGIAR and put it on a promising track for the future in which the world community will have an even greater need for its services.

I am impressed with the new directions for the CGIAR set out in the Plan of Action for Strengthening Global Agricultural Research, prepared for International Centers Week.

Lester Brown of the Washington-based WorldWatch Institute has long been warning against complacency and pointing to the growing vulnerabilities in the world's food supply system. The FAO has called for massive new efforts to improve food security at both national and household levels. This call is based on a new green revolution, drawing on the social and economic lessons of the green revolution and its advances in agricultural science.

The CGIAR, as part of its renewal program, has called for a doubly green revolution—green for productivity and green for natural resource management. The World Bank is revisiting its own policies on agriculture, and under its dynamic President, Jim Wolfensohn, is giving it renewed priority.

If there ever were a cause for complacency, it has surely been overtaken by the sobering evidence of the challenge we face in doubling world food production by the year 2025. It will be a monumental task, but even more daunting will be the challenge of ensuring that poor people in food-deficit areas receive the quality and quantity of food that they will require for their basic sustenance.

The FAO's World Food Summit will be focusing much-needed attention on these issues, and this International Centers Week will make a major contribution to the process.



The knowledge and the technologies developed primarily as a result of the green revolution will, I believe, make it possible to produce the food the world will need in the foreseeable future on a globally aggregated basis. But this is subject to the major qualification that we do not at this point know how food production may be affected by climate change—something I will come back to shortly.

The other issue is how to match food availability with food needs, particularly on the part of the poor. Even in times of food scarcity, those with the resources to purchase food can usually obtain it. I found in my own famine relief activities on behalf of the U.N. that there was no evidence that rich people die of starvation. Conversely, even in times of food abundance, those without the means are often hungry and malnourished. Poverty, more than lack of availability, is what denies most people access to the food they need. To invoke a U.S. political theme, "It's poverty, stupid."

On the supply side, it seems probable that the genetic technologies and intensive farming methods developed during the green revolution and the rapid development of biotechnologies can produce further significant increases in production. But these prospects are clouded by some very significant uncertainties and vulnerabilities. Let me cite some of these.

### **Uncertainties and Vulnerabilities**

These uncertainties and vulnerabilities include the degree to which climate change may disrupt weather and rainfall patterns. Climatologists tell us that even without the effects of greater greenhouse gas emissions, it would be logical to expect some deviation from the relatively benign period of climate we have enjoyed in the past century or so. And if human-induced climate change is in fact under way—and evidence certainly points in that direction—it is likely to be accompanied by a good deal more climatic turbulence than we have come to regard as normal. There will be greater extremes of both heat and cold, drought and flood, and greater severity of storms. Such extremes can wreak havoc with food production.

The great famine of 1984 to 1986 in Sub-Saharan Africa was preceded by seventeen years of below-average rainfall. And in North America we saw only last year how drought and floods can disrupt food production.

Recent advances in biotechnology which promise even greater increases in yields may also radically change patterns of production away from traditional land-based practices to more intensive, industrial-type production systems. This will initially effect the higher-value crops, including some of those on which developing countries depend for their export earnings.

You are, I am sure, aware of the case of vanilla. In that case a genetically engineered product produced industrially has largely taken over the market from natural vanilla, which was an important source of income for Madagascar and other countries in that region.

I recently participated in a presentation at the Massachusetts Institute of Technology which pointed to the immense potential of these biotechnological techniques to increase production and to stabilize the quality of a wide range of agricultural products. Welcome as this would be in terms of ensuring supply, it would clearly shift the locus of production to those with the capital, the technology, and the specialized management expertise to use these technologies and techniques.

This could well lead to a new generation of comparative disadvantage and dependency for many developing countries. At the same time it could open up some new opportunities for them to participate in the benefits of this potential new agricultural revolution. And as you know, biotechnology is talent intensive, knowledge intensive, but not quite so capital intensive as some areas of technological development. Therefore it would be perfectly feasible for developing countries to join in a concerted effort to be in the lead in this field. It is surely to their benefit and to the benefit of the agencies that assist them that they take this opportunity while it is still feasible to do so.

The environmental, health, and social costs that have accompanied the increases in production achieved by the green revolution are likely to impose greater costs and constraints on future production increases. A recent study by the World Resources Institute (WRI)<sup>2</sup> cites evidence of the ill effects of the rapid growth in the use of chemical pesticides, which have become the main means of controlling pests. Global sales of pesticides rose by some 11.2 percent annually between 1960 and 1992 and reached \$29 billion by 1995. The

<sup>2</sup>Lori Ann Thrupp, ed., *New Partnerships for Sustainable Agriculture* (Washington, D.C.: World Resources Institute, 1996).

report points to the economic, social, and health costs exacted by the massive increases in pesticide use, and the evidence that much of this is proving to be ineffectual and self-defeating as pests develop resistance to the chemicals used, and new pests emerge.

Developing countries are of course particularly vulnerable to these effects. The WRI report indicates that half of pesticide poisonings of people and 80 percent of pesticide-related deaths occur in developing countries, which account for only 15 to 20 percent of world pesticide use.

Also becoming more evident are the health risks that arise from the accumulation of pesticide residues in the environment and in food products.

Similarly, the use of chemical fertilizers, so indispensable to the major increases in production that have occurred through the green revolution, are a growing source of contamination of soils, water, and the food chain.

Much of the world, particularly developing countries in which population growth is concentrated, is approaching the limits of the availability of new cropland, while existing cropland is being degraded or lost to urban expansion. China's notable achievements in feeding more than 20 percent of the world's people from less than 7 percent of its land area is a particularly important case in point. Although it has continued to bring new land into production, China nevertheless experienced a net loss of some 3.87 million hectares of cropland in the 1987-1992 period, and prospects are that losses will soon overtake the entire potential for further cropland expansion.<sup>3</sup>

China also provides an example of the effects of continuing urbanization, with plans to build some 600 new cities by 2010 as existing cities continue to grow.

While Africa and Latin America have significant potential for expansion of cropland areas, much of it consists of land that is relatively marginal. Meanwhile, the cropland being lost to urban expansion is generally of a higher quality. Particularly ominous is the beginning of a decline in irrigated lands globally, after a long period of expansion.

<sup>3</sup>Gary Gardner, "Shrinking Fields: Cropland Loss in a World of Eight Billion," WorldWatch Paper No. 131 (Washington, D.C.: WorldWatch Institute, 1996), 15-16.

Despite the formal challenges it faces, China remains confident that it can meet its future food needs—and here I cite a recent report prepared by China for the World Food Summit (Rome, November 1996).

Quite apart from the prospect that climate change could affect major shifts in rainfall and weather patterns, availability of usable water supplies is subject to significant reduction through overdrawn and contamination of groundwater resources and river systems, and large-scale wastage of water through mismanagement, often encouraged by misguided policies. And as one who lives in part in the arid Southwest U.S., I am particularly conscious of the fact that these water issues are not confined to the developing countries. Water is one of the most ancient sources of conflict among people, and these conflicts are likely to become more numerous and more acute in the future.

Degradation of existing productive lands through soil erosion, salination, and contamination is permanently undermining their productivity. Estimates quoted in a recent World Watch report<sup>4</sup> indicate that erosion affects more than one-third of China's croplands, that salination has reduced yields of 7 million hectares, and another 7 million hectares have been polluted by industrial waste. The same report estimates that soil erosion now affects some two-thirds of Russia's arable land, nearly 94 percent of Iran's, some 60 percent of Pakistan's, and 25 percent of India's, and that salination has forced large areas out of production or drastically reduced production.

Loss and degradation of cropland is not confined, as I mentioned, to developing countries. For example, in California more than 125,000 acres of cropland were lost to urban or nonfarm use between 1984 and 1992. The productivity of the Great Plains of the Midwest U.S. and Canada, where I grew up, is being undermined by soil erosion, loss of organic matter, salination, and acidification. Because this region produces a high proportion of the food supplies on which the food deficit areas of the world depend, a decline in productivity would have important implications for the availability of supplies to food-deficit developing countries.

Irrigation, of course, is one of the oldest methods of increasing agricultural productivity. It has also played a key role in the almost tripling of world

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<sup>4</sup>Gardner, 28-29.

grain production from 1950 to 1990. Now, however, this expansion is also leveling off while irrigated croplands are being degraded or lost.

Limits to the expansion of cropland areas and loss and degradation of existing lands is particularly ominous in the face of continued growth of both world population and the world economy. This is brought into stark relief by the knowledge that the area devoted to production of food grains shrank by some 30 percent on a per capita basis between 1950 and 1981 and is now reduced to some 0.12 hectares per capita and is continuing to fall. Croplands taken out of production in the U.S. and Europe provide a significant reserve capacity, but however useful this would be in the short term, its long-term impact would not be substantial.

Another area of vulnerability is the increase in the use of meat as it becomes affordable to an increasing proportion of the world's population, particularly in rapidly developing countries. Some two of every five tons of grain produced in the world are fed to livestock, poultry, and fish. Two kilograms of grain are required to produce a kilogram of chicken or fish, and the conversion ratio is up to 7 kilograms of grain for a kilogram of meat for grain-fed cattle.

Even this very inadequate summary of some of the constraints and vulnerabilities we confront in meeting the world's future food needs surely underscores the complexity of this challenge and its relationship to the broad range of factors that are shaping the future of our technological civilization.

### **Creating Sustainable Food Production Systems**

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The transition to a sustainable agricultural and food production system is an essential precondition to a secure and sustainable future for the human community. We must awaken from our recent complacency and give highest priority to making our agricultural and food production systems truly sustainable. There are many good examples which demonstrate that this is possible. Let me cite briefly a few of these examples from the recent World Resources Institute report on New Partnerships for Sustainable Agriculture.

In Bangladesh farmers in an integrated pest management pilot program achieved an 11 percent increase in rice production and eliminated pesticide use totally.

In the Philippines rice farmers increased yields by 5 to 15 percent while substituting cultural controls for chemicals.

In Senegal farmers have been successful in increasing the yields of various crops, using natural crop protection and soil conservation techniques.

Cuba has developed remarkably high productivity from the use of biological products and biocontrol organisms for pest control and soil restoration.

And if I may cite an example from Colorado, my wife feeds her extended family entirely from organic products that she grows in her garden. However, I have to admit that it still has not achieved economic viability.

[Laughter.]

A recent meeting sponsored by the World Engineering Partnership for Sustainable Development and the World Bank focused on the close interaction between rural and urban life and pointed out some highly promising examples of how the organic waste generated in urban areas can be used to increase agricultural productivity on a sustainable basis in rural areas. This, too, offers a promising prospect for the future work of the CGIAR.

In all of these cases the common elements are an emphasis on empowerment and participation of farmers and communities, institutional collaboration, and the application of agroecological principles which combine traditional with modern scientific knowledge. And I am very pleased to see that in the research and development activities of the CGIAR, there is an increasing realization of the importance of building on traditional knowledge as well.

These and other good examples indicate that sustainable agriculture is feasible at the local and community levels when people and institutions cooperate. But for these experiences to become the norm rather than the exception, they need to be supported by a conducive national policy environment and by international development agencies. While there has been an encouraging move in this direction, particularly with the World Bank's new emphasis on sustainable agriculture, policies are still geared more to increasing production than to ensuring its sustainability.

Land ownership is an important constraint on the stewardship of land in many countries, particularly in Latin America. One of the most effective means of providing incentives to small farmers for sustainable management of their lands is to enable them to own these lands.

Now, what does all this mean to the CGIAR and the research centers it supports as you move into a new era? Let me offer a few observations.

### **Looking Forward**

The CGIAR and its network of agricultural research institutes has become, unquestionably, one of the most unique and important assets of the world community by focusing primarily on technologies and techniques that will increase food production. It must now turn more of its attention to dealing with the risks and vulnerabilities which I have cited above if it is to lead the transition to a sustainable agricultural economy.

Already, an increasing amount of the work of the centers, I am pleased to note, is devoted to these issues, but I submit that this portion must increase. The CGIAR's centers should concentrate more of their attention to creating a positive synthesis between the modern scientific techniques they have been pioneering and traditional knowledge and practices. This means integrating their work more fully with the institutions, scientists, and farmers in the communities in which they are located and to which their work pertains. This is particularly important because, as you know, the centers have sometimes been seen as external foreign transplants in these communities.

I would like to see the CGIAR pay special attention to helping developing countries anticipate the effects on their own agricultural and economic prospects from new developments in biotechnology, and to assist these countries in participating in and benefitting from these developments. This, indeed, is one of the most important contributions the CGIAR can make to the world community in the period ahead.

The CGIAR should focus more and more of its efforts on helping small farmers, especially the poorest of them, to access the knowledge and resources required to increase their own productivity in accordance with sustainable development principles. This, of course, requires a special focus on the key role of women.

While it is possible to envisage that the world's aggregate food needs could be met by large industrialized agricultural enterprises, the social and human consequences of this would be clearly devastating, and the poor could be forever pushed into a dependency relationship for their subsistence supplies.

I would also like to see the formidable research and development capacities of the CGIAR institutes used to a much greater extent to help developing countries improve their competitive advantage in growing high-value crops that can produce the export earnings they will require to meet their needs for food imports.

To lead the transition to sustainable agriculture, the CGIAR and its institutes will need to integrate the environmental and social dimensions of their work with their scientific research and development to a much greater extent than has been done. This has important implications for future staffing and programming.

In essence agriculture is primarily an energy conversion system. Modern agriculture is highly intensive and inefficient in its use of energy. Increasing the energy efficiency of agriculture and reducing its use of fossil fuels is an area I would particularly commend to the CGIAR for higher priority in its future work. Indeed, it should consider establishing a new center or program focusing on energy-related issues.

Given that poverty is the principal source of hunger and malnutrition for the poor, the CGIAR should focus more of its efforts on helping to develop sustainable livelihoods for the rural poor—something in which you have already had a good deal of experience. Most of this would, of course, have its basis, directly or indirectly, in agriculture.

My work with the late Bradford Morse (former Administrator of UNDP) in the U.N. Office for Emergency Operations in Africa from 1984 to 1986 gave me some personal experience of the human tragedy of famine and some sobering insights into its causes and consequences. It vividly brought home to me the reality that while droughts are inevitable, famine is not. Famine is the product of human mismanagement, ecological breakdown, neglect, inequity, and poverty. Poverty sometimes combined with greed results in overgrazing of land, which produces degradation and loss of productivity in some areas, reducing them to deserts. Cutting down trees to open

up new land for cultivation and to provide firewood produces soil erosion and disrupts watersheds.

Misguided government policies and inadequate budgets deny rural peoples access to the transportation and infrastructure needed to move their products and to bring in supplies from outside. I well recall a situation in the Western Sudan in which people were literally starving in one valley whereas there were food surpluses in the adjoining valley, with which there was no serviceable transport connection.

While individual farmers usually had their own grain storage, these were sufficient only to meet short-term needs, not the extended periods of drought that they had experienced during that period. Yet government and community-level food storage was virtually nonexistent.

At that time the world community responded generously and shipped in massive amounts of food and other relief supplies. But this was at a time when governments of the grain surplus countries had large supplies on hand, and contributions from these surpluses met both domestic and international purposes.

Today the situation is radically different. Surplus stocks of grain have fallen in 1996 to a level as low as the equivalent of forty-eight days of consumption, the lowest on record, and prices of wheat doubled last year. Per capita grain production has fallen 15 percent since 1984, after increasing by 40 percent since 1950, and available croplands for grain production, as I have indicated, are rapidly diminishing.

Food aid was cut in half, to some 7.6 million tons, between 1993 and 1996, and in December 1995 the European Union imposed an export tax of \$32 per ton on wheat, a form of reverse protectionism which could be an ominous portent for the future. Some 120 countries now rely on imports to meet their food grain needs, the principal sources of which are North America, Europe, and Australia. Many of these, particularly the chronically food-deficit countries of Sub-Saharan Africa, have little prospect of being able to pay for the grain they must import, particularly if the current trend toward higher prices were to continue.

While some argue that this price trend is a temporary phenomenon, it surely illustrates the vulnerabilities and uncertainties to which I have referred.

The per capita catch of seafood, too, has fallen some 7 percent since 1989, after doubling during the period 1950 to 1989. Already this has led to conflict, including the tense confrontation two years ago between my own country, Canada, and the European Union.

Food aid as a means of disposing of surpluses has diminished greatly and cannot be seen as a reliable source of food for those who will be in need in the future. The only safe assumption on which food deficit countries can plan is that they will have to pay for their food imports. For people the same will be largely true. They will either have to grow their food or pay for it.

This underscores the need for a massive effort to alleviate poverty, which I am pleased to say President Wolfensohn has made a central priority for the World Bank. The process of revitalizing and reorienting the CGIAR and its agricultural research centers, which Chairman Serageldin and the colleagues who joined in this, largely in this room, initiated, promises to prepare this unique system of institutions for an expanded role in shaping the world's agricultural future and its transition to a sustainable system of food supply.

This will require much greater levels of financial support, which clearly will not be easy to come by under current conditions. The CGIAR has a strong and compelling case for a larger share of development assistance budgets because its research and development programs have clearly demonstrated that they produce returns that cannot be replicated in any other field of development that I know. At the same time, the CGIAR must be enterprising and innovative in developing other sources of funds, including perhaps seeking a portion of the added value it creates for its clients, or for some of its clients.

### **Conclusion**

Finally, let me say that while none of us can feel confident in predicting the future, all of us must prepare for it. Despite the daunting nature of the challenges which confront us in meeting the world's food needs in the twenty-first century, I remain an optimist. Pessimism, of course, would be self-fulfilling and counterproductive. But to succeed we must accelerate the transition to sustainable agriculture. It will require a degree of common purpose and cooperation among nations, institutes, and people, beyond anything we have yet achieved.

As our experience in agricultural research and translating its results into greater production has clearly demonstrated, modern technology has provided us with the means to do this. The main barriers will be attitude, political will, and institutional inertia. These, I have found, will not be easy to overcome: Inertia is as powerful a factor in human affairs as it is in the physical world.

But history tells us that necessity drives change, and we must believe that the growing awareness of the necessity for change to sustainable agriculture will provide the will and the impetus to effect this change. The CGIAR and the World Bank will be at the center of this process, and it is reassuring at this critical juncture to have in Ismail Serageldin at the CGIAR and Jim Wolfensohn at the World Bank the kind of leadership that this will clearly require.

Although agricultural subsidies are being phased down in Europe and North America, they too continue to create distortions in the trade in agricultural products, largely to the detriment of developing countries. These and other nontariff barriers deny developing countries their natural comparative advantage as producers of sugar, cotton, and other agricultural products, the export earnings of which they will need to meet the costs of growing imports of food grain.

As a nonexpert I will not take sides in the professional argument as to whether the foreseeable future will be one of growing food scarcity or of continuing abundance. I tend to be persuaded by the evidence that it will be feasible on a global basis to produce all the food required to satisfy the needs and appetites of a growing world population. But I am also deeply impressed and chastened by the many uncertainties and vulnerabilities that we face in doing this, and by the prospects of escalating environmental and social costs.

What seems certain is that to meet these needs and to make the transition to sustainable agriculture, on which our long-term future clearly depends, will require a radical overhaul of government policies and a degree of cooperation among nations, institutions, and peoples on a scale without precedent in human experience. This means moving agriculture back into the center of the international and national agendas and developing new policy and management regimes that are systemic in nature, and that recognize and are able to deal with the complex interacting relationships in the physical, economic and



*social domains, which together are the nexus to the only viable pathway to a sustainable agriculture and food-producing system.*

I would not pretend to prescribe in detail the specifics of the solutions, and the observations I made are simply the notions of an interested layman and practitioner. But if I read the evidence correctly, it certainly points to the need for a much more integrated policy and management framework if we are to move to a sustainable agricultural future.

The NARS Plan of Action and the agenda of this International Centers Week provide an encouraging and promising basis for the way ahead. I am very pleased and grateful for the opportunity that has been accorded me this morning to speak at the beginning of this important week.

Thank you.



## Questions and Answers

**MR. ROBERT CHANDLER** (former Director General, IRRI, and World Food Prize laureate): The thing that I noticed, Mr. Strong, in your excellent talk was that you made no mention of population control and the need for it. In a finite world I don't see how we can have sustainable production without having population control. Governments, national policies, individuals, families, more education, overcoming poverty, and all that are going to help, but I think that that needs to be stressed.

**MR. STRONG:** I thoroughly agree with Mr. Chandler, and perhaps I didn't give it the highlighting it deserves. The reason is that I was concentrating on those issues about which I felt the CGIAR and its institutes could do most. I did talk about the importance of the problem of concentration of population growth in the developing countries, but if I ever get asked to do a new version of this, I will give it more stress.

**MR. HANS-JOACHIM DE HAAS** (Germany): I have been very impressed with what we have been hearing about sustainable agriculture and its importance for poverty alleviation and reduction of malnutrition and hunger, from both Mr. Strong and from Mr. Wolfensohn.

However, as bilateral donors, we very often look at the World Bank as the leading organization and how it emphasizes certain activities in its budget. And I wonder whether this redirection and reemphasis on agriculture and the necessity to combine it with and base it on agricultural research results would not lead to an increased contribution of the World Bank to the CGIAR System in such a way that we as bilateral donors might follow you in this example.

**MR. STRONG:** This is one that Chairman Serageldin can address. One of the nice things about being an advisor is that you don't have to take responsibility. But I can tell you that my advice will be very much in that direction, and I think Ismail will tell you that the Bank has already made a significant additional contribution, which has made possible a revitalization of the CGIAR. And you heard President Wolfensohn say that, subject to his Board, he is committed to continued—and I think I heard or inferred—increased support.

**MR. SERAGELDIN (Chairman, CGIAR, and World Bank Vice President for Environmentally Sustainable Development):** I think it is well known to many people who have participated in the last two years that in fact the World Bank made a very exceptional effort on behalf of the CGIAR in 1994 and 1995. This exceptional effort was on the order of \$120 million over those two years, but this was an exceptional effort as understood. Since then, we have gone higher than we were before, but not at the same exceptional level.

In fact, I think it is precisely the changes that are occurring—the changes in membership, the diversification of our membership, where we are now welcoming so many new members who are developing country donors, not just the traditional OECD donors and international agencies—which ensure that the support of the CGIAR will be broad-based and should be diversified *from as many sources as possible*. I think this was part of the original thinking of the design, and it would be unhealthy for the CGIAR to rely excessively on any single participant or donor.

But as Maurice Strong has just said, and you have heard from President Wolfensohn, there certainly is a very strong and continued commitment to the CGIAR from the World Bank.

**MR. NYLE BRADY (former Director General, IRRI, and former Associate Administrator, USAID):** I was very impressed with this very excellent presentation and also with the good judgment of our speaker to spend his summers in the mountains of Colorado. I think that's a good place to go.

I am in complete agreement with everything you said you wanted the CGIAR to stress more. Would you care to comment on those things which you think we should stress less?

**MR. STRONG:** I think they really represent the other side of the coin because most of the specific observations I made as to where I believe the CGIAR could pay more attention would really represent a reorientation of its work, and some would of course require an expansion of its work.

I can't tell you where the reductions could come in, but perhaps there are a number of areas where you have really in a sense had it made, where your efforts are not quite as necessary in terms of priority. The actual development of new strains is something that I understand requires continued breeding

and continued work, and that obviously needs to continue. But surely some of the fundamental research work that gave rise to that—there must be some room for improvement there.

Because I am not an expert I certainly don't want to speak authoritatively on where you can reduce your work. I simply don't have sufficient knowledge to do that. But I sense that much of what I suggested really requires more of a reorientation of existing work and emphases rather than a cutting down of work in other areas. Obviously some of that would be necessary if you didn't get increased budgets, and I am sure that, like with most enterprises, there must be some room for doing that.

I moved into a big utility company recently, where everybody told me that they had already done all the cutting they could, and that more cutting wasn't very feasible. Well, \$2 billion and 20,000 people later, the place is still running quite well.

**MR. R. S. PARODA (India):** Mr. Chairman, I would like to compliment Maurice (Strong) for covering the varied issues that face agriculture today, and especially for the pessimistic approach which he condemned and the optimism which he expressed with regard to what the CGIAR can do in the years to come.

My comment is specific to two issues. Maurice very clearly emphasized one point, that subsidies in agriculture in the developed nations are to the detriment of agricultural growth in the developing countries, where we also feel that access to food is most important, and this access can only be possible if food is produced where a maximum of those in poverty live. So in that context, we would like to hear from him what would be his solution to this problem.

The second is that we seem to have done well through the CGIAR System in addressing the problem of hunger and food to a certain extent, but the issue now is with regard to household nutritional security. We didn't hear much from you in terms of what the CGIAR should do to address this issue of nutritional security, while we seem to have addressed food security to a reasonable extent.

**MR. STRONG:** On the first issue, I do actually believe and tried to say in my comments that it is the disconnect between the supplies of food and

the places where those supplies are needed that will constitute the greatest challenge of the future, and that on an aggregated basis you can certainly make the case that there will be more than enough food-producing capacity in the foreseeable future to meet the globally aggregated needs. But the real problem is the food deficit areas, the places which are chronically deficit, which do not at the moment have the capacity to produce the food they need. And as I mentioned, you cannot look to food aid in traditional terms as being a reliable source of supply in the future, so the real issue is in fact the one you spotlighted and focused on.

There are only two answers, really. One is to concentrate on increasing the local food production in those areas. The second is to try to ensure that they develop the potential for exporting in at least the amounts required to buy their food. That is one of the reasons why I pointed out that perhaps an important priority for the CGIAR in the period ahead would be to help those food-deficit areas to develop the higher value-added crops, which might provide the earnings they could use to purchase the food they can't grow for themselves in addition, of course, to concentrating on helping them increase their food production.

On the second issue of nutrition, yes, I perhaps could have given it more emphasis. I do myself consider food security to require nutritional security. I did not make that sufficiently evident in my comments. I do admit that every time I make a speech, I realize that if I had it to make over again, I could certainly improve it, and that's the case with this one.

**MR. WARREN C. BAUM (former Chairman, CGIAR):** I have an historical footnote and a comment in the form of a question.

The footnote has to do with the earlier point about the contribution of the World Bank. Former Bank President Robert McNamara, whose role in the launching of the CGIAR cannot be overestimated—he really was one of the two or three people without whom this would not have been possible—insisted that the World Bank's contribution should be no more than 10 percent. He said that to ensure we would make every effort to have all of the other potential donor countries contribute their share. The Ford Foundation, the Rockefeller Foundation, I, and others tried to budge him, but he was not movable on this point. It was only after new presidents came in that the World Bank's contribution began to rise to the very

high and impressive levels which our present Chairman has been able to achieve.

The question or comment has to do with a study which I saw recently in a CGIAR publication. It was done in Australia, and it was a study of the impact on Australian agricultural production of the technology which had been developed in the CGIAR centers. If I remember the conclusion correctly, it said the net benefits to agricultural production in Australia were so large that they would fund the Australian contribution to the CGIAR and to the national research institute in Australia for the next 100 years. If this is true of other countries, ought this not be a major thrust of this group in its efforts to raise more funds?

**MR. STRONG:** I agree, and that is why I indicated that, in addition to the persuasive case you have made for an increasing share of what may be diminishing Official Development Assistance budgets, trying to capture a portion of the value added that arises from the efforts of the CGIAR System certainly would represent probably the best additional opportunity for funding.

Now, how to do that is not easy, but the Australian case could be replicated, I'm sure, in Canada, the United States, and elsewhere. So I think that is a fertile field for exploring and hopefully achieving future contributions. It is only normal that those who benefit from these developments should in fact put something back into the System, other than just through voluntary contributions.

**MR. SERAGELDIN:** If I may just add a footnote to the comment, I think similar studies released about two weeks ago by the United States show remarkable figures as well—that for every dollar put into IRRI over the years, the United States benefits \$17 back, and for every dollar in CIMMYT, it benefits \$190. But the more stunning thing is that studies that have looked at the breakdown of benefits between the developing countries and the industrialized countries find the bulk of the benefits are going to the developing countries, and depending on the various crops, it is 5-to-3 or 7-to-2 or so on, the patterns that one observes. And despite that, the returns in the industrialized countries are enormous; way above what the investments are.

The rates of return on investments for the CGIAR in terms of the development impact alone run from a low of 22 to 42 percent in some potato pro-

grams to a high of 190 percent in maize programs in some places, and the average close to 50 percent in, say, wheat worldwide. For all of us who have been involved in the development business and in agriculture, to consider that 22 percent is the low end of your rate of return on investment is pretty stunning, and this is a consistent pattern in study after study, independent studies that have been done, that all come together around this point.

**PROFESSOR REGINA GATA (Zimbabwe):** I would like to congratulate Mr. Strong for a very in-depth, very balanced speech, especially when he presented both the positive contributions of the green revolution and the negative impacts as well. Also, I would like to thank him for recognition of the need for integration of modern science and indigenous knowledge.

My question is that it has now more or less been accepted that there is the need to integrate modern science and indigenous knowledge. But what I continue to observe is the resistance to acknowledge the owners, indeed to acknowledge that the knowledge has scientific bases among the modern scientists.

In our biodiversity meeting in Montreal, this was the strongest resistance I met from scientists. I would like to hear from Mr. Strong how this can be helped through the centers of excellence, because in my view, as long as the owners of the knowledge continue to be relegated to the back, and yet their knowledge is considered useful for sustainable development, I cannot see a balanced development process emerging from the partnership relationships that we are trying to forge.

**MR. STRONG:** Well, thank you very much for your generous comments. I would not pretend to be able to respond fully to that important question. However, I will observe that I have personally a great regard for traditional knowledge. When I was very young, I lived with the Inuit people up in the Arctic, and I learned much of my own respect for traditional knowledge and for the environment from them.

One thing I learned was that they do not store their knowledge and disseminate it in the same way that we are used to. They obviously have had a tradition of handing their knowledge down verbally and by example, not putting it in learned papers that can be consulted. I have also found in the field, that when the modern professional encounters the traditional person

who is the repository of traditional knowledge, there is almost an assumption on both sides of the superiority of the one and the inferiority of the other. And we Westerners are very profuse in our communication; we are not very patient at listening.

If I may just give you an example from my experience living with the Inuit people. There are long nights up there. The Inuits would discuss for hours, and then there would be silence for hours. I learned that just sitting there in silence—the silence itself—was part of the communicating process. But for us Westerners, silence is no part of our communicating process, and listening is something we do very reluctantly sometimes, and particularly listening to people who are reluctant to be forthcoming in their knowledge.

So I think there is a cultural gap, a communications gap, that tends to reduce communication of traditional knowledge and puts greater emphasis on communication of the modern knowledge through the professionals who are its repositories.

Now, this is not just a new comment; I have been trying to say this and trying to practice it myself, sometimes with difficulty—but professionals have got to learn to listen. And if there is any one thing that I would add to the training of your people, although I know the best of them are already very good listeners, it is to listen and learn and to communicate your own expertise. Only if there is listening on both sides will there be learning on both sides.

**MR. PAUL EGGER (Switzerland, Chair, CGIAR Oversight Committee):** I have a question, Mr. Strong, on your suggestion of one new area the CGIAR should become involved in, which is energy use efficiency. Do you suggest that the CGIAR address this basically in agriculture in the South? To what extent, also, do you see opportunities for the CGIAR to look at this at the global level, energy use efficiency in the North, policy research on energy and the way we handle energy in the North, and the interaction of the way energy is used in the industrialized world versus in the developing world, and what can the CGIAR really do about the question of energy use?

**MR. STRONG:** There is no question that it would be very difficult for the CGIAR to make a convincing case to the developing world on the need for and methods of achieving energy efficiency in agriculture if we were simply projecting the very bad habits we have in the North. The need is certainly

just as great. The wastage of energy is just as great, if not greater, in the agricultural systems of the industrialized world.

Of course, one of the problems is that they tend to be able to afford the waste more than it can be afforded in developing countries, but there is no question that this is something that is needed everywhere—everywhere, agriculture is wasteful of energy, and it is, as we all know, an energy conversion system in itself.

So yes, I think it would be very wise and productive for a program to improve the energy efficiency of agriculture to be both a North and South program.

**MR. SERAGELDIN:** Thank you very much. Ladies and gentlemen, I ask you to join me in thanking Maurice Strong.

## About the Speaker

Mr. Maurice F. Strong is Senior Advisor to the President of The World Bank Group. He is also Senior Advisor to the Secretary-General of the United Nations; Chairman of the Earth Council; Chairman of the World Resources Institute; Foundation Director of the World Economic Forum; Chairman of Technology Development, Inc.; Chairman of Strovest Holdings, Inc.; Chairman of Quantum Energy Technologies, Inc.; Chairman of the International Advisory Group of CH2M Hill Companies, Ltd.; Member of the Toyota International Advisory Board; and Member of the Lamonte-Doherty Observatory Advisory Board.

His past appointments are numerous. He was Secretary-General of the United Nations Conference on Environment and Development, and Executive Coordinator of the United Nations Office for Emergency Operations in Africa. He was Secretary-General of the United Nations Conference on the Human Environment, and the first Executive Director of the United Nations Environment Programme (UNEP). He was twice Under-Secretary General of the United Nations.

He was first President of the Canadian International Development Agency (CIDA); Chairman of the Board of Governors of the International Development Research Centre (IDRC) in Canada; Director of the Rockefeller Foundation; President of the World Federation of United Nations Associations, and President of the National Council of YMCAs of Canada. He was a Member of the World Commission on Environment and Development (the Brundtland Commission) and the Commission on Global Governance.

He has been Chairman and Chief Executive Officer of Ontario Hydro; President, Chairman, and Chief Executive Officer of Petro Canada; President of Power Corporation of Canada; and Chairman of the Canada Development Investment Corporation.

Mr. Strong is a Member of the Queen's Privy Council for Canada. He was awarded the Swedish Royal Order of the Polar Star and the Order of Canada. He is a Fellow of the Royal Society, United Kingdom, of the Royal Society of Canada, and of the Royal Architectural Society of Canada. He holds honorary doctorates from thirty-seven universities.