

CONSULTATIVE GROUP ON
INTERNATIONAL AGRICULTURAL RESEARCH



ECOLOGICAL SUSTAINABILITY AND FOOD SECURITY: CHALLENGES AND OPPORTUNITIES

MOHAMED T. EL-ASHRY

2002 SIR JOHN CRAWFORD MEMORIAL LECTURE



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ECOLOGICAL SUSTAINABILITY AND FOOD SECURITY: CHALLENGES AND OPPORTUNITIES

by Mohamed T. El-Ashry

Chief Executive Officer and Chairman
Global Environment Facility

2002 Sir John Crawford Memorial Lecture
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ECOLOGICAL SUSTAINABILITY AND FOOD SECURITY: CHALLENGES AND OPPORTUNITIES

My thanks go to Ian Johnson, to Francisco Reifschneider, and to everyone at the CGIAR for the honor and the opportunity to give the 2002 Sir John Crawford Memorial Lecture. Allow me to pay tribute to Ian Johnson for the superb job he has been doing as Chairman of CGIAR and as Vice President of the World Bank's Environmentally and Socially Sustainable Development Network.

It is said that Sir John Crawford was a man who spoke with authority. But this lecture is named for him because he was, above all else, a doer. Australia takes great pride in this native son—and with good reason. He was knighted for a lifetime of achievement that entailed long hours making breakthroughs alongside some of the world's poorest people.

As well as any institution can, the CGIAR embodies Sir John's brand of leadership. Your science bolsters food security in communities and climates where it is most in doubt. I am happy to report that the GEF-CG collaboration is more promising than ever, as we consider ways to mutually support and contribute to sustainable development and the global environment.

THE WILDERNESS AND THE GARDEN

“In wildness is the preservation of the earth.” When a famous recluse living on Walden Pond wrote these words in his diary, the year was 1850 or thereabouts. Society at large, and even most scientists, didn’t realize the full extent of their truth. After all, humanity had spent much of its history hunting, fishing, and clearing—in other words, preserving itself from wildness by exploiting it in ways that often gave little thought to the future.

Two decades would pass before the world’s first national park was designated and a century before Rachel Carson linked disappearing songbirds and birds of prey to the profligate use of DDT. Her alarm foreshadowed our efforts to combat persistent toxic substances today. The first global environmental issue to truly galvanize the world emerged in the 1970s, when Paul Crutzen and Mario Molina demonstrated that industrial compounds used in refrigerants and aerosols were depleting the ozone layer.

In the 21st century, hardly a week goes by without further confirmation that nature can be our saving grace—if we work together and treat it with the care and respect that it deserves. We can only guess at the existence of plants and fungi capable of joining penicillin, tamoxifen, quinine, codeine, and 24 other drugs in common use, as nature’s gifts to our medicine chest. Similarly, to find even one or two new useful crops among 23,000 unexploited species we know to be edible could save millions of people from malnutrition.

In nature’s eco-systems lies the preservation of humanity, yet it is to agriculture—and about 12 species of crops—that civilization looks for its next meal. We must find new ways to address the reality that we really cannot have one without the other. The ability of our planet to support life depends on its continued capacity to maintain key ecological functions. This, in turn, is the foundation for sustainability in all forms of human activity, and none more so than the sustainability of agriculture and fisheries for food security.

We all know that agriculture cannot succeed without healthy, intact ecosystems: a stable climate, forests, rivers and lakes, clean and abundant water, and rich soil. At the same time, there is little hope of saving the environment if people decide they must lay waste to it to provide for their families. The *finca* and the *selva*—the cultivated plot and the forest—need each other. Without agriculture, there is no life. Without the environment, there is no agriculture.

CURRENT TRENDS: FOOD SECURITY AND THE GLOBAL ENVIRONMENT

In the past 100 years, we have witnessed a massive transformation of farming practices brought about by industrialization, the “Green Revolution,” agribusiness and, now, new discoveries in genes and proteins. We have also seen a tremendous gain in food production in many developing countries. From 1970 to 1990, the proportion of chronically underfed people living in these nations fell from 36 percent to 20 percent. However, some of the means employed—indiscriminate clearing, flood irrigation, and excessive use of inputs—have exacted a high price. We pay this price every day in deforestation; the salinization and water-logging of soils; depleted rivers, aquifers, and lakes; and toxic chemicals in our surface and ground waters from pesticide and fertilizer run-off.

These environmental consequences are now threatening food security. Global progress on nutrition was slower between 1987 and 2000 than between 1970 and 1985. Worldwide, 800 million people do not have enough to eat. Children are hit especially hard: every year, 20 percent of the children in poor countries die before they reach the age of 5. Differences among regions and between rich and poor are an important subplot to this story. In South Asia and Sub-Saharan Africa, food insecurity persists alongside poverty, relatively high population growth, and environmental degradation.

At a time when nearly 1 billion people depend on fish as their primary source of protein, some 75 percent of the world’s marine fisheries are judged to be at risk. Fish catches in 15 of the world’s major fishing regions have fallen by 30 percent since 1989, according to the Food and Agriculture Organization of the UN (FAO).

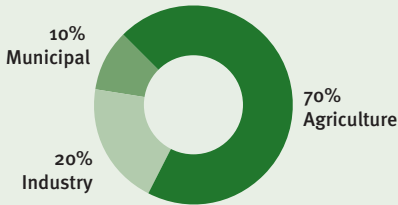
Forests contain two of every three land species and the highest species diversity of any system. Yet the world already has lost half of its forests and, according to the FAO, about 15.2 million hectares of forests disappear in the tropics every year. The largest areas threatened today—in Canada, Russia, much of the Amazon, Central Africa, and the large frontier forests of Indonesia, for example—are not subject to high population pressures. Rather, they are being cleared for industrial plantations, unsustainable timber harvest, and other agricultural activities.

Annual Change in Forest Area, 1990-2000 (million ha)

Domain	Natural Forest			Forest Plantations			Total Forest		
	Loss		Gain	Net change	Gain	Net change	Net change	Net change	
	Deforestation	Conversion to forest plantations	Total loss	Natural expansion of forest	Conversion from natural forest	Afforestation			
Tropical areas	-14.2	-1.0	-15.2	+1.0	-14.2	+1.0	+0.9	+1.9	-12.3
Non-tropical areas	-0.4	-0.5	-0.9	+2.6	+1.7	+0.5	+0.7	+1.2	+2.9
World	-14.6	-1.5	-16.1	+3.6	-12.5	+1.5	+1.6	+3.1	-9.4

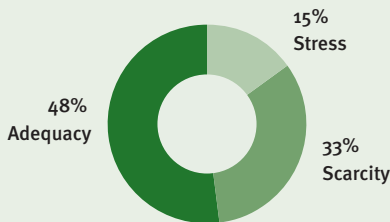
Source: FAO, *State of the World's Forests 2001*.

Agriculture Dominates Freshwater Use



Source: World Water Vision, 2000.

Projected Water Scarcity, 1995-2025



Note: Estimates for 2025 are based on the United Nations' low-range projections for population growth (7.2 billion). Four percent of water is unallocated.

Source: World Resources Institute, 2000.

The Intergovernmental Panel on Climate Change (IPCC) reported last year that temperatures could rise by between 1.4C and 5.8C over the next 50 to 100 years. The possible impacts of global warming are well known. Receding ice caps could cause sea level rises of tens of centimeters, threatening millions of people living in coastal areas where agricultural production is high. Up to one-fourth of the Nile delta—between 1,800 and 4,500 square kilometers of cropland—could be lost. Three-fifths of the Ganges-Brahmaputra delta could be inundated.

In the second half of the 20th century, water withdrawals from rivers, lakes, reservoirs, underground aquifers and other sources increased by a factor of more than four. Irrigation and, to a lesser extent, municipal and industrial uses of water have been the largest sources of this growing demand—about 70 percent of freshwater resources are used today for agriculture. By 2025, if current trends are not reversed, nearly two-thirds of the world's population will live in water-scarce areas.

Sometimes, in the light of all these challenges, there is the temptation to say, “Stop the world, I want to get off!” As professionals in the field of sustainable development, however, we can pause and take stock of problems as well as solutions. Without productive land and water resources and a stable environment, there can be no food. Feeding the world will require every ounce of our collective ingenuity to innovate and apply integrated and holistic ways of working with nature and natural resources.

THE CGIAR AND THE GEF

This is the agenda that the CGIAR and the GEF are revisiting through research and projects to help today's farmers realize the value of biodiversity, achieve food security, cope with social and environmental pressures, and gain more sustainable livelihoods.

In *Historia Naturalis*, Pliny (23 – 79 A.D.) describes the agricultural practices of his time. They included grafting and budding; the use of cultivated varieties adapted from nature to withstand physical stresses such as drought and pests; legume rotation to maintain soil fertility; greenhouses and irrigation; and the matching of crops with best climate and physical conditions, thus respecting limits.

Similarly, over the past 30 years, the CGIAR has harnessed science and technology to promote agricultural development and combat famine. More than 300 CG-derived varieties of wheat and more than 200 varieties of maize are

now being grown by farmers in developing countries. New corn types with higher protein content have been developed by the International Maize and Wheat Improvement Center (CIMMYT), and International Rice Research Center (IRRI) scientists have been tapped for the international effort for “Golden Rice.”

Golden Rice and the Promise of Research

RICE IS A STAPLE FOOD FOR ONE-HALF OF THE WORLD’S POPULATION. THEREFORE, THE NEWS THAT A NEW RICE—GOLDEN RICE—HAD BEEN DEVELOPED BY SWISS RESEARCHERS SPARKED BANNER HEADLINES. RICH IN BETA CAROTENE (THE PRE-CURSOR OF VITAMIN A) AND OTHER CAROTENOIDS, THE NEW RICE COULD BE MORE EFFECTIVE IN COMBATING VITAMIN A DEFICIENCY, A CONDITION ESTIMATED TO CAUSE HALF A MILLION CASES OF IRREVERSIBLE BLINDNESS AND UP TO 1 MILLION DEATHS WORLDWIDE EVERY YEAR.

SCIENTISTS AT THE INTERNATIONAL RICE RESEARCH CENTER (IRRI) HAVE EMBARKED ON A MAJOR EFFORT TO INVESTIGATE THE SAFETY AND EFFICACY OF THE NEW RICE. ALTHOUGH THE WORK COULD BE TAGGED “HIGH SCIENCE,” THE IRRI EFFORT BEGAN BY GOING BACK TO THE BASICS: SEEKING A BETTER UNDERSTANDING OF THE RELATIONSHIP BETWEEN PLANTS AND THEIR ENVIRONMENT; EXPLORING WHICH POPULATIONS IN ASIA NEED A VITAMIN A DIETARY BOOST; AND GAINING IN-DEPTH KNOWLEDGE ABOUT THE NATURAL, SOCIAL, AND COMMERCIAL ENVIRONMENTS IN WHICH RICE IS GROWN.

THIS RESEARCH IS A PUBLIC-PRIVATE PARTNERSHIP THAT OFFERS ONE POTENTIAL SOLUTION TO THE PROBLEM OF VITAMIN A DEFICIENCY. THROUGH THEIR WORK AND AN UNREMITTING COMMITMENT TO ACHIEVING THE HIGHEST BIOSAFETY STANDARDS, IRRI SCIENTISTS HOPE TO BE ABLE TO DELIVER ON THE PROMISE OFFERED BY GOLDEN RICE.

Source: CGIAR 2001

Between 1910 and 1940, the pioneering Russian agronomist Nikolai Vavilov collected hundreds of wild crop relatives that had originated in Africa, Central and Southeast Asia, the Mediterranean, and South and Central America. This research proved a thesis he had developed: that most crop plants grown throughout the world are not native to the areas of greatest production. Vavilov identified eight areas of the world important for agriculture, and they correspond very closely with recently identified biodiversity “hotspots”. These include: Afghanistan and Pakistan; Bolivia and the coastal mountains of Brazil; East Africa; eastern China; India and Malaysia; Iran and Iraq; the Mediterranean and North Africa; Mexico; Peru, and Turkey.

Fifty years later, the GEF has projects in all of these hotspots. We know these centers of diversity are critical today because they can be used to contribute very useful hereditary genes, such as resistance to disease and pests, to weeds, and to water and temperature stress that have been bred out of modern crop varieties. For example, a GEF project conserving African land races in Ethiopia provided barley germplasm critical to agriculture in many countries, both developed and developing. The project fostered teamwork by farmers and genetic research institutions, enabling continued evolution of valuable land races through farmer selection, interaction with the environment, and genetic exchange with wild species.

Guarding Biodiversity

CGIAR HOLDS IN PUBLIC TRUST THE WORLD’S LARGEST COLLECTION OF PLANT GENETIC RESOURCES—MORE THAN 530,000 ACCESSIONS OF MORE THAN 3,000 SPECIES, INCLUDING:

- 6,000 ENDANGERED VARIETIES OF LATIN AMERICAN MAIZE,
- 5,400 POTATO SPECIMENS,
- 40,000 ACCESSIONS OF CROPS AND PLANTS IMPORTANT TO AFRICA, AND
- 117,000 SAMPLES OF CROPS GROWN IN THE WORLD’S DRY AREAS

Source: CGIAR 2001

Like the CG, the GEF is a strategic alliance—among developed and developing countries; between U.N. and Bretton Woods institutions; and between the GEF Secretariat, its implementing and executing agencies, an international scientific and technical advisory panel (headed by the distinguished Mexican scientist Julia Carabias), NGOs, and the private sector. International conventions and other global agreements on biodiversity and biosafety, climate change, desertification, international waters, stratospheric ozone, and, as of last year, persistent organic pollutants increasingly rely on the GEF as their primary engine for action. Our portfolio stands at more than 1000 projects in more than 140 countries and is worth more than \$16 billion.

GEF's Mission and Role

THE GLOBAL ENVIRONMENT FACILITY (GEF) IS THE FINANCIAL ENGINE THAT DRIVES ACTIONS TO IMPROVE THE GLOBAL ENVIRONMENT. THE GEF CHANNELS MULTILATERAL FUNDS INTO PROJECTS INITIATED BY PEOPLE IN DEVELOPING COUNTRIES THAT CREATE GLOBAL ENVIRONMENTAL BENEFITS. IT HAS GROWN FROM A PILOT PROGRAM TO THE LARGEST SINGLE SOURCE OF FUNDING FOR THE GLOBAL ENVIRONMENT. IN 2002, DONOR NATIONS PLEDGED THEIR SUPPORT OF A \$3 BILLION, 4-YEAR REPLENISHMENT OF THE GEF TRUST FUND, THE LARGEST EVER.

THE GEF'S THIRD REPLENISHMENT CAPS A DECADE OF SUCCESSFUL EFFORTS TO LINK GLOBAL ENVIRONMENTAL BENEFITS AND SUSTAINABLE DEVELOPMENT. SINCE ITS CREATION IN 1991, THE GEF HAS APPROVED MORE THAN 1,000 PROJECTS IN OVER 140 DEVELOPING NATIONS AND COUNTRIES WITH ECONOMIES IN TRANSITION. GEF HAS COMMITTED \$4 BILLION IN GRANTS AND LEVERAGED \$12 BILLION MORE FROM OTHER SOURCES. IN ADDITION, THE GEF HAS MADE MORE THAN 3,000 SMALL GRANTS, UP TO \$50,000 EACH, DIRECTLY TO NGOs AND COMMUNITY ORGANIZATIONS.

THE GEF'S MANDATE IS TO FORGE INTERNATIONAL COOPERATION AND FINANCE SOLUTIONS TO CRITICAL THREATS TO THE HEALTH AND WELFARE OF ALL PEOPLE ON EARTH: BIODIVERSITY LOSS, CLIMATE CHANGE, DEGRADATION OF INTERNATIONAL WATERS, OZONE DEPLETION, DESERTIFICATION, AND PERSISTENT ORGANIC POLLUTANTS. AN INDEPENDENT AND IN-DEPTH ASSESSMENT OF THE GEF'S PERFORMANCE FOUND "SIGNIFICANT RESULTS IN EFFECTIVELY USING ITS RESOURCES FOR GLOBAL ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT." ONE HUNDRED AND SEVENTY-THREE COUNTRIES ARE GEF MEMBERS.

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Looking back at our collective accomplishments, yours and ours, it is not an overstatement to say that the CGIAR and the GEF have made concrete, positive contributions to people's lives and the places they call home.

HARMONIZING GROWTH AND PRODUCTIVITY WITH SUSTAINABILITY

The question we must now ask ourselves, however, is this: In the face of 90 million additional people being added to our global village each year, how can we ensure sustainable development by bringing growth and environmental protection into harmony? What will it take to protect our biological heritage, avoid devastation from climate change, sustain the soil and water that give us life, protect human health, and reduce the scourge of poverty and hunger? How do we summon and perpetuate the necessary political will?

First, we must forsake single-sector approaches that rely too heavily on short-term technical fixes and end up resulting in long-term environmental degradation. We need to address policy and institutional issues, such as the pricing of natural resources and counter-productive agricultural subsidies. We need to spread the word about sustainable agriculture, water-saving irrigation, and other common-sense practices that work. We need to employ science and modern information technologies *and* tap traditional and indigenous wisdom. We need systems of land tenure that do justice to land and the people who work it. Consider this statistic: one-third of all rural households are headed by women, yet just 2 percent of the land is owned by them.

As we look ahead, the next decade presents a unique opportunity to ensure that environmental sustainability is fully and effectively integrated into actions designed to achieve sustainable development and fulfill the aspirations of poor and hungry people in the world.

Quality Protein Maize Reaps Millennium World Food Prize for Two CGIAR Scientists

A LIFETIME'S WORK IN DEVELOPING A HIGHER-YIELDING, PROTEIN-RICH MAIZE THAT CAN HELP PREVENT MALNUTRITION IN MILLIONS OF PEOPLE EARNED TWO CGIAR SCIENTISTS, DR. SURINDER K. VASAL AND DR. EVANGELINA VILLEGAS, THE MILLENNIUM WORLD FOOD PRIZE. DR. VILLEGAS IS THE FIRST WOMAN EVER TO RECEIVE THE PRIZE. BOTH SHE AND DR. VASAL ARE AFFILIATED WITH THE INTERNATIONAL MAIZE AND WHEAT IMPROVEMENT CENTER (CIMMYT).

THIRTY-FIVE YEARS IN THE MAKING, THE NEW QUALITY PROTEIN MAIZE (QPM) LOOKS AND TASTES LIKE NORMAL MAIZE, WITH ONE VITAL DIFFERENCE: IT CONTAINS TWICE THE AMOUNT OF LYSINE AND TRYPTOPHAN, AMINO ACIDS ESSENTIAL FOR HUMAN HEALTH AND NUTRITION. QPM'S NUTRITIVE VALUE APPROACHES THAT OF PROTEIN FROM SKIM MILK. IT IS BEING GROWN IN 20 COUNTRIES IN LATIN AMERICA, ASIA, AND AFRICA.

Source: CGIAR 2001.

This goal will take new ways of acting and thinking—we must develop more holistic policies and management approaches, and incentives that allow for more rational and efficient use of resources. We must involve and seek partnerships with a range of stakeholders, particularly NGOs and the private sector. I was pleased to see the names of many leading agribusinesses among those participating in a new partnership for sustainability with the CGIAR. International trade and private investment flows can make or break many of our efforts on the sustainable development and food security fronts. GEF can help level the playing field for least developed countries seeking trade and investment through technology transfer and by providing grant resources for legal, policy, and institutional reforms.

STRATEGIES AND PARTNERSHIPS

I would like to suggest that the CGIAR should, in consultation with other stakeholders, ensure that its strategic research agenda is aimed at contributing to the achievement of global sustainability and the goals of the Millennium and Johannesburg Summits in at least three areas: integrated land and water management, increased attention to small farmers and marginal lands, and mitigation of agricultural impacts on climate change.

Integrated land and water management. The need for a paradigm shift from a single-sector approach to an integrated land- and water-management approach is supported by the experience from both developed and developing countries. Although it often leads to short-term economic gains, the single-sector approach to land and water management can result in long-term environmental degradation because it fails to account for the complex linkages among various components of the ecosystem. The single-sector approach typically seeks to maximize the benefits of one sector, such as irrigated agriculture, without considering impacts on other sectors.

Development activities in the Senegal River valley highlight many of the unintended environmental and social impacts of the single-sector approach to land and water management. Two dams were constructed on the Senegal River in the 1970s to support intensive rice production, electricity generation, and year-round navigation. Environmental and social considerations were not fully addressed in the design of the projects. As a result, the projects' initial economic success, in terms of rice production and electricity, has been overtaken by rising environmental and social costs. About 50 percent of the irrigated fields have been lost to soil salinization, dams and dykes have reduced traditional grazing lands from 80,000 hectares to 4,000 hectares, water pollution from pesticides and other agrochemicals is prevalent, and fish production in the river and estuary has dropped by 90 percent.

Increased attention to small farmers and marginal lands. According to the International Fund for Agricultural Development (IFAD), the poor natural resource base in countries such as Bangladesh, Botswana, the Dominican Republic, Haiti, Honduras, Lao People's Democratic Republic, Mali, Nepal, Papua New Guinea, Peru, and Somalia has been found to contribute significantly to rural poverty. In many of these countries, the land simply does not support diversified agricultural activities (see Table 1).

Regional Distribution of People Living on Fragile Land

Region	Population on fragile lands by region	
	Number (millions)	Share of total (%)
LATIN AMERICAN AND CARIBBEAN	68	13.1
EASTERN EUROPE AND CENTRAL ASIA	58	12.1
MIDDLE EAST AND NORTH AFRICA	110	37.6
SUB-SAHARAN AFRICA	258	39.3
SOUTH ASIA	330	24.4
EAST ASIA AND PACIFIC	469	25.3
OECD GROUP	94	11.1
OTHER	2	6.9
Total	1,389	24.7

Source: World Bank 2002.

Thus, if we are serious about poverty alleviation and hunger reduction, major attention must be given to resource-poor small farmers and to marginal lands. Resource-poor farmers—mainly in semi-arid, rainfed, and upland areas—have been by-passed by the Green Revolution. They have not had access to improved varieties and farming systems that offer significant productivity gains. They have not enjoyed the large subsidies extended to “irrigation.” And their incomes have suffered from depressed agricultural prices and the surpluses generated by resource-rich regions. In addition, experience in countries such as Bangladesh, Botswana, Mali, Senegal, and Somalia has shown that segments of the population that are relatively poor suffer disproportionately from droughts, floods, and other natural calamities that seem to increasingly afflict these countries.

In this regard, strengthening national agricultural research systems is indispensable to the achievement of food security and sustainable land management. Capacity-building programs should be tailored to the needs of the scientific community and other stakeholder groups in developing countries. These programs can help raise environmental awareness related to agriculture and farming practices, improve technical skills, and provide facilities and training to support integrated natural resource management.

Mitigating agriculture's impacts on climate change. If we believe the IPCC's most recent assessment of climate change (and we should), then the CGIAR must deal squarely with the fact that a significant portion of the total emissions of greenhouse gases comes from agricultural activities. Agriculture's contribution to climate change is starting to be recognized. Clearing forests for fields and pasture, flooding areas for rice production, burning crop residues, and using nitrogen fertilizers, all release greenhouse gases into the atmosphere. Agriculture is estimated to account for about 20 percent of total anthropogenic emissions of greenhouse gasses. Research to mitigate the impact of agriculture on earth's climate needs to carry equal weight with research addressing adaptation of the agro-ecosystem to climate change.

In the 1990s, GEF collaborated with the World Agroforestry Centre in a global program to provide alternatives to slash-and-burn agriculture. This partnership helped farmers, their forests, and our climate, by reducing atmospheric carbon dioxide. In addition, one of GEF's projects, in partnership with IRRI and the Philippines, is addressing rice-field methane emissions.

The GEF's role in adaptation under the climate change convention will be growing, now that management of the new Adaptation and Least-Developed Country Funds has been entrusted to GEF. Agriculture will be of paramount importance in most participating countries. The bulk of our climate change dollars, including \$5 billion in co-finance, support renewable energy and energy efficiency projects. These expenditures make the GEF the largest investor in modern energy services for the developing world. Small-scale renewable energy installations are powering water pumping and other productive on-farm activities, as well as value-adding micro-enterprises, schools, health clinics, and TVs, radios and computers for linking to information and markets. And they do all this while conserving fuel wood and other natural resources, and reducing air pollution in households and in our atmosphere.

That leads me to the last area I want to highlight today—that of partnerships. The challenge of achieving food and environmental security is too great for one nation or one institution to tackle alone. One of the positive lessons from the "Green Revolution" in the 1960s and 1970s is that partnerships involving a broad array of governments and non-governmental stakeholders, bilateral and multilateral development agencies, and foundations can play a major and successful role in addressing the issue of food insecurity.

The GEF has also demonstrated the importance of partnerships, being itself one large partnership. We have provided coordinated financial and technical

assistance to developing countries and economies in transition through a multitude of partnerships, including partnerships with CGIAR Centers.

I have already mentioned the partnership with the World Agroforestry Centre on a global program to provide alternatives to slash-and-burn agriculture. Other GEF-CGIAR partnerships include: work through ICRISAT to recover desertified lands in West Africa; through ILRI to address land degradation in East Africa; through ICARDA for dry land agrobiodiversity in Jordan, Lebanon, Syria, and the West Bank and Gaza; and with CIFOR for national forestry planning, a key component of the Biodiversity Planning Support Program.

All in all, in the first 11 years of GEF's existence, we have had a good, collaborative, and productive relationship with the CGIAR. The challenges ahead are enormous for both our institutions but we can face them decisively by strengthening our partnership. Pooling our collective resources, our expertise, and our networks of partners to assist our member countries in the pursuit of sustainable development and global environmental protection can go a long way toward achieving real progress in the coming decade.

Other international institutions have an important role to play in this regard as well. But progress will not be achieved if institutions remain rigid. In fact, institutions can become irrelevant if they do not adjust to changing circumstances. This is another area in which the CGIAR and the GEF can benefit from each other's experience in dealing with the needs of today and adjusting to those of tomorrow.

CONCLUSION

The World Summit on Sustainable Development has reaffirmed the commitment of the international community to sustainable development. I have focused my lecture today on three of its major outcomes: integration, implementation, and partnership. In many ways, we have entered one of the most creative phases in human history. Science, technology, and communications are advancing at breathtaking speed and offering unmatched opportunities for responsible action. We have new tools and a vastly increased understanding that our strength lies in working together to overcome the threats facing our planet.

For this new era to build on past success and fulfill its promise, giving concrete form to the Johannesburg declaration and the Millennium Development Goals, we need to strengthen our partnerships, multiply our resources, and, increasingly, focus on on-the-ground results. Most of all, there is no substitute for each and every one of us giving our all.

As the philosopher Lao Tze wrote:

Those who are filled with life
Need not fear tigers and rhinos in the wilds,
Nor wear armor and shields in battle.
The rhinoceros finds no place in them for its horn,
The tiger no place for its claw,
The soldier no place for a weapon,
For death finds no place in them.

Yours and ours is the business of life, for our generation and all others to come. Thank you.

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. Sir John (1910 – 1984) was the first Chair of the CGIAR's Technical advisory Committee.

SIR JOHN CRAWFORD MEMORIAL LECTURERS

- 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
- 1997 Omar Kabbaj, Morocco
- 1998 Peter C. Doherty, Australia
- 1999 Michael Lipton, United Kingdom
- 2000 J. Craig Venter, United States
- 2001 Nafis Sadik, Pakistan
- 2002 Mohamed El-Ashry, Egypt

MOHAMED T. EL-ASHRY BIOGRAPHY



Mohamed T. El-Ashry is the chief executive officer and chairman of the Global Environment Facility (GEF). He has been the GEF Chairman since 1991, and was appointed the first CEO and Chairman of the GEF in 1994. Under his leadership, the GEF grew from a pilot program with fewer than 30 members to the largest single source of funding for the global environment, with 173 member countries. In 2002,

donors cast an extraordinary vote of confidence by replenishing GEF's trust fund by nearly \$3 billion—the largest amount ever.

Dr. El-Ashry came to the GEF from the World Bank, where he was the chief environmental advisor to the president and director of the Environment Department. Prior to joining the World Bank, he served as senior vice president of the World Resources Institute and as director of environmental quality with the Tennessee Valley Authority. He has held teaching and research positions at Cairo University, Pan-American-U.A.R. Oil Company, Illinois Geological Survey, Wilkes University, and the Environmental Defense Fund. He has also served as senior environmental adviser to the United Nations Development Programme, as special adviser to the Secretary General of the 1992 U.N. Conference on Environment and Development, and as a member of the World Water Commission.

Dr. El-Ashry received his B.S. degree with honors in 1959 from Cairo University and his PhD in geology in 1966 from the University of Illinois. He has received numerous international awards and honors and is the author of three books and more than 200 papers.

Dr. El-Ashry is a fellow of the Geological Society of America and the American Association for the Advancement of Science. He is listed in *American Men and Women of Science* and *Men of Achievement*.

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