



THE WORLD FOOD PRIZE.®



CONFRONTING CRISIS *Agriculture and Global Development in the Next Fifty Years*

THE 2008 BORLAUG DIALOGUE
OCTOBER 15 - 17 · DES MOINES, IOWA

THE 2008 BORLAUG DIALOGUE

<i>Ambassador Kenneth Quinn: Confronting Crisis</i>	4
<i>Norman E. Borlaug: Agriculture's Global Hero Continues to Inspire</i>	5
<i>Sir Gordon Conway: The Global Agricultural Crisis of the 21st Century</i>	6
<i>Graham Stegmann: Infrastructure for Development and Food Security</i>	7
<i>Conversation: International Cooperation in Education, Extension, and Research</i> <i>W. Ronnie Coffman, Gregory Geoffroy, Monty Jones, Peter McPherson, Olive Mugenda, Ren Wang</i>	8
<i>Conversation: Promises and Challenges of Next-Generation Science and Technology</i> <i>Martin Fisher, Scott Kilman, Bernadene Magnuson, Clay Mitchell, Roberto Rodrigues, Paul Schickler, Judi Wakhungu</i>	14
<i>Rita Sharma: Agriculture, Climate Change, and Poverty in India</i>	20
<i>Conversation: Biodiversity and Agricultural Security</i> <i>Pamela Anderson, Margaret Catley-Carlson, Cary Fowler, Emile Frison, Rosamund Naylor, Ed Rege, Ravi Singh</i>	21
<i>Conversation: Trends and Impacts of Rising Production Costs and Rising Food Prices</i> <i>Jim McCarthy, Rajul Pandya-Lorch, John Powell, Jerry Steiner, Bob Thompson, Carlo Trojan</i>	28
<i>Josette Lewis: The Role of Foreign Assistance in Eliminating Hunger</i>	35
<i>Sylvia Mathews Burwell: Seizing the Moment, Seeding the Future</i>	36
<i>Robert Hormats: Urban and Rural Food Security in Emerging Areas</i>	38
<i>Conversation: The Role of the Private Sector in Global Food Security and Development</i> <i>Sarah Hull, Carl Hausmann, Robert Lane, Sheri Schellhaass, Jerry Steiner, Samuel Worthington</i>	39
<i>Robert Zoellick: Leading the Response to International Crisis</i>	46
<i>Robert Dole and George McGovern: The 2008 World Food Prize Laureates</i>	48
<i>Ed Schafer: The Secretary's Address: New Partnerships for Agriculture</i>	54
<i>Joaquim Chissano: Looking Ahead Fifty Years: A Vision for Africa</i>	56
<i>Conversation: Lessons Learned from Investments in Agricultural Development</i> <i>Joaquim Chissano, Rajiv Shah, Rita Sharma, Roger Thurow</i>	57
<i>Conversation: The Challenge of an African Green Revolution</i> <i>Daphrose Gabakwa, Richard Mkandawire, Namanga Ngongi, Armando Panguene, Pedro Sanchez, Speciosa Wandira</i>	62
<i>Judith Rodin: Gender and Poverty in the Age of Climate Change</i>	68
<i>Conversation: Trade and Untapped Economic Growth in Developing Countries</i> <i>Kym Anderson, Pedro de Camargo Neto, Robert Thompson, Rhoda Peace Tumusiime, Ann Tutwiler</i>	70
<i>The Global Youth Institute</i>	76



Pictured on the Cover :

*(Top row, l-r): Rita Sharma, Joaquim Chissano, Daphrose Gabakwa, Ed Schafer
(Bottom row, l-r): Sylvia Mathews Burwell, Robert Zoellick, Judith Rodin, Cary Fowler*

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Complete transcripts from the 2008 Borlaug Dialogue can be found at <http://www.worldfoodprize.org/symposium/2008/transcripts.htm>.

For additional information on the Borlaug Dialogue, please contact Frank Swoboda of The World Food Prize Foundation at 515-245-3798 or fswoboda@worldfoodprize.org.



CONFRONTING CRISIS

AMBASSADOR KENNETH M. QUINN
President, The World Food Prize Foundation

When we began planning last year for the 2008 World Food Prize and Norman E. Borlaug International Symposium, we chose the theme “Confronting Crisis” to assess challenges that agriculture and global development would face over the coming five decades. We didn’t realize that food prices would spike so dramatically or that the world financial system would face severe danger this very year.

As you see in this book, some of the world’s foremost experts and highly respected leaders gathered in Des Moines to offer provocative insights and engage in compelling conversations on the causes and effects of these crises, as well as critical elements for the future.

With the number of hungry people in the world creeping closer to 1 billion; climate change, water shortages, and depleted soils pressuring agricultural yields in the face of expanding demand; and food insecurity and lack of opportunity particularly threatening women, youth, and vulnerable people in the world’s most marginalized areas – the challenges discussed at the 2008 “Borlaug Dialogue” were perhaps more dire and pressing than ever before.

Yet, as each of these distinguished speakers noted, there are numerous opportunities to build on and continue the work of our founder, Dr. Norman E. Borlaug, whose agricultural innovations over the past century made him “the man who saved more lives than anyone who has ever lived.”

Policymakers from Africa, Brazil, China, Europe, India, and the United States exchanged ideas on how new partnerships can

allow all people access to food. CEOs and top executives from agribusiness and the food industry outlined investments their companies are making to strengthen connections throughout the agriculture and food value chain. Leading academics, researchers, development officials, and farmers stressed the importance of cutting-edge science and technology making good on its promise to boost production, enhance nutrition, and support sustainability.

Sylvia Burwell and Rajiv Shah from the Bill & Melinda Gates Foundation, Judith Rodin of the Rockefeller Foundation, and World Bank President Robert Zoellick spoke in detail about the renewed priority, vision, and resources that they and their international partners are devoting to agriculture and the infrastructural systems to support it.

Also offering inspiration and hope for conquering hunger were the legacies of Dr. Borlaug and the World Food Prize Laureates – particularly the 2008 recipients of our \$250,000 award, Senators Robert Dole and George McGovern, honored for their work to provide nutritious meals to millions of children, particularly girls, in schools around the world.

This book highlights the “conversations” of the Borlaug Dialogue, which again attracted well over 500 eminent participants from more than 65 countries. Full transcripts are available at www.worldfoodprize.org.

In addition to the symposium, the week of events included the annual Iowa Hunger Summit, an engaging Laureates Forum with Senators McGovern and Dole which drew 550 people, and meetings of groups including USDA’s Foreign Agricultural Service, the Board for International Food and Agricultural Development, the International Food and Agricultural Trade Policy Council, and the Partnership to Cut Hunger and Poverty in Africa.

All these rich conversations actively involved more than 100 high-school students and a like number of teachers from around Iowa, 13 other states, and four countries, participating in our ever-expanding and one-of-a-kind Global Youth Institute.

Taken as a whole, the 2008 World Food Prize was again, we believe, “the most significant observance of World Food Day anywhere around the globe,” and we are indebted to our sponsors and partners, without whose generous support none of our activities and programs would be possible.

The success of this year’s celebration has us already looking ahead to October 14-16, 2009, when our next Borlaug Dialogue will look at food and agriculture’s connection to issues of national and international security. I hope you will plan to join us.



*Dr. Norman Borlaug meets with over 30 USDA Borlaug Fellows from 18 countries.
 Inset: Dr. Borlaug with 2008 World Food Prize Laureate George McGovern and 2003 Laureate Catherine Bertini.*

AGRICULTURE’S GLOBAL HERO CONTINUES TO INSPIRE

More lifesaving achievement gathers at each year’s World Food Prize in Des Moines than anywhere else in the world. Foremost among the luminaries present is Nobel Peace Prize Laureate and “Father of the Green Revolution” Dr. Norman Borlaug, whose participation is always a major thrill for the attendees.

The World Food Prize events draw a great deal of meaning from this global hero of agriculture, who again this year was able to make the trip to Des Moines. October 16 is celebrated globally as World Food Day, and in Iowa as Norman E. Borlaug/World Food Prize Day, honoring Dr. Borlaug’s several decades of improving production and championing greater attention to hunger, malnutrition, and food insecurity in Latin America, Asia, the Middle East, and Africa.

For the third year, the Norman E. Borlaug International Fellows program of USDA’s Foreign Agricultural Service brought to the World Food Prize over 30 outstanding graduate researchers

and young professionals in agricultural and food sciences from 18 countries. The Borlaug Fellows attended the symposium and Laureate Award Ceremony and also had a chance to meet and speak with Dr. Borlaug, who looks forward to personally welcoming and getting to know the Borlaug Fellows as part of each year’s events.

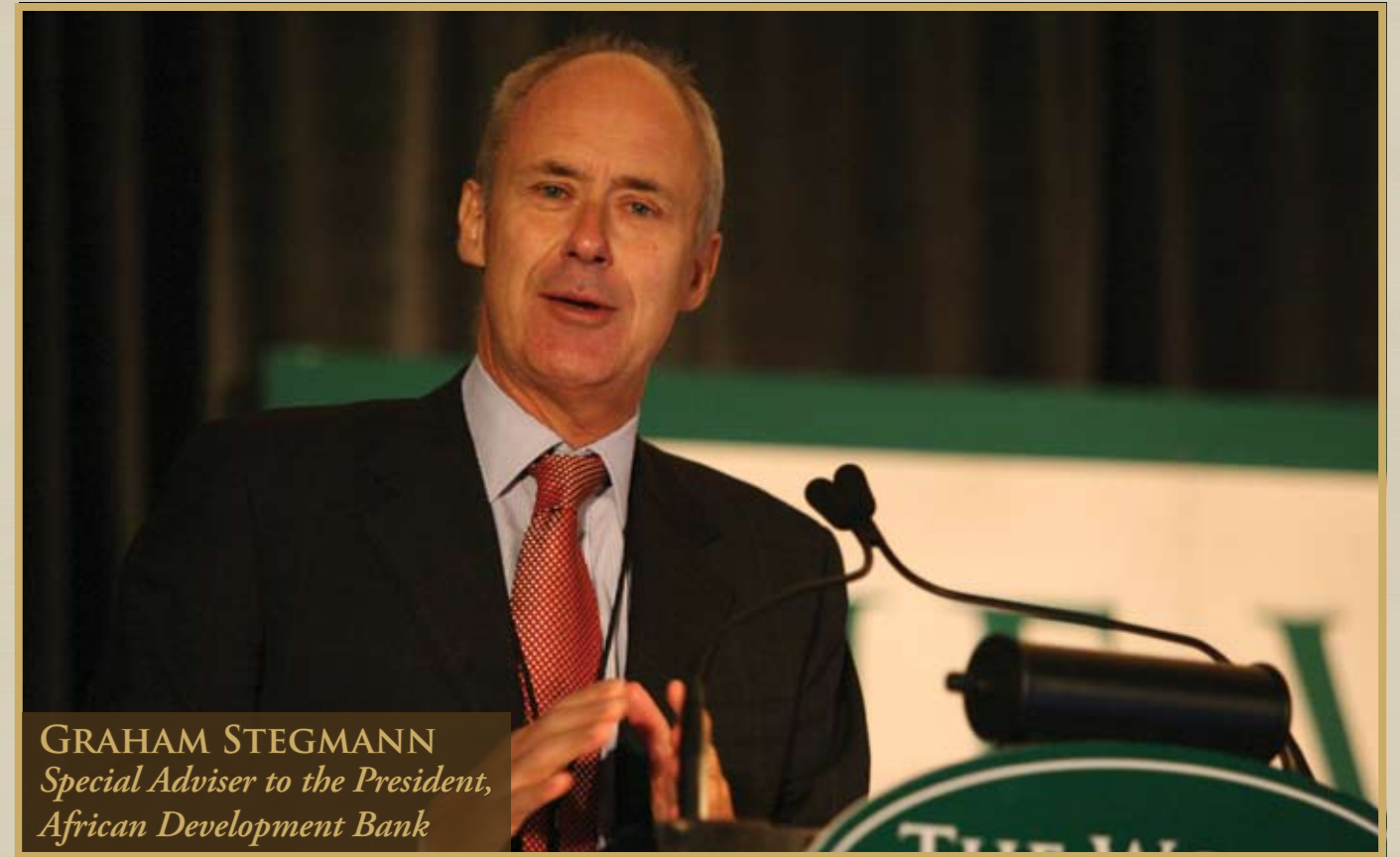
The World Food Prize Global Youth Institute – which Dr. Borlaug has called his “single greatest legacy” – similarly seeks to develop a new generation that will carry on Dr. Borlaug’s global fight against hunger and poverty.

In 2008, as in past years, the World Food Prize sought through its programs to further preserve the legacy of its founder on behalf of the millions upon millions of lives he has saved and the many millions more facing hunger this year and in coming decades. The commitment and vision espoused by the participants and attendees of the Borlaug Dialogue are a tribute to Dr. Borlaug’s inimitable life of achievement.





SIR GORDON CONWAY
*Chief Scientific Adviser,
 UK Department for International Development*



GRAHAM STEGMANN
*Special Adviser to the President,
 African Development Bank*

THE GLOBAL AGRICULTURAL CRISIS OF THE 21ST CENTURY

We are in the middle of a number of crises. The financial and the food crisis are probably the biggest, but there are others. We don't understand them very well. We don't know how to manage them very well. And, even more scary, they're beginning to join up.

What that has done is create 100-150 million more hungry people on top of the 850 million we've got already. The worst statistic is the 400 million women who are anemic. If a woman is anemic and gives birth, she may die, the baby might die. It's a great stain on the world that we've got 400 million women living like that.

We may grow biofuels for energy security, to increase farm income, to reduce carbon emissions. They're not mutually exclusive. But we need to be much more explicit and upfront about why it is that we're growing a biofuel crop. And is it profitable, cheap, environmentally friendly, socially acceptable? Do the poor benefit? Is it at least carbon-neutral? Very few first-generation biofuels pass muster.

Cereal yields remain low in Africa, 1 ton per hectare. Public funding of agricultural research has declined. In developed countries, the private sector is producing the seed and technologies. But that's not working in the developing countries. We have to get public

funding of agricultural research up if Africa's going to benefit.

The challenge for [biotechnology] is to produce products that are valuable for small farmers, for consumers, and for the environment. The advantage of a genetically modified cabbage is it reduces insecticide use and the loss of insecticide into the water that goes into the drinking around urban areas. We need more of that. The Chinese have got something like 20 or 30 different GM crops waiting to be released. When those start, we'll see a major sea change.

The important thing about climate change is water. In many places droughts and floods will occur with greater frequency and intensity. In the same place we're going to have droughts and floods, and not know from year to year which. How do you deal with that? One answer is, build the diversity of the source of livelihoods of poor farmers. So when the next flood or drought comes – and it will – that family will have a range of sources of income to rely upon. That's what's going to be crucial.

We need to build up participation in high-value agricultural markets. You can see it in China. They're growing walnuts in the loess plateau to sell in Singapore. It's that entrepreneurship that we need, all around the world. ■

INFRASTRUCTURE FOR DEVELOPMENT AND FOOD SECURITY

Africa is a rural continent. The majority of Africans rely on agriculture as a source of income, as farmers or indirectly as consumers. 80 percent of African farmers are smallholders. It's to that group that we need to look for progress. Smallholder capacity is limited not so much in Africa by farm size but by lack of physical assets, irrigation, transport, and other infrastructure. Without it, most farmers will not be able to enter a modern procurement system. Without being able to enter into longer-term contracts, progress is going to be very slow.

We have a huge rural-infrastructure gap, much higher costs of transport, and very high costs of maintaining that infrastructure. The perishability of most agricultural products requires careful handling—transport, storage facilities, the ability to deliver quickly to consumers while maintaining quality and reducing losses. Long supply chains in Africa, poor access to roads, poor access to electricity severely limit the capacity for growth. The returns to basic, boring infrastructure are really very considerable.

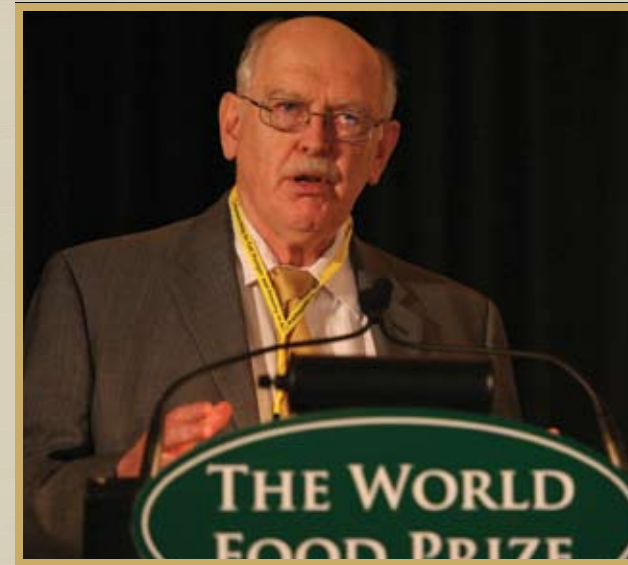
We need to improve the resilience of farming systems [and] infrastructure to changes in climate. Kenya suffered droughts and floods [over the four years from 1997 to 2001], a loss of about \$4.8 billion to damaged infrastructure and lost agricultural production.

With 53 small countries in Africa, many of the infrastructure demands not only for transport infrastructure but to manage water resources, rivers, lakes, forests require cross-border solutions. And in many cases we don't have good enough instruments to deal with those. We need to make progress in the Doha Round to reduce the barriers to trade.

It is very important that we see infrastructure and the agricultural crisis in the broader context, and it has to be dealt with as an integrated whole. Increase in infrastructure would [bring] gains not only economic but social. Access to clean water has declined. Access also to health facilities is dire. Far too many women die in childbirth from simple complications which could have been treated had the woman been able to get to a basic health facility. Every day 2,000 children in Africa die of a diarrheal disease, most of that easily preventable.

The gains are great, but so are the resource requirements. \$40 billion is a figure which will come out of a World Bank study this year. It's not only the new investments which are going to be costly. Simple operation and maintenance, which has suffered badly, is reckoned to require the same level of resources. ■





“How we do extension, research, and so forth is going to have to be driven by universities and countries themselves. As you look back over the recent decades, it’s clear that those countries that took charge of things themselves have been the countries that really have made progress.”

PETER MCPHERSON
*President, National Association of
 State Universities & Land-Grant Colleges*

Peter McPherson: This is the right time to talk about agriculture-related work, neglected for so long. The food crisis has risen us up again. It seems we’ve relearned the lesson that you can’t just give away fish, you’ve got to teach how to fish. Our donor programs have focused on immediate goods and services, and I hope [they] understand that it’s a broader lesson in training people.

Gregory Geoffroy: The local universities, the local needs, are absolutely critical. A program we launched several years ago at Iowa State University, in Uganda, the Sustainable Rural Livelihoods Program, has been hugely successful. It’s because we work very closely with two partner organizations, Makerere University [and] an NGO called VEDCO, who really understand the local culture, how to get things done, how to work with the local population and communities.

When we look at agriculture, at research, extension, and education, our land-grant model is important. There’s a lot of history and lessons. But the land-grant university has evolved. It wasn’t born this way. Over the decades, it tied extension to [going] out and [listening] to farmers, as well as teaching them. The research component was linked – so you began to research the issues the farmers had presented, and turn out new ideas. And all those things you taught to students, so the linkage was mutually reinforced and an important part of what drove American agriculture.

We bring a lot of the expertise that we have at Iowa State University to our partners in Uganda. And then in a very close partnership, we deliver that. We work with subsistence farmers, small communities, in creating a small-scale extension service; we work closely with one farmer who then takes that knowledge and extends it to maybe a dozen others, with great success. But it works because we work closely with Makerere and VEDCO. What would not work is if we just went in ourselves and tried to impose what we think we know.

People don’t always remember [that] there was a huge amount of government money that went into this from the beginning. This was not something that just came from nowhere. There was a major government commitment to research, extension, and so forth. The other component, which is even less remembered, is the role of the private sector as a companion for distribution of technology [beginning at the turn of the century]. The seed companies, fertilizer companies, and so forth all worked together. And when they did, it drove this engine.

Peter McPherson: Monty, this triage system through a university – research, extension, and education – there are many countries, many systems that do not use it in Africa. Is that a mistake?

Monty Jones: I wouldn’t know if it’s a mistake, but in Africa for the past 50 years we have adopted a linear system, in which various entities tend to work in isolation. Research is working in isolation of a university, and extension is working in isolation of research. In fact, the trend was that research should develop the technology, and the technology would go to extension, and extension would take it to the farmers.

We all know we have to change the [education] delivery model a little bit. Our delivery is fundamentally the way it was 100 years ago. We’re going to have to change it at the margins a lot. Maybe the pressure in Africa is going to have Africa be ahead of the curve in teaching us some lessons of how to do a different delivery model on education.

This created lots of problems along the line, entities not collaborating enough. Research, universities would come up with very good products, but those products take time to get

CONVERSATION: INTERNATIONAL COOPERATION IN EDUCATION, EXTENSION, AND RESEARCH

PETER MCPHERSON (MODERATOR)
*President, National Association of
 State Universities & Land-Grant Colleges*

MONTY JONES (WORLD FOOD PRIZE LAUREATE)
*Executive Director,
 Forum for Agricultural Research in Africa*

W. RONNIE COFFMAN
*Director of International Programs,
 Cornell University College of Agriculture*

OLIVE MUGENDA
*Vice Chancellor,
 Kenyatta University*

GREGORY GEOFFROY
*President,
 Iowa State University*

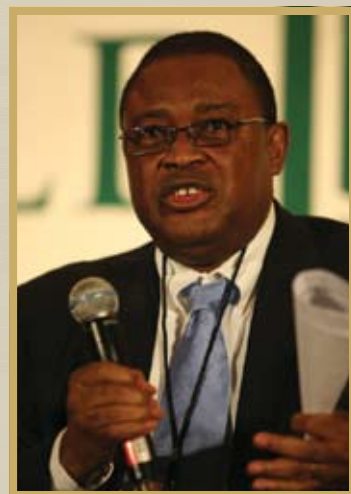
REN WANG
*Director, Consultative Group on
 International Agricultural Research*



“We have been able to increase production to some extent in isolated areas, but we have not been able to transform that into increased agricultural productivity, and we’ve not been able to influence developmental impact, the livelihood of the people, increasing the income of the farmers, attaining food security, and conserving our natural resources.”

MONTY JONES

Executive Director, Forum for Agricultural Research in Africa



to farmers. And what happened is we created islands of success in terms of technology adoption in Africa. You have very good, credible technologies that do very well in isolated areas, but they cannot translate into continental-wide impact.

Peter McPherson: If there’s more resources going into this area, which we hope, is it going to be possible to get that together?

Monty Jones: We have not coordinated ourselves very well to get all of these entities together. And another problem, of course, is lack of investment to bring entities together, to learn from one another, to create the necessary knowledge that is required to adopt technologies, to utilize technologies. Coordination and investment and practically, what you mentioned about looking for resources to support African agricultural higher education – that might help to bring entities together and get them to function in innovation systems, taking the participatory approaches into consideration.

Ren Wang: On this topic of education, I’d like to say that it is very, very important to examine what has happened in the past, even the recent past. But also it is a really opportune time now to

look ahead and put our heads together to think what we can do.

About two and a half years ago, I was visiting Indonesia – perhaps one of the largest rice-consuming countries and the most important rice-producing country in the world. And in the whole country of Indonesia two and a half years ago, there was not one rice breeder under the age of 50. So there is a serious generation gap, particularly in breeding scientists.

Developing the next generation of agricultural scientists is not just the job of universities. The international centers can play a very important role in this, and the international centers have been very strong, actually, in all of these training programs. Hundreds and thousands of developing-country scientists train in these international centers. And I’d like to see these centers, sponsored by the CGIAR particularly, looked at as preferred partners with universities in the North and South, as well as the national programs for efforts in developing the next generation of scientists.

Ronnie Coffman: A new race of wheat rust arose in Uganda in 1999. Dr. Borlaug, one of the few people alive that’s seen a

“I get concerned about the kind of research we are doing, because the researchers, and I review quite a few of them, are not connected to results that we need. They are not targeted to actual variables on the ground.”

OLIVE MUGENDA

Vice Chancellor, Kenyatta University



wheat-rust epidemic and how devastating it can be, expected the world community to respond. But time went by, several years – it didn’t happen. We don’t have the capacity there for it to happen the way it would have 40 years ago. The trained people are not there. People trained back in the ’70s [in] the very active training programs associated with wheat improvement – they’re not there anymore. It’s a real wake-up call.

Peter McPherson: In the ’80s, in AID, we were educating, in graduate long-term work, about 15,000 people a year. Last year it was 1,000. We’ve just moved away. We basically got out of the business.

Ronnie Coffman: [And] think about our domestic situation and our ability to respond, say, to a demand, and that’s changed a lot as well. The kind of faculty and staff that we have in our universities are very different.

Olive Mugenda: In Kenya we have a bigger problem of interesting people to take agriculture. There’s a decline of students wanting to get into agriculture, and you have to find ways that we get students to study agriculture.

Are we able to mainstream agriculture in our educational system, so that children in primary school, secondary school, are taught agriculture? A colleague last week said that a university student joined the school of agriculture, and the first question the student asked is: What is agriculture? They have no clue what it’s about, so we need to do something about that. We also need to train professional extension workers. We tend to get people from other professions and then ask them to do extension work.

Gregory Geoffroy: As you indicated and as we have seen at Iowa State University, over the last decade or so, student interest in agriculture programs had been slowly declining. In the last several years, that has been completely reversed, and we’re seeing significant interest in young people in pursuing careers and research in agriculture and related areas. It’s stimulated by the food-price crisis that has been alluded to, but also by the interest in using plants for fuels, food, other products. Overall I think that is extremely healthy for the world. Anything that happens to raise agriculture to a higher level of interest and prestige eventually will help solve these critical problems, particularly related to food.

Peter McPherson: I used to think of my agriculture college at Michigan State [as] being more of a science college than agriculture. You get a real shift.

Monty Jones: Science and technology generation have done quite a lot for Africa in various sectors – agriculture, transport, communication, energy. If we look at agriculture in Africa [as]

true science, it has gone through tremendous transformation. Today, compared to 500 years ago, we’ve got crops that are alien to the continent like barley, wheat, maize, rice, apples, tomatoes. That was not cultivated in Africa before, but today they’ve been adapted and are widely cultivated. In that regard, we have made tremendous strides.

Coming to recent years, a number of Africans have come up with incredible technologies through agricultural research. One of the major problems we face is how to get these materials to the farmers so that they are utilized properly. And how do we organize the farmers so that they can receive appropriate information about the technologies, so that they can appropriately adopt this new technology for optimum yields? That has been the problem.

If I could take this back to acquisition of knowledge. Such knowledge should come from research, from the university, from your education. And we get farmers that do not have access to that information, do not have access to that knowledge. Until we are able to build knowledge, we cannot talk of economic growth; when you build knowledge, then you can use that to solve your problems, to improve well-being, improve the well-being of your community – that will translate to economic growth.



“There is an urgent need for a global campaign on developing the next generation of agricultural scientists, not only in the developing countries but also in industrialized countries. We should give special attention and effort to development of women scientists, particularly in Africa.”

REN WANG

Director, Consultative Group on International Agricultural Research



We've seen tremendous increase in the number of universities in Africa. From the days before independence in the '60s we had just 12 universities. Today, we're talking 250 universities. Funding and investment in universities have gone down considerably. In the last two decades it has almost remained stagnant. And the quality of our education has gone down considerably. One of the major challenges that we face in Africa is – how do we bring up this quality again? We're looking at our colleagues outside Africa to the west and to the international centers, so that they can help to improve this quality.

Peter McPherson: Olive, in Africa student population is doubling about every five years – [universities] don't have enough professors, libraries. We want to have these partnerships with U.S. universities. Can you see a massive effort, partnerships with U.S. and European universities, to help train, not in America but there, through the Web?

Olive Mugenda: In my university just five years ago, we were 10,000, and now we are 23,000 students. The quality doesn't have to be affected just because the university is increasing. If you hire professors and make sure that you get the infrastructure right, we can still have good quality, even with the numbers. But we can't go on doubling.

Partnerships – especially in training – really can help a lot. In fact, we're talking to some of the government partners how that training can be done within the countries so that, for example, we get assistance in supervision, we get split programs where staff don't have to leave the country.

If we go that way, then capacity-building will be good. Now, a lot of students, when they leave, especially when they come to this country, don't come back. We are worried about that. So partnerships for supervision of students and for training are very, very helpful.

Gregory Geoffroy: One observation I have made from my

limited experience with institutions in Uganda is that our faculty at Iowa State University, when they see the exciting challenges in agriculture and development that exist in Africa, get very energized and truly want to partner and help find solutions. Particularly, they're interested in partnering with African universities to help build capacity and infrastructure.



“Before you can go anywhere with extension, you're going to have to invest in education, because you don't have the bodies there for extension.”

RONNIE COFFMAN
*Director of International Programs,
 Cornell University College of Agriculture*

We have at Iowa State a world-class distance-education program offering a master's in agronomy, the only one that I know of that's fully online, and it is truly spectacular. But for anyone around the world to enroll in that program, they have to pay the tuition, and that becomes a problem in some parts of the world. So it is a great program to do what you said, to deliver the expertise that we have in agronomy to universities in Africa. But who will fund the tuition?

Peter McPherson: Can we use that program, plus some travel, to arrange tools to help augment Olive's faculty? There are 3.6 million undergraduate students in sub-Saharan Africa as of 2005. There are hundreds of thousands of faculty. Could there be some distance

education? That assumes connectivity, of course. Olive, please go into how we can be helpful in faculty education, because Greg's right – there's a lot of software out there.

Olive Mugenda: As the president has said, Iowa State is quite expensive, but I think we can use economies of scale to bring the cost down. The distance-education program we have in my university, we call it “open learning,” is registering so many [more] students, because it's cheaper than the regular degree. And because we are seeing many students out there, we are using economies of scale and reducing the cost. I think that is the way to go, to reduce the cost so that many people can enroll.

Peter McPherson: I think we need to be particularly sensitive that this curriculum has to be driven by African needs and will be separate and unique, in many cases. For example, I know that if you were to teach agronomy courses, the biomass issues are different in various parts of the world.

Ronnie Coffman: It's a question of comparative advantages and technology to link us so that we can draw on those comparative advantages. We have tremendous library resources in this country in our universities. You don't have to reinvent that; you just create access to it, as far as Africa's concerned.

There are other comparative advantages that we should try to exploit, but you need to end up with people trained in the environment in which they are going to work. It doesn't work, as you pointed out, to send people here. And I'm not sure it works to have an online course to learn agronomy at Iowa State University or Cornell.

There are many universities producing a large number of students. How can we take advantage of that? Could we design some kind of capstone degree that would take a reasonable general education and add the specificity needed?

Peter McPherson: Let's talk about the international CGIAR system. How do universities get better linked with the system unless some portion of the individual center's budget is set aside to do that?

Ren Wang: The CGIAR is a small part of the global research-for-development continuum. The total budget of the CGIAR today represents 1.5 percent of the global investment money for agricultural R&D.

For many years there has been constant debate, should CGIAR use this small portion of the global investment in upstream or downstream research? That has implications for partnerships with universities. In my view it is not an accurate description of the strategy or direction of the CGIAR for its research agenda. An accurate description should be whether or not the CGIAR research is linked or oriented towards development targets.

CGIAR is making an effort now. First, let's sharpen our focus. We have agreed that we're going to focus on three areas: productivity and production; environment, natural resource management;

and institutional innovation and policies. Then, working with partners – national programs, universities, regional organizations – let's identify development targets. A very interesting example [was] initiated by the government of Japan and AGRA. They identified the target for doubling rice production in sub-Saharan Africa in the next 10 years. Can the CGIAR centers and the universities, Cornell, UC-Davis, work together to identify technologies and research that we can do to contribute to that development target?



“Over the last decade or so, student interest in agriculture programs had been slowly declining. In the last several years, that has been completely reversed. Anything that happens to raise agriculture to a higher level of interest will help solve these critical problems.”

GREGORY GEOFFROY
President, Iowa State University

Peter McPherson: The [CGIAR] system is clearly the largest concentration and provides huge leadership to agriculture research for the world. I have been a long, long supporter of this back when I was at AID. It is my hope the U.S. government gets in the business of providing real money, like we used to, to this effort.

Monty Jones: I think the African political leaders realize [these partnerships are] the way forward. And the reason why they created NEPAD and NEPAD, recognizing the role of agriculture in development, developed the Comprehensive African Agricultural Development Program that spells out strategies and outlines goals and objectives for agricultural development.

Capacity-strengthening is a key in that process and all of us within Africa are organizing ourselves to respond to that – creating partnerships with political bodies like the AU, the regional economic communities, with research entities, extension, NGO groups. It's in light of that that we approach American friends for support to build higher education. And in the same light, we also are partnering with development partners, linking us to 34 universities in Europe. This is the only way forward. Africa cannot work in isolation. Africa needs the international community. ■





CONVERSATION: PROMISES AND CHALLENGES OF NEXT-GENERATION SCIENCE AND TECHNOLOGY

SCOTT KILMAN (MODERATOR)
Senior Writer,
The Wall Street Journal

MARTIN FISHER
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“The trends in technology are some of the most predictable trends in agriculture that we have. It’s almost certain that we will have fewer people in farming, yields will increase, and that successful technologies will transfer to parts of the developing world.”

CLAY MITCHELL
Saltonstall Fellow in Agronomy,
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Martin Fisher: Any poor farmer will tell you, they actually need money as much as food to buy farm inputs, education, health care. The best way to get income security is to grow a high-value crop that you can eat and sell for a high price in the local market. Unfortunately, simply growing more of the same staple crop with better seeds and fertilizer very often doesn’t work because the price at the rain-fed harvest is low, you can’t sell your crop, you don’t have storage, and there’s no transport to take it away.

In Africa, 40 percent of the crops go to waste. It’s not clear that just growing more crops with rain-fed harvest is the solution. This is where irrigation comes in, because you can grow crops throughout the year, high-value crops, and you can especially sell them during that long period when no other crops are available on the market. But there’s really no good technology for irrigation in Africa. We all know the problems with large-scale schemes, not only environmental ones but management issues. Petrol pumps are too expensive, and there’s no electricity.

So at KickStart we’ve designed a line of human-operated irrigation pumps. Over 70,000 families are using these and have used them to generate substantial incomes. The potential in Africa for these is something like 20 million farmers who could use these technologies. We’re clearly just scratching the surface.

Private companies will not design equipment like this for very poor farmers in Africa. It’s simply too expensive to get the equipment to them. And this is why farmers in Africa still use that wooden-handled hoe and the machete – and those are the only two tools most of them have.

Clay Mitchell: My family has been farming for about five generations. Think for a moment about how much farming has

changed in the United States in that time. Even if I was farming using the methods from a few generations ago, I wouldn’t be able to be in business now. Technology is having a much greater impact on farming in the U.S. than policy has, making policy seem puny, even.

[The U.S.] has focused on precision-farming technology – variable-rate application of fertilizers, seeds and chemicals to match variable needs throughout the field. The adoption of these technologies has been negligible in the developing world. It’s not the most important thing on the farm. It’s not the most important thing for productivity. And on the farm, if a person is not working on the biggest limitation to productivity, there’s an opportunity cost.

The most important things in most parts of the world tend to be timeliness of applications, water-management issues, and the quality of the application. And we’re still doing a very poor job on all of those basic things. The technologies that have become adopted readily in recent years address those with large, out-of-the-box gains. Those depend largely on automation, particularly merging automation with survey-quality GPS for sub-inch-accurate application of chemicals and fertilizers and seed. This also enables novel and otherwise impractical systems like controlled traffic farming, intercropping, and things like this.

Bernadene Magnuson: To explain a little bit about nanotechnology, a nanometer is 1/100,000th of the width – not the length – of a human hair. Once you get down into the nanoscale, properties of very familiar things change quite dramatically. For example, gold would have very different properties. Instead of actually being colored gold, at the nanoscale it looks blue. Instead of being very stable, it is highly catalytic and reactive. A very





“There is a great deal of investment in the use of nanotechnology in pretty much every industry in developed countries; it is only now really starting to move into the food industry.”

BERNADENE MAGNUSON
Senior Scientific/Regulatory Consultant,
Cantox International

exciting aspect of nanotechnology is we can create new properties and discover new properties, which then provide very new and exciting applications.

One of the greatest areas is improvements in food safety, pathogen detection. It has impacts in food packaging and long-term food storage. Nutritional qualities can be dramatically affected, as well [as] bioavailability of those nutrients that we do have. Also one area is improved development of new food ingredients. That may impact the question of need for increased meat products and design of new ingredients that very accurately simulate meat products.

It is, of course, very much at the developmental stage for the food industry. But there's many challenges to be addressed, many hurdles to overcome. And these will be especially important to address if they ever were to be able to be used by underdeveloped countries and be of economic and viable use in those areas.

Paul Schickler: Pioneer's business has been to improve genetics so that we can bring improved productivity to farmers throughout

the world. We combine improved genetics with a system that enables the farmers to also match those genetics with improved production practices, so that they can get the best out of those genetics on their farm.

[That] works as well for small farmers in Thailand as well as large farmers in the United States – it is scale-neutral. Over the last decade we've added to those practices – focusing on genetics and improving production practices – the science of biotechnology. That is giving us another leap forward in our ability to improve productivity and the livelihood of farmers everywhere in the world.

What we can do with biotechnology is not only continue to increase productivity but also improve the protection that the plant can have against other environmental factors. We can also bring additional characteristics, improved nutrition or other uses of the plant, through biotechnology. And just like making available genetic improvements to farmers worldwide [is] scale-neutral, so is biotechnology.

“Where the most hungry people are, there's a fundamental market failure. Big, private-sector companies can't go into those places and make money selling to these extremely poor, risk-averse, hard-to-reach customers who have very limited access to any kind of marketing or information. And that's where this breaks down.”

MARTIN FISHER
Cofounder and CEO,
KickStart International



We are continuing to be committed to improve the productivity and livelihoods of farmers everywhere through the use of genetics and biotechnology, with particular focus on improving livelihoods on the continent of Africa and southern Asia. We want to do that in collaboration with public organizations, foundations, NGOs, academia, so that we can bring together a more robust effort across the private and public sector.

Judi Wakhungu: If you look at the state-of-the-art in agricultural science and technology, and if you look at the efficacy and what we know today in terms of agricultural science and technology, how can we reduce hunger and poverty? How can we improve rural livelihoods? How can we improve nutrition and health? With a major challenge of striving to do so in an environmentally sustainable manner, and also in a manner that promotes socioeconomic justice and equity.

We need to look at small-scale farmers once again and that the critical role of small-scale farmers now in the future (and the future for us we addressed as 50 years from now) is more

critical than ever. Secondly, we will need to have policies that are pro-poor. We will also need to have policies that very directly address women farmers, since most of the families are actually led nowadays in rural areas by women and women farmers.

Roberto Rodrigues: It's not a question if technology is going to guarantee the world's supply of food. It must, it has to. There is no other answer. Population is going to increase by 2 billion people from the year 2000 to the year 2025.

In the last 17 years, cultivated area in Brazil with grains has increased 27 percent. But production has improved 147 percent. [More] productivity and more production in less areas means sustainability. We get much more production per area, and we are able to feed humankind, and we are able to produce biofuels also, all together.

New sugarcane varieties and new use of the leaves and bagasse will give us a chance to double the productive area of ethanol in 10 years. Currently we produce 8,000 liters per hectare, but in 10

“If you look at the policy environment in sub-Saharan Africa, it's mostly dominated by the politics, the economics, and the legalities of the day. But we're living in a world that's much more dynamic in terms of science and technology.”

JUDI WANGALWA WAKHUNGU
Co-chair, International Assessment of
Agricultural Knowledge, Science, and Technology for Development



“Most of this decade the world has consumed more food than it's produced. And they're now projecting that the number of hungry people is climbing back towards a billion. So how optimistic are you that the world can meet the Millennium Development Goals, that the world will be able to reduce hunger by half by 2015?”

SCOTT KILMAN
Senior Writer,
The Wall Street Journal



years we will go to 15,000 liters. So it will be very much cheaper than today, in competition with gasoline.

Scott Kilman: Most of this decade the world has consumed more food than it's produced. And they're now projecting that the number of hungry people is climbing back towards a billion. So how optimistic are you that the world can meet the Millennium Development Goals, that the world will be able to reduce hunger by half by 2015?

Paul Schickler: If you look over history throughout the development of hybrid corn, productivity has improved at about 1.5 percent per year. As we look to the future, we think we can more than double that. That has already started to show up in the last 8-10 years through biotechnology, plant genetics, and improved agronomic practices. We can translate that over the next 10 years to a 40 percent improvement in productivity over that 10-year period. That same improvement can be done everywhere in the world.

It can also be done in a sustainable fashion. 150 million acres went unplanted due to the productivity improvements in the last 20 years. That is about the size of the Cerrados in Brazil. So we have, in the last 20 years, brought into productivity, and not required additional land, 150 million virtual acres. And most of that would be fragile land.

Judi Wakhungu: In terms of the IAASTD, when it came to GMOs or transgenics, it was difficult to get agreement. It wasn't questioning the science, per se, [as] the milieu in which the science was embedded. Reservations about the efficacy of GMOs were concerned with looking at the yields and saying that, over the past 20 years, the yields were not as high as expected, or were very uneven. Certain agro-ecological zones fared well, others had not. So they were lukewarm in terms of the potential for GMOs, given the current arrangement dominated by the corporate sector.

Looking at the potential for these technologies themselves – as we continue to face erratic climate, with some areas from one season facing excessive floods and then a few years down the road also facing excessive drought – we need to look specifically at the potential of recombinant DNA to address local issues, specific to the community.

Scott Kilman: Do you use molecular breeding and biotechnology to increase yields in the developed world, and keep prices down so food is more affordable? Or [do you] get biotechnology right into the hands of poor farmers? Genetically modified crops cost



“If a small farm is not profitable they cannot buy technology. We have to cut that in some place. And the only solution is cooperatives, because cooperatives can spread technology, can give credit, and can add value. The big farmers can do it alone by themselves, but small farmers without cooperatives cannot.”

H.E. ROBERTO RODRIGUES
Co-chair, Interamerican Biofuel Coalition

more. These are farmers who can't afford much of anything.

Paul Schickler: We have a model in place in the Philippines – the farmers there are small – South Africa, Spain, Portugal. The first thing we do is bring improved agronomic practices to our customers. As they manage their crop better, then they can make the step to improved genetics. And as they work through that opportunity to improve their productivity, then bring biotechnology to them as the next step in productivity.

Judi Wakhungu: I concur. Over the next 25-50 years, in order to feed the world, we'll need to double food production. A variety of tools will be needed. And we need to look at the array of tools and the suitability for each local area.

Martin Fisher: In the developed world, unless climate change has huge impacts, I think we can produce a lot more food. But I'm much more skeptical about ending hunger, because it's really going to get down to smallholder farmers.

[There are] three things to get to the smallholder farmers. First of all, [the technology]'s got to be affordable. It's got to be locally

available in their local marketplace where they are; and they have to be aware of their benefits. You need to put in place smart subsidies in terms of establishing private-sector supply chains and in terms of doing that massive amount of promotion to get that awareness. And if we have the political will to do those things, then I think these technologies can get down.

Bernadene Magnuson: In terms of hunger and issues of food scarcity within even our developed countries, it is not a matter of trying to produce more food. We are having such a tremendous increase in obesity, and health costs, and food wastage [and] spoilage. And I think that actually just better utilization and distribution of the food currently in many of our developed countries – even awareness and social conscience in some – [is] definitely something that has to be considered.

Clay Mitchell: As we look at obstacles to technology, we expressed a lot of optimism. [But] there are often environmental and other costs. I've been fortunate on my farm to discover a lot of technologies that seem unambiguously good, things that allow me to save fuel, save soil, increase productivity. But the first question that people ask me when I say that I'm a farmer is, Are you organic? This concept of what is natural is so strong, it's really kind of a trump card for whether something is true or valuable. We're talking about biotechnology and nanotechnology. That desire, that value to see something as natural – will that be an obstacle?

Bernadene Magnuson: One of the common comments in terms of nanotechnology is we have to make sure we don't do what was done with biotechnology of food – because of the misunderstanding and lack of knowledge of how food is produced. A lot of misinformation has perpetuated undue fear of

GM foods and is likely to occur again with any new technology in food. As was food irradiation. It got killed by misinformation. Food [is] one of the areas where people are most risk-averse. They will accept levels of risk in pretty much every other aspect of their lives, but food – they will not accept it.

Roberto Rodrigues: 55 years ago, some teachers in my university were very afraid about hybrid corn, [that it] could be a disaster for our natural corn. Biotech is a science, and we must believe in science. Of course, we need three points. First, security; protection for environment, health. Second, the market, [which] depends on the demand of consumers. And then what is absolutely important – I said it, and Bernadene said it – is information, correct and pure information.



“We need to address the food security and productive requirements of the world from both directions – the developed world, using biotechnology to continue to improve productivity, but also the underdeveloped world and small farmers so that they can improve their livelihoods.”

PAUL SCHICKLER
*President,
Pioneer Hi-Bred International, Inc.*

Clay Mitchell: If we go back to the 1930s where corn yields were 30 bushels an acre in the U.S. and over 6 million people farmed, there was no way to forecast the change technology would bring about. Policy is inherently something more deliberate. Technology in some ways comes as a surprise; certainly, the impacts do. So there are a lot of other non-technology issues that we often deal with – [like] issues of fairness and equity in agriculture policy – and ignore incredible impacts of technology.

Bernadene Magnuson: In terms of food nanotechnology, that is a critical question. And the Institute for Food Technologists is working together with FDA, the National Science Foundation, National Health Institute to address very early on health impacts, safety impacts, and environmental impacts – in order to be able to make sure that, as we're developing these technologies, we're also developing the techniques and the science to support the policy that is likely to come. ■





H.E. RITA SHARMA
*Secretary to the Government of India,
 Ministry of Rural Development*

AGRICULTURE, CLIMATE CHANGE, AND POVERTY IN INDIA

Of the [world's] 850 million hungry people, about a fourth are in India. They are primarily small and marginal farmers, landless agricultural laborers, fisherfolk, herders, tribal and indigenous people, women, children, and the elderly. And their numbers are increasing. This group will be most vulnerable to climate change, as their livelihoods directly depend on environmental resources.

While economic growth since the 1990s has risen sharply, clocking some 9 percent last year, agricultural growth has declined and stagnated at around 2-2.3 percent. Sixty percent of the population still depends upon agriculture, although agriculture contributes about 18 percent to the GDP. If we are targeting double-digit overall economic growth, agricultural growth must also double.

Public investment in agriculture has doubled in the last two to three years. There's a great focus now on dry-land rain-fed agriculture. Diversification of agriculture is a major cornerstone. There will have to be much greater effort in effective input management, with special reference to water-use efficiency.

But agricultural growth [alone] is not enough to reach the poorest and the most vulnerable of the rural households. For that, the

Ministry of Rural Development mounts several "direct attacks" on rural poverty. One of them is the National Rural Employment Guarantee Act (NREGA), which has for the first time, on an unprecedented scale, guaranteed employment by law.

NREGA aims at providing at least 100 days of guaranteed wage employment in a year to every household whose adult members volunteer to do unskilled, manual work. Last year, 34 million households were employed on some 1.8 million works, of which 50 percent were water conservation works; 19 percent were micro-irrigation, and 15 percent were land development, and 15 percent rural roads. NREGA yielded major benefits for adaptation to climate change: water conservation, rejuvenation of traditional water bodies, de-silting of irrigation channels, tree plantation work, and rural road construction. The impact on poverty has been very significant.

In the way forward, we need to recognize that suitably crafted sustainable development and rural livelihood strategies are the best form of adaptation to climate change. I would [also] like to recall what Indira Gandhi said in 1972 at the Stockholm Conference: "Poverty is the worst polluter." And therefore poverty eradication becomes our first and foremost challenge. ■



CONVERSATION: BIODIVERSITY AND AGRICULTURAL SECURITY

MARGARET CATLEY-CARLSON (MODERATOR)
*Chair, World Economic Forum
 Advisory Council on Water*

ROSAMOND NAYLOR
*Director, Stanford University Program on
 Food Security and the Environment*

PAMELA ANDERSON
*Director-General,
 International Potato Center*

ED REGE
*Director of Biotechnology,
 International Livestock Research Institute*

CARY FOWLER
*Executive Director,
 The Global Crop Diversity Trust*

RAVI SINGH
*Director of Bread Wheat Breeding,
 Intl. Maize and Wheat Improvement Center*

EMILE FRISON
*Director-General,
 Bioversity International*





“Now, more than at any point in history, crop genetic resources have become the quintessential resource for moving agriculture forward and for increasing food security. [But] we lose a lot of diversity, and frankly we lack a system for caring for it. And this is simply a crime when we know that we’re going to need the diversity to meet the challenges in the future.”

CARY FOWLER

Executive Director, The Global Crop Diversity Trust

Cary Fowler: Is agriculture ready? Ready not just to produce the same amount of food, given all these new crises and challenges, but to produce more food, despite the fact that we’re about to experience a different climate and less water and higher energy [needs]. If we’re not ready, the first thing we have to do is assess what our resources are to get ready. Here the news is actually rather good. We have a tremendous amount of crop diversity upon which to draw, different traits and characteristics, many of which are unexplored and untapped.

There are about 200,000 different varieties of wheat. To put that in perspective, there are 400 breeds of dogs, but 200,000 varieties of wheat; 200,000 to 400,000 different varieties of rice; 35,000 different varieties of beans. These aren’t just pretty and interesting. These are essential raw materials and resources for the future of agriculture. These are the most important natural resources on earth.

We experienced dramatic losses in the past. In the 1800s, about 7,100 varieties of apples were being grown [in the U.S.]. Today

6,800 of those varieties are extinct. And any unique trait or characteristic that they may have had is gone. We’re losing varieties now even in gene banks. There are about 1,300 gene banks in the world today, but there are not 1,300 good gene-bank managers, and there are not 1,300 good systems for conserving this diversity. I know of not a single gene bank in the world that operates on a secure multi-year budget. Recently we’ve lost gene banks in Iraq and Afghanistan. In the Philippines in 2006, a typhoon put over a meter of water in the gene bank there.

We know, however, how to solve this problem. We know how to conserve diversity and how to distribute and manage it. We can construct a system where we have all of the unique diversity in one gene bank and backed up safely.

Within two years, for somewhere between \$350-400 million, we can conserve, understand, distribute, and ensure the use of crop diversity for every major crop in the world, forever. In the scope of the things in the newspaper, \$350 to \$400 million dollars to secure the biological foundation of agriculture seems like a pittance.

Within five years, could we not collect all of the remaining biological diversity, the wild relatives of our agricultural crops? Could we make a major initiative on “orphan crops” which don’t get the attention they deserve because we haven’t invested in them sufficiently, and yet which are so important to food security for the poor?

Within five or ten years, could we not screen the existing collections? We have a wonderful library of life here, but in many cases the books in this library haven’t been opened or read, and we don’t have a card catalog. This is simply unacceptable.

Conserving and making available crop diversity is not going to solve all the world’s problems, but it’s a prerequisite. Can you imagine an effective, reliable, efficient, or sustainable solution to climate change, water problems, energy constraints, or food security that does not involve crop diversity? I can’t come up with any such solution.

Margaret Catley-Carlson: Pamela, given all the varieties of potato in the world, there must be a real concern to protect the

plant diversity in potatoes – right?

Pamela Anderson: Often we do feel like the orphan crops. Roots and tubers have tremendous potential. Potato is exploding in the developing world. We see in China 24 million people in extreme poverty. They have explicitly included potatoes as a pathway out of poverty. India has said they’re going to double potato production in the next 5-10 years. Africa sees potatoes expanding more rapidly than any other major staple.

What about the basis for realizing that potential? It is a discussion in Latin America because that’s where the diversity lies. The domestication of potato was in the Lake Titicaca region. Latin Americans are extremely concerned with preserving potato diversity. But we don’t have that same concern outside of the region.

What we see is high vulnerability. If you have political unrest, if you have natural disasters, potato farmers will lose their seed, because they plant the potatoes for the next crop. Urbanization is one of the problems, and we can’t keep repatriating at the rate that we’re losing. And Cary’s right: we don’t have more than one year of funding at a time. The other concern is climate change. Talking about potatoes in the High Andes, the way of dealing with climate change has been to keep moving up; there’s no place to go anymore. There’s tremendous concern as late-blight, the diseases and pests, catch up with the rising temperature that we are going to have severe loss. Collecting the rest of what’s out there becomes even more important.

Margaret Catley-Carlson: We’ve been growing wheat for a long time, and there are 100,000 or more accessions of wheat. So the situation in wheat must be much better, enabling us to fight things like rust disease?

Ravi Singh : Yes and no. There is plenty of genetic diversity you can draw upon to tackle the problem. But let me just mention the example of the stem-rust situation – the Ug99 race, which appeared in Uganda first, and in 2003 started to affect fields in Kenya, crossing to Yemen in 2006 and a year later was picked up in Iran. This particular race somehow evolved to overcome whatever resistance genes people used for over 40 years. For 40 years this disease was under control through the use of genetic resistance. But the pathogen can overcome all that resistance. Between 80 to 90 percent of the wheat area currently sown worldwide is vulnerable. About 230 million hectares of wheat.



“Why aren’t we in better shape? We have known about wheat rust. It’s one of the plagues listed in the Christian Bible; it’s in the historical texts. Why are we not in better shape to fight an old-time enemy of this important crop to human beings?”

MARGARET CATLEY-CARLSON

*Chair, World Economic Forum
Advisory Council on Water*

So no, because you have largely susceptible wheat varieties. [But] yes, because you can manage this crisis in the short term. But you have to look for longer-term approaches. We have to continue looking for new diversity.

When Dr. Borlaug went to Mexico to work with stem rust, there was major cooperation in those days between the countries of North and South. They all worked together, shared germplasm information, tested each other’s material, and came up with this stem-rust resistant wheat, which remained resistant to such an extent that most of us, the younger-generation people, started to forget that that disease ever existed. So there was neglect for a long time. Researchers quit working on stem rust. We can name just four or five people who currently work on stem rust worldwide. That’s about it.

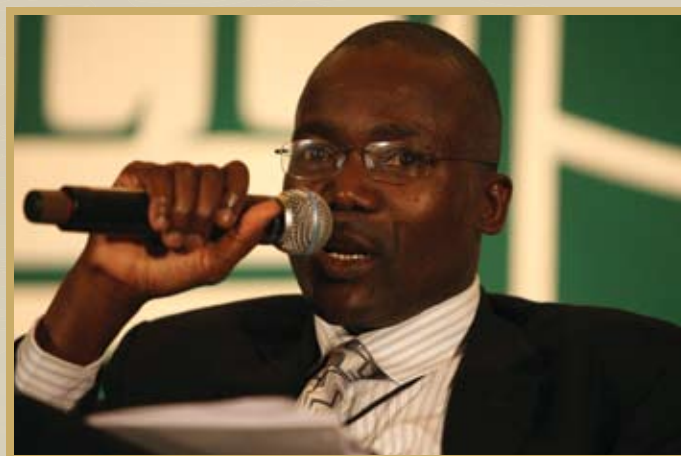
Margaret Catley-Carlson: I think everybody has some glimmer of this happening in the plant world, but when you start seeing



“We are losing one breed a month. And the genetic diversity and the window is very small. So the situation is much more serious on the animal side than it is on the plant side.”

ED REGE

*Director of Biotechnology,
International Livestock Research Institute*



cows, goats, and sheep species that used to cover an appreciable part of the farmyards of the world – we’re not just talking about plant diversity.

Ed Rege: The only difference is that the challenges are greater in livestock, and opportunities are much fewer. Livestock feed 1.2 billion people. 600 million actually could not do if there wasn’t any livestock. About 400 million of these people live in crop-livestock systems where livestock pull the plow and provide the manure that provides the nutrient cycling, the sustainability. In pastoral systems, 200 million people depend on livestock. Period. There’s nothing else.

We have 40 species used for food and agriculture, the yak of the Himalayas, the Bactrian camels in Asia, the dromedary camel in Africa, llamas and alpacas, rabbits that are used in domestic production, and so on. We are talking about a very small, narrow genetic base. Within the 40 species, we have only between 8,000 and 14,000 breeds, varieties, or strains. That range is so wide because we know so little about what we have. There’s a lot of work still needed to understand what we’ve got.

In crops, there are concerns about loss of diversity as a result of a movement to the North. In the animal world, the problem is the opposite – the movement of “turbo-type” or high-productive breeds to the South. In many cases, these end up actually destroying the very basis and integrity of the national populations that are adapted in those systems.

By 2030, we will have double the demand for livestock products, particularly milk and meat. People are moving very quickly to find the highest-producing breeds, but not necessarily thinking through what that is doing to the resilience of the systems, which depend on the low-producing but yield-sustainable breeds that we’ve always had, particularly in the smallholder systems in the tropical world.

Roz Naylor: As we look at the roughly 20 global climate-change models that contributed to the recent IPCC report, we find three overwhelming agreements. One of those is obviously rising temperatures. The second is the decline in soil moisture, particularly in the subtropics. That will lead to more droughts in some areas and the inability to intensify, and flooding in other areas where you have rain, but it just falls on hardpan soils and

“The impact of climate on pests and pathogens was the one area that it seemed the scientific community was least well-equipped to deal with. When you think about how quickly pests and pathogens can evolve to changes in climate – whereas crops have been bred for many other qualities and are constrained in how quickly they can evolve – it’s going to be startling.”

ROSAMOND NAYLOR

*Director, Stanford University Program on
Food Security and the Environment*



floods areas. The third is sea-level rise and the flooding of massive areas, particularly of South Asia.

When we combine our crop models on intensive systems and more extensive rain-fed systems, what we find is in southern Africa – not even looking to the end of the century – the mean projection is a 30 percent drop in maize production in these systems by 2030. Just by climate change alone; not even with the complications that go along with intensification, like water, pests and diseases, and so forth. That’s a massive fall for a population that doesn’t have a lot of security mechanisms to fall back on, as maize is the major crop in those systems. South Asia is another area where there’s going to be problems not only in sea-level rise but in predictable falls in yields across all of the crops.

Livestock is vulnerable. It’s the one security net in terms of assets in a lot of these systems, and it is intensifying in very important ways. The industrialization of livestock has been really overwhelming. Some of the highest growth in any food-production sectors has been in poultry and hogs providing a protein source in developing countries.

We’re moving towards an out-of-bounds situation where, by 2050 or slightly beyond, in virtually any country, the mean temperature for the growing season is going to be equivalent to or hotter than the very hottest season we’ve seen in the past hundred years. If you look throughout the tropics or parts of the subtropics, even the coldest seasons are going to be hotter than the hottest seasons we’ve seen in the past hundred years. How you deal with the genetic diversity in plants [in that context] is going to be challenging. Animals are going to be eminently more challenging.

Margaret Catley-Carlson: I guess [the International Treaty on Plant Genetic Resources] handles all of this well, and people are rushing under the umbrella of the treaty to do the right thing.

Emile Frison: The last 15-20 years have been a drastic change regarding the way people look at genetic resources, after the Convention on Biological Diversity (CBD) brought in a new dimension of national sovereignty over natural resources, including genetic resources. What was the basis of progress in agricultural breeding has been jeopardized. If you look in the last 12 years or so, in some continents, Latin America is an example, virtually nothing has moved from one country to another in terms of genetic resources. The negotiations that led to the international treaty have been extremely important to reopen the exchanges.

That has been achieved at the international level in theory. We still have to translate that into a reality, and that means applying the openness that is foreseen in the international treaty at the



“In the ’80s Brazilian scientists reported a disease called rice blast on wheat, which is unheard of in other parts of the world. It is spreading to countries like Paraguay and Bolivia. This is a disease where the wheat crop was not exposed in the past. And there’s very little diversity so far found in wheat for resistance to this disease.”

RAVI SINGH

*Director of Bread Wheat Breeding,
Intl. Maize and Wheat Improvement Center*

national level and translating it in a restarting of the exchanges of genetic-resource flows. We receive a lot of questions from countries that have ratified the treaty – now more than 100 countries have ratified the treaty, and it’s expected to become a universal treaty like the CBD – but at the national level, the people that are dealing with the exchange of germplasm say, “We don’t know how to do it. Who is in charge in my country? Who has to authorize things?”

Cary Fowler: I wouldn’t want anyone here to go home feeling hopeless or helpless. In fact, a number of very important things are being done. In the next three years we will rescue from extinction, literally from extinction, 100,000 unique crop varieties that are in substandard conditions, primarily in developing countries’ gene banks. That’s probably the biggest biological rescue program in history.

We are working with Bioversity International to develop essentially an Amazon.com for plant breeders. Plant breeders have no way of accessing the entire gene pool with their crop



to find the materials that they require. We can find a used book at Amazon.com, but can we find disease resistance or drought tolerance with our major crops? In a couple years we can.

Margaret Catley-Carlson: Is this going to help with plant rust?

Ravi Singh: Definitely. If we are looking for a gene or genes for resistance, if we know which germplasm to access, it will greatly help. There are many other traits which people are basically looking for new genes, new alleles of genes. It's very important to start right now breeding and incorporating genes which will give heat tolerance. If you grow two crops per year, you need six years at least to build up self-pollinated wheat varieties, from the time you make a cross. Some wild relatives, if you want to transfer genes, it may take even longer.

Margaret Catley-Carlson: Latin America has had particular difficulty in sharing germplasm material. Can you reflect on the concerns that governments have which get in the way of international collaboration?

Pamela Anderson: The CBD came into effect in 1992, and we have essentially not seen a new acquisition of potatoes. It's very extreme – the chart just drops. International, regional, and national legislation are often contradictory. It's been very challenging.

But there is another fundamental issue which sometimes we are shy about talking on – and that's trust. Latin America is very, very proud. Latin America gave more domesticated crops to the world than any other region. There's a particular sense of ownership of these crops, and a problem with trust: "We have turned over our genetic resources to the world; what have you done with them, and what have you done for us?"

"What's missing from our conversations is still gender. We're not getting to it in a serious or systematic way. In many cultures, women are the keepers of the seed. If we don't understand their role in agro-biodiversity, we're not taking full advantage of the knowledge out there."

PAMELA ANDERSON
Director-General,
International Potato Center

The people who were the breeders of a lot of these crops that we rely on and become rich on, including potatoes, are some of the poorest people on our continent. And so there is really an issue of rebuilding the trust. We're working on that, and are very close to having the breakthroughs and moving the germplasm again. But there's been a real job of rebuilding trust so that we could move these very precious treasures around again.

Ed Rege: Under the CBD, there have been a lot of discussions on the animal side. The NGOs, particularly pastoral-group NGOs, are pushing for a treaty, like the one on the plant side, for livestock. But there's also a lot of people saying, "Wait a minute. We already are experiencing problems on the plant genetic resources treaty." I would say that it is fortunate that there isn't a treaty that has been rushed to be concluded.

Margaret Catley-Carlson: [Thomas Odhiambo] used to say that the real history of Africa is written in its bugs. Anybody want to take on entomology?

Pamela Anderson: [Regarding diseases and pests], avian flu and wheat rust are pandemic, dramatic events. There are dozens and dozens and dozens of these events happening in our major crops around the world at a smaller scale. It is a huge threat we're not paying attention to. We are totally unprepared. 57 percent of the new, emerging diseases we saw as introductions and 25 percent as a result of climate change or weather events related to climate change. So it's significant.

Roz Naylor: One of the areas we're picking up is on aflatoxin, which by all indications looks to be a major problem with warming of the climate, particularly in tropical areas. So it's going to be quality of food, not just quantity of food.

Emile Frison: What is the function of diversity in the production



"Hunger is still too often talked about only in terms of quantity of food. But what really matters is to have a healthy diet. We have to restore a much greater diversity in these diets if we want to have healthy people."

EMILE FRISON
Director-General, Bioversity International



system? Agriculture intensification in the last 30-40 years has been based on the availability of cheap energy, on the principles of economy of scale, and on simplification of the production system in terms of number of varieties of species being grown.

The greater fluctuation, the extremes, the greater unpredictability of what the climate will be means that we have to mitigate risks of crop failures or production failures in a different way. That can be done relying on a greater use of diversity. We can combine diversification from an economic point of view, bringing greater income, and making more, better use of the scarce water resources, by having better deployment of diversity in production systems.

Pamela Anderson: What we've been talking a lot about is: How do we improve productivity of our basic food crops? This is critical. But we need to go beyond commodity thinking to food-systems thinking. And that means a paradigm shift.

We are working actively to increase the productivity of potatoes and protect biodiversity. In the High Andes, we are now also working with barley, quinoa, oca, ulluco, cañihua, and trying to look at that as a portfolio for food security and adding value to each one of those options for the poor. We've got to start thinking completely different and take a systems approach, and that is going to make a lot of difference in terms of how we go forward.

Emile Frison: I'd like to follow up on what Pamela said, looking at things in a much more integrated way. We haven't had a chance to talk about the issue of nutritional quality. Cheap food that is energy-rich but nutrient-poor is having devastating impacts now in developing countries. Diseases that were known as disease of affluence – cardiovascular disease, Type 2 diabetes, cancers, and obesity – are expanding at exponential rates in developing countries and among the poorest people. Again, we must make much broader use of the available diversity, also from a nutritional

point of view, in order to have the health and livelihood outcomes we all wish for.

Roz Naylor: Identifying new crops is a really important point. At a conference at Bellagio, [the Global Crop Diversity Trust and the Program on Food Security and the Environment at Stanford] identified the need to look at extreme areas in terms of genetic-resource collections. We also identified the need to look at these alternative crops to understand where their characteristics might exist, in sorghum, quinoa or teff, that could be used in some of the more major crops as well.

Ed Rege: What will happen to us from the perspective of climate change, there's a lot of people working on. What we are not doing enough about is what should be done. When weather changes, farmers have the ability to adjust their production methods to deal with that. When weather changes a little bit more severely, farmers start thinking, "Perhaps I should find another breed." When weather changes so much more dramatically that it is basically climate change, then farmers start saying, "Well, maybe cattle cannot do here; I need to find camels." We have to be thinking, how will we be retooling farmers over time to be able to adjust to things they have never before had to deal with?

Ravi Singh: We are going through a really exciting period. We heard yesterday there are quite a few new technological advances which can be used [in plant breeding]. You can move genes around from one species to another more easily than was done in the past. And we should be really positive that if we prepare a good, scientific base of people in the North, in the South; good partnerships between private, public, international centers – we should be able to manage genetic diversity much better and be able to produce what will be needed to feed the world. ■





“There is a fundamental shift underway in global food and agricultural systems. Are governance systems, the international architecture, responding to this shift? Or are we going to use our old architecture to apply to the new problems?”

RAJUL PANDYA-LORCH
Head, 2020 Vision Initiative
International Food Policy Research Institute

Rajul Pandya-Lorch: In the 1950s and '60s and early '70s, prices in real terms were higher than they are still today. And that is one of the greatest legacies of Dr. Borlaug: with the Green Revolution we were able to bring down prices for a sustained period of time. The new world food situation is now characterized by higher and more volatile prices.

The combination of population growth and growing incomes, along with urbanization and changing dietary preferences as incomes rise, result in continued growth in demand for cereals. The use of cereals for food has increased 5 percent, for feed by 8 percent, and for industrial uses 38 percent since 2000.

The price of oil rose from about \$30 a barrel to about \$140 and has now slid down to about \$80 a barrel. Energy prices traditionally affect agriculture through effects on fertilizer, irrigation, transportation. But they're also beginning to intertwine in terms of agricultural products being used as fuel. And energy prices are then affecting output prices and opportunity costs for agricultural commodities.

One of the key changes in the last five to seven years has been the policy towards biofuels. The generous developed-country subsidies – in the U.S. and European Union, in particular, but also in other parts of the world – have distorted markets and shifted production away from agriculture for food to agriculture for biofuels. Increased biofuel demand has contributed to about 30 percent of the increase in cereal prices since 2000 – other estimates suggest that may be as much as 60 to 70 percent. The policy shifts may have been made with good intentions, but they've had consequences that were not quite foreseen or taken into account.

On the supply side, response has been relatively slow. Yields have been growing very slowly. There have been land and water constraints and under-investment in agricultural innovation, and also inadequate agricultural banking or finance systems that allow people to take advantage of the rising prices and make investments they need. We have experienced weather changes, particularly extended drought in Australia, cyclones in Burma, a number of these. As a consequence, we have depleted our cereal stocks.

Many countries, naturally, have taken ad hoc steps to minimize the effects of higher prices on their domestic populations. Export bans, restrictions, price controls may reduce the risk of food shortages in the short term for the country imposing them, but they make international markets more volatile. They also undermine trust, and that is one of the key casualties of the situation we have experienced. How to build up trust in these global food markets will be a challenge in the coming years.

Before this crisis unfolded, there were many, many people who were absolutely poor. About 900 million people live on incomes of less than \$1 a day. There are at least 160 million people several years ago who were “ultra-poor” – who lived, if you can call it living, on half a dollar a day. Their numbers are growing, and most of the ultra-poor today live in sub-Saharan Africa. We don't even have information of how many people have fallen deeper into hunger this year as the crisis really unfolded.

There are at least 33 countries that have alarming or extremely alarming states of hunger. Most are in sub-Saharan Africa and a handful in South Asia and Southeast Asia. There are some

CONVERSATION: TRENDS AND IMPACTS OF RISING PRODUCTION COSTS AND RISING FOOD PRICES

ROBERT THOMPSON (MODERATOR)
Gardner Chair in Agricultural Policy,
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JOHN POWELL
Deputy Executive Director,
UN World Food Program

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RAJUL PANDYA-LORCH
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H.E. CARLO TROJAN
Chairman, International Food and
Agricultural Trade Policy Council



“Today 75 percent of the world’s poor live in rural areas, but the international foreign-aid programs spend only 4 percent of their resources on agricultural development. And governments of developing countries also spend only 4 percent of their budgets on agricultural development.”

ROBERT THOMPSON

Gardner Chair in Agricultural Policy, University of Illinois



countries that gain – the net food exporters. There are countries that struggle – the net food importers. Many of the net food importers are in sub-Saharan Africa.

There is also the other side, where people want to take advantage of rising prices. To what extent will prices transmit down, in terms of incentives and mechanisms that allow people to respond to increased agricultural production? The bulk of the world’s poor are net food buyers. Many are small-scale farmers who sell their product and then a few months later re-engage in the market to buy back the food. They are harmed.

The impacts of the high prices on the poorest are very much driven by their initial conditions. The greater the share of your income, or your budget, that goes to purchasing food in the market, the more vulnerable you are to higher food prices and the adjustments that you need to make. One major adjustment is cutting back on meals, from three to two to one, and shifting to less nutritious and cheaper foods. Many households withdraw their children from school because they cannot afford fees or they want the children to earn income and supplement the family budget. In many instances, households sell off productive assets and condemn themselves to greater poverty down the road.

There are gender implications of this. Women are impacted much more than men. They’re impacted because of their lack of or their very tenuous access to property, and because of having to travel longer distances to find cheaper sources of food or to spend time preparing foods in different ways.

IFPRI has put forward key priority actions that are needed. Expand emergency humanitarian assistance. Eliminating the agricultural

export restrictions. Our work suggests that this would reduce price levels by up to 30 percent and reduce volatility. Fast-impact production programs in key areas to contribute to the supply response. And change the grain and oilseeds biofuel policies. To cope with the crises and to prevent them from becoming more volatile [includes] calming markets, investing in social protection, and [investing] for sustained agricultural growth and to complete the Doha Round.

Robert Thompson: Malthus has been wrong for more than two centuries. He predicted population growth would outrun food-production capacity and that eventually starvation would constrain the size of the world’s population. Instead, we had a 150-year decline in the real price of grain. This was particularly beneficial to the poor, who spend the largest fraction of their incomes on food, and allowed them to spend more of their income on other goods, stimulating the rest of their respective economies.

The last two years’ explosion in commodity prices and, in turn, food prices have had a devastating impact on the poor in developing countries because they spend such a large fraction of their income on food. More recently with the explosion in the cost of fertilizer and energy, [farmers in grain-producing and -exporting countries] have seen their net incomes shrink.

So with this period of higher-than-historically-normal commodity prices, what are the challenges being confronted by the World Food Program? How do you see the next few years in this environment?

John Powell: The good news is that, for the last 40 years, we have managed to reduce the percentage of those living in hunger by

50 percent. We’re now at 7-8 percent – that is an extraordinary achievement. The world is now nourishing more people than at anytime in history.

But we have a series of challenges. The number of natural disasters has quadrupled in the last couple of decades. They affect more than 250 million people a year since 2000. 90 percent of those people are in developing countries. If you live in a developing country and you are a poor person living on marginal, fragile lands – and guess what? That’s where the poor do live – then climate change isn’t an issue for 2050.

We began with 850 million people, last year, not having enough to eat each day; 162 million living on less than 50 cents a day. These are not numbers – these are people, every one of them with a name, a face, and an aspiration. WFP began the year with a very substantial program of work, emergency operations [in] Sudan, Afghanistan, etc. The program at that stage was estimated to be \$3.1 billion to reach 90 million people. Within a few months that number increased to \$6 billion. Part of that is cost increases – fuel and food. Most of it is more people needing help. It’s the Horn of Africa, Somalia, North Korea, Afghanistan – before you get to the somewhere between 75 and 150 million new people affected by high food prices.

At WFP we’ve had a mixed blessing, in that one of the elements behind high food prices is low food stocks. That means our partners are increasingly giving us cash to buy food. We can do more things. 80 percent of the resources we get we purchase in developing countries, which is a real opportunity to leverage your purchasing power. We can have a more nuanced and robust set of interventions. If there is food in the market, and the problem is income, then the answer may be cash or coupons or vouchers. We are now able to do that. We are able to look at more nutritious foods, particularly targeted to the young, the pregnant woman, and small children.

Robert Thompson: Can the world’s farmers produce food or increase production fast enough, on little more land and with less water than today, in a world in which agroecosystems are shifting, if world food demand doubles and we rely on agriculture for part of our energy security?

Jerry Steiner: I think yes, and we’ve made a very broad and public commitment on increasing and doubling yields of corn, soybeans, and cotton by 2030. \$3 million a day is what we now spend to accomplish that goal.



“If hunger had a face, it would be the face of a woman. Gender in conversations about hunger is not a cross-cutting issue – it is the issue.”

JOHN POWELL

Deputy Executive Director, UN World Food Program

harvest the farmer can realize. Both of those working together with improved practice, better disease protection, make a dramatic increase in yield.

In the U.S., corn yields are up 32 bushels since the introduction of biotechnology in 1996. And that’s just the start. When we look at all the tools available today – including drought tolerance, better use of nitrogen – we are very optimistic that we can make a big difference. We’re not just talking about making a difference in the U.S. or Brazil or Argentina or Western Europe. This has got to make a difference in Africa, in Central America, in Asia – and it absolutely can.

We need to find a way for these improvements to make a real

Rajul talked about the declining rate of yield growth, and that’s absolutely true. From 1980 to 1999, the average rate of yield growth had declined to less than 1 percent per annum. But if you look at 1998 to 2007, you see some hope because that yield growth has now boosted significantly. Corn is 1.65 percent; cotton is well above 2.5 percent, largely because of the role insect-protected cotton has played; and soybean, a little bit lower than corn.

It’s both in breeding, where genomics and markers are allowing us to accelerate that rate of yield-gain, and biotechnology, where we can turn the potential inside that seed into a





“An awful lot of the issue with hunger is that we’re not producing enough locally, and so many of the people that are food net buyers should be food net sellers. We in the private sector are going to have to think about ‘business as unusual.’”

JERRY STEINER
Executive Vice President, Monsanto

difference in farmers’ lives. Malawi in the last three years is a phenomenal story, where the country’s production has more than doubled with some relatively simple steps. It isn’t just about better seed and fertilizer and crop protection. We also have to connect these people to markets. It’s going to take some unusual partnerships to make that happen.

Jim McCarthy: The initial euphoria of the increase in grain prices over the last two years was very short-lived because of the aftershock of input costs’ increases. The world of the farmer changed – when you got a price increase in the past, it came from supply problems; now it’s come because of demand, and that demand is continuing to bump up. The farming world is going to have to realize that food price and energy cost are totally related. High energy costs, high food prices. End of story. We are going to have to revisit the farm-production model completely.

My vision of the farm-production model is that we would have GM crops completely, because GM crops facilitate no-till. We can establish in Argentina a crop of maize with six liters of diesel per hectare. A conventional system in Europe is taking 30 liters of diesel. No-till is about crop rotation, and it’s about sustainability

and the land acting as a carbon sink. Wherever we develop agriculture in the world, we are going to have to get a much bigger return for every dollar we spend on energy. And that will be done with GM crops.

I feel ashamed to see the European stance on agriculture. It will not allow GM; it is doing everything to reduce production. Ireland’s Rural Environmental Protection Scheme basically will pay you to cut production to reduce nitrogen rates. It is living on the past glories of surpluses. Africa looks to Europe, and Europe is a very bad lead. Africa needs to look to Asia, because Asia in the next 40 years is going to add on another China. And if Africa has surplus, that’s where it’ll go.

Robert Thompson: Rajul pointed out that there’s been a huge erosion of trust in the world market after the shrinking availability of food this past year. Carlo, how do we reassure net food-importing countries that trade can reliably provide food security?

Carlo Trojan: The trade environment has become more complex, and global support for trade liberalization is weakening. Nonetheless, it is important to pursue a more open and equitable food system, especially on the brink of a prolonged recession worldwide. Temptation for protectionist measures in such situations is very, very great. We should try to conclude the Doha Round, as soon as it is politically possible.

The period of cheap food policy is over; we are moving into a structurally different situation. We will go through a period of relatively high food prices but relatively high volatility as well. [Those are] the threats. But it is also an opportunity to invest heavily in new production methods in agriculture, especially in developing countries. Let’s be frank – agriculture has been neglected in poverty-reduction programs [and] in development cooperation policies of the major donors.

Rising food prices have given way to all kinds of export restrictions. 40 countries in the world have operated restrictions and levies of all kinds. That has contributed a fair amount to the rise in food prices. The international community, especially the WTO, rather than looking only at the import side of world trade, should also look at the export side.

I concur that we should look very critically to the present biofuel policies. We should promote, to the extent possible, second-generation biofuel feedstocks, and we should discourage first-generation feedstocks, especially where the impact on greenhouse-gas emissions is questionable.

Robert Thompson: We have the challenge of as much as doubling world food production in the next several decades on little more land and probably using less water. Is there any fundamental inconsistency between addressing the poverty problem and also doubling food production?

Rajul Pandya-Lorch: Agriculture itself is not only what we should be focusing on, but on the rural economy. As we are investing in rural economy, the potentials for technology are immense. What is missing in our discussions are finance people. How do we get from the availability of the technology to the access to the technology?

I don’t think we have made the investments we need in finance options, bridging the gap from microcredit, where we’ve been focusing so much of our energy, and the mega-programs. How does a small-scale farmer or a medium-scale farmer get access? One of the major innovations WFP has been making is the Purchase for Progress program. What is very exciting is WFP’s commitment to purchasing over a period of time, making a secure market possible. Farmers in developing countries are like farmers everywhere. They want to take advantage of these prices and participate in [the market]. But how do you take the risk, if you only have secure access to the market for one year?

Jerry Steiner: It’s absolutely the right point. Microfinance has lagged in agriculture versus a lot of other industries, and it doesn’t need to. There are successful examples of where this gap is being bridged. The first part [is] someone being willing to make that loan to get a farmer started – and fertilizer is the single biggest input we’ve got to get financed. [Then] we need to organize, where the farmer has confidence that they’ve got a buyer and a reasonable market price. We’ve put a closed-loop system together in Campo Unido in Mexico, getting Maseca involved as a tortilla buyer and buying the grain. The WFP could play that same role.

Once we get that started, and the farmer starts earning a return

“Recently in the context of rising food prices, there has been a tendency to say, ‘We should be self-sufficient in terms of food.’ I don’t think that’s the right answer. If we want to ensure food security in the longer term, we need more and not less trade.”

H.E. CARLO TROJAN
*Chairman,
Intl. Food and Agricultural Trade Policy Council*

for a couple of years, this turns into a sustainable business model. That’s where this has to go. It can’t be [that] we’re doing some things on donations, other companies are doing things on donations, countries are doing things. That’s important, to get it started, but it has to transition to normal business if this is going to work over time.

Robert Thompson: Do you sense that agriculture is getting back on the agenda of governments in the developing world, particularly recipients of significant amounts of food aid on an ongoing basis? Has the food crisis jarred them into addressing the longer-term as well as the shorter-term problems?

John Powell: The answer is not robust but a nuanced “yes.” In Darfur today, no one is thinking about agriculture. They’re simply thinking about survival. In Somalia today, that’s all they’re thinking about. In North Korea, we’re not talking about these kinds of things either.

For countries in a different situation, there is enormous interest and enthusiasm for a resurgence of investment and policy reform in agriculture. It has prime-ministerial engagement. If we can find ways to genuinely engage small farmers as part of the solution, then we’re a long way home.

[In the Purchase for Progress program], our ambition is to be able to have a series of pilot programs to establish that we can connect small farmers and markets, particularly through cooperatives, farmers’ associations, and so on.

Our thinking had been that there should be no reason why, if we can make this work, we can’t extend that to agroprocessing – the production of micronutrient- and vitamin-fortified foods, specialized foods particularly designed for use by women and small children. We’re very concerned as we run this series of tests and pilots in 17 countries to make sure that we have a series of viable models before going to the next step.



Robert Thompson: We've entered a period of greater risk to farmers with flooding one year, droughts the next, greater volatility of market prices. Do farmers have the risk-management tools they're going to need? [And] what's the likely response in the future, in public policy, to this risk?

Jim McCarthy: What we're seeing to our envy in other parts of the world is the consistency of American harvests. It's because of the technology that's come, triple stack and different things. [Despite] those risks, with drought or with too much rain, the American harvest seems to become very consistent. And that's the wonderful thing the technology is bringing.

A big concern is that in the last 10 years the amount of paper traded in the grain markets is enormous. What's evolving in the world is two grain markets. There's the futures market, which shunts a lot of paper around, and there's actually the checkbook in which you buy your grain. And that's becoming disjointed, which is a big risk and hugely adding to the volatility of prices, and is going to be devastating for those people with less than half a dollar a day – because they cannot afford to fund the [futures markets].

Carlo Trojan: We have to continue to move away, as we have been doing in Europe, from trade-distorting subsidies. I don't think we should come back to the old policies, which we had in Europe to an extent and we also still have in the United States. What you may still need in developed countries is to have a safeguard mechanism – if you have very abrupt movement in the market, that you put some kind of floor in the market. As far as Europe is concerned, the kind of income compensations which we give – which are put in the so-called “green box” – over the years, farmers will get more return from the market, [and] there will be also a reduction of the kinds of income compensations which we are giving.

“Risk management is something that's poorly managed at every level in agriculture. In farming we plan 15 years ahead, but we farm from day to day. And that's a lot of the trouble.”

JIM MCCARTHY
Marburn Farm, County Kildare, Ireland



Jim McCarthy: It's helping farmers to farm. Funding has to be given for seed. Can you imagine the women in [Uganda], if they could get a seed that protected their crop from insects and pests and maybe took in some nitrogen from the air. One bag of that seed will feed a hectare, and they may produce 2-3 tons of corn with very little effort – what a difference that would make. I would beg for the thinking people to start aid at [that] level – teaching a man to fish, not giving him fish.

Jerry Steiner: A lot of points have been made that farming is a business like any other, in that it needs to be profitable. But farming is something without a roof over the top of the factory, and therefore it has lots of elements of unpredictability.

Technology can help with some of those, but you hear a lot of things on the policy front that we also need to fix to take out that risk. We – and I mean collectively all the people in this room, representing different places – need to work to put some value-chain systems in place, that I think will address many of these challenges.

Rajul Pandya-Lorch: High prices are not inherently evil. And I'd want us not to walk away with that impression. For many years, we have all complained about low prices, and the high prices provide us an opportunity. The challenge for us is how to take advantage of that opportunity and to protect those who cannot take advantage and are hurt by the prices.

John Powell: We have to be smart enough to do two things at once. The first is to provide emergency humanitarian assistance to those who need it. The second is – high food prices offer an opportunity, the first in decades, for small farmers to get a fair price for their commodities. What's wrong with that? The issue is how we take advantage of it. ■



JOSETTE LEWIS
Director of the Office of Agriculture, USAID

THE ROLE OF FOREIGN ASSISTANCE IN ELIMINATING HUNGER

There is no more important question taken up at a more critical time than the one before us: how we can end hunger and its chronic and debilitating implications in our lifetime.

It is time for a second Green Revolution that enlists public, private, not-for-profit, academic, foundations, and individual [actors] to respond in ways that we have not before. A more systematic challenge to food security worldwide will demand a greater level of coherence and coordination from all of us than ever before. And for government that means committing the resources necessary.

As the largest food donor in the world, the U.S. provided over 60 percent of global food aid last year. We are determined to make assistance dollars more effective than ever. Humanitarian assistance is essential to our role in the world. With our international partners, we are providing immediate aid to countries most vulnerable to rising food prices; helping boost stable food production by driving productivity and easing infrastructure constraints; and encouraging broad markets for agricultural products, technology, and trade that will help countries feed themselves.

People only need the basics to ward off hunger and make their

own way in the world. It seems only reasonable that government leaders should be equal in their commitment. If [small-scale farmers] can manage through droughts and locusts, surely policymakers can craft reasonable regulatory regimes and allow trade in food commodities.

Financing for rural small- and medium-sized enterprises is critical. We can also drive greater private-sector investment, innovation, and technology transfer through creative partnerships that help everyone involved. Since 2001, AID has created nearly 700 global development alliances, enlisting more than 1,700 unique public, private, and academic partners and leveraging more than \$9 billion. These enterprises making investments represent the future of development assistance, because they lead to results that lift people out of poverty and hunger permanently.

Imagine the prospect of ending hunger in our lifetime by enlisting the creativity of everyone from a small farmer looking for a secure livelihood to the world's leading scientists, to the most innovative NGOs and foundations, to the leading multinational CEOs and the shareholders they work for. While none of it will be easy, of this I am absolutely certain: There is no work on earth that is more worth doing. ■





SYLVIA MATHEWS BURWELL
*President of Global Development,
 The Bill and Melinda Gates Foundation*

SEIZING THE MOMENT, SEEDING THE FUTURE

At the Gates Foundation our work is guided by one belief – all lives have equal value. This belief is simple to say but much harder to achieve. Our ultimate goal is to reduce the world’s greatest inequities so that every person has the opportunity to lead a healthy and productive life.

We asked, what issues affect the most people but receive the least attention and resources? What are the greatest opportunities to help large numbers of people lift themselves out of hunger and poverty? What can we have impact on that is scalable and sustainable over time? Time and again, the answer was agriculture. By the end of this year, the Global Development Program will have committed \$1.5 billion; of that, \$900 million is to agriculture.

Our approach in agriculture begins and ends with the small farmer. Everything we do is focused on him – or more likely, her. Success requires not only quality seeds and healthy soils but good information, access to markets, and supportive policies. That’s why we’re pursuing improvements across the entire value chain. And in each of these areas we’re focused intently on women. When women are neglected or treated as an afterthought, agricultural programs don’t get the results that they can.

When a single farmer achieves independence, it’s a success story. When it happens to an entire community, it’s development. There’s a saying we take to heart: If you want to go fast, go alone. If you want to go far, go together. It is our unequivocal goal to go far together.

It’s going to take strong, effective partnerships, like those that brought us the Green Revolution, and new, innovative partnerships that more closely link the public and private sectors. We need partnerships between researchers in the developed and developing worlds so the newest discoveries can benefit those growing the oldest crops. And we need all governments to start thinking about problems in new ways.

Our largest partnership – the Alliance for a Green Revolution in Africa – brings together the Rockefeller Foundation, the UK Department for International Development, and African governments under one shared vision, which is revitalizing African agriculture. AGRA’s first initiative aims to introduce

more than 1,000 new varieties of African staple crops. These varieties will be researched, developed, and distributed by African institutions and are projected to help alleviate poverty and hunger for up to 30 to 40 million people.

Another partnership is Purchase for Progress, our collaboration with the Howard G. Buffett Foundation and the World Food Program to revolutionize the way WFP buys food in the developing world, giving hundreds of thousands of small farmers access to reliable markets and the opportunity to sell their crops at competitive prices.

Infrastructure works across a number of issues: soil health, roads, and also water, since agriculture uses so much. Those are all areas where we are thinking about the most effective ways for us to play a role. Roads, while essential, [are] not necessarily something that we think we’re best capable to do; those are probably better being government-based partnerships. We funded a large effort at AGRA in integrated soil-health management. When we first started thinking about the issues, to be honest, we talked about a fertilizer initiative, and we very quickly learned that that was not the approach that we should be thinking about in terms of long-term, sustainable change.

There are many [products] that already do exist that could promote dramatic change. One of the hardest pieces to crack in increasing productivity at large scale has to do with that actual extension piece. We think about seed production, but we also think about market access. A mistake we originally made was, we thought we could do our work sequentially with regard to market access – creating the demand pool, doing extension, teaching farmers the standard of quality for export or what types of fertilizers are acceptable in different types of use – and do that last. So we’ve changed and evolved. And one of the first investments at AGRA was a program for African seed systems – systems, not the seeds. Much money has gone to agro-dealers to do that promotion [and] extension. I wouldn’t be forthright if I didn’t say it’s the hardest part.

If donor governments follow through on their pledges to increase aid and reprioritize agricultural development; if developing-country governments follow through on their commitments to increase spending on agriculture; and if non-profits expand on smart and catalytic investments – then we will have the resources to reduce hunger and poverty on a large scale.

Improving the effectiveness of investments is just as important as increasing them. That means ensuring that funding for crop



“When a single farmer achieves independence, it’s a success story. When it happens to an entire community, it’s development. There’s a saying we take to heart: ‘If you want to go fast, go alone. If you want to go far, go together.’ It is our unequivocal goal to go far together.”

research flows to the crops that mean the most for those living in poverty. It means investing in local capacity and efforts. It means making sure that donor priorities align with the priorities of their developing-country partners.

Sharing data and results more openly is challenging but critical. The Gates Foundation is piloting a feature on our website that tracks the progress and lessons – real-time and real data – on a set of our agricultural development grants. Perhaps the World Food Prize could be the place where people gather each year to share concretely what they’ve accomplished, what went well, and what didn’t work.

Let’s put small farmers front and center. Scientists, can you partner with researchers in the developing world? Grantmakers, can you involve farmers in programs as you design them? Business leaders, can you reach small farmers with investments that deliver both financial and social returns? Can everyone ensure that all your efforts consider the importance of women farmers?

The measure of our success will be the degree to which we can enable small farmers to do what we all take for granted – feed our families. Ultimately what we do is not about yields, returns, or markets. It’s about increasing opportunities for hundreds of millions of people to build healthy, productive lives. ■





ROBERT HORMATS
*Vice Chair,
 Goldman Sachs*



URBAN AND RURAL FOOD SECURITY IN EMERGING AREAS

Even though we're in a major financial crisis, it's important that we not forget about food – it's a pressing global issue, part of a structural shift occurring with urbanization and rapid growth in demand in emerging as well as industrialized economies.

For the first time in history, half of the world's population lives in cities requiring vast amounts of infrastructure – roads, railways, airports, housing, water, sanitation facilities. Because urbanization and industrialization will continue to absorb agricultural land and labor in many countries, there's going to be pressure to increase yields in the rural parts of the economies. This may increase productivity growth, but it could also exacerbate environmental degradation and further strain water supplies.

[In 2015], Brazil, Russia, India, and China are going to be home to five of the world's 10 largest cities. The world is going to have 22 mega-cities consuming larger amounts of food and other raw materials. There are enormous rural-urban income divides. Infrastructure is the key differentiating factor between the urban areas of developing economies and rural sectors. The urban-rural gap in water and sanitation is particularly pronounced. Many of the problems of the past result from insufficient investment in the

food production and delivery chain, including irrigation, fertilizer, roads, etc. Real supply-side constraints have to be overcome. A large portion of that investment should go to the very poorer countries or poor parts of the wealthier, emerging economies.

In the large emerging economies, only around one-third of the cropland is irrigated. Urbanizing countries face a dual challenge of supporting intensive agriculture to meet the growing demands while also preserving freshwater supplies. The FAO estimates that irrigated crop production will need to increase by about 80 percent between now and 2030 to match demand. It expects irrigated-land water use to rise by just 12 percent, increasing the demand for efficiency in all the inputs that go into agriculture.

The potential for overseas investment in agriculture in emerging economies could be useful. There is growing interest among capital-surplus, food-deficit countries. The UAE and Saudi Arabia are seeking opportunities in countries that have the capability of increasing food production, such as Sudan and Pakistan. If managed constructively, these investments in under-utilized land can create jobs; [they] can improve infrastructure; and new technologies can make agriculture more efficient. ■

Mr. Hormats delivered his remarks via satellite from New York

CONVERSATION: THE ROLE OF THE PRIVATE SECTOR IN GLOBAL FOOD SECURITY AND DEVELOPMENT

JERRY STEINER (MODERATOR)
*Executive Vice President,
 Monsanto*

SARAH HULL
*Global Head of Public and Government Affairs,
 Syngenta*

CARL HAUSMANN
*CEO,
 Bunge North America*

ROBERT LANE
*Chairman and CEO,
 Deere & Company*

SHERI SCHELLHAASS
*Vice President of Research and Development,
 General Mills, Inc.*

SAMUEL WORTHINGTON
*CEO,
 InterAction*





“I see the private sector having to commit to people. We need people to operate in each of these markets, and as much as we can do to bring training and development to these places and to hire people, it’s also the start of a sustainable business model.”

JERRY STEINER

Executive Vice President, Monsanto

Jerry Steiner: The difference between a success story and development is really pertinent because many times getting things going is one of the hardest things. The success story doesn’t turn into development until that pilot becomes scaled and no longer is a project, but is simply an ongoing business system that creates value for all of the people in it. It’s often this challenge – making a pilot become a sustainable, everyday business model that we start to take for granted – where we lose an awful lot of good ideas.

Society is counting on us to make these investments, to innovate. In the case of us as a seed company, that means doing breeding. That happens locally; as does the seed production happen locally, so it can build into an economy very, very quickly. One of the things we can also bring is – even though the crops aren’t always the same, they leverage off of a very common platform that we could never afford to build just for this specific market. [There are] two examples of that, one being molecular breeding. We built this platform on top of corn, soybeans, cotton, and some vegetable crops for the developed world. But at a modest, marginal cost, it can also make a difference in those crops grown in much of the developing world.

The same thing is true for technology like drought tolerance or insect resistance. Even though it’s developed for maize in the U.S. or Latin America, that technology often has a direct application

but needs to be incorporated into germplasm that fits. The private sector taking [what it has], what’s been paid for and has an investment basis somewhere else but can make a difference in making a sustainable business model in the developing world, is an important element that we need to bring.

Sarah Hull: The role of the private sector in global food security and development comes down to two words: technology and partnerships. We’ve heard a lot about the technology side – the seeds and the genetics and the traits – and that’s very important. We also heard the possibility around nanotechnology, which is also very interesting. But we’ve got to get the partnerships right now and develop them in solid form so we can take those forward.

We say our purpose is “bringing plant potential to life,” and that is going to be done through technology. We spent 11 years developing [tropical sugar beet in India]. We partnered with the Vasantdada Sugar Institute. We partnered with a bioethanol co-op with 12,000 farmers. We partnered with the Indian government. We partnered with local NGOs. And we together built the business model that allows this tropical sugar beet, which grows really fast and with a lot less water than traditional sugar beet, to have a two-crop season for these farmers, where they have markets for sugar production in the first crop, and then [in] the second crop the ethanol production. This is just in its infancy, but we can take this into other countries, like Ethiopia, Peru, and South Africa, where this model could be effectively replicated.

The challenge with these things is, how do you make them scalable, not pilot projects in different parts of the world? How do you come together to actually make them more effective? It’s us having a mindset shift ourselves. We need to look at this differently than we have before. It’s taking a look at the challenges of public policy. We’ve got to figure out how we can partner on a much deeper, broader level. Some of the international organizations are much more willing to talk to the industry than they have been before. Typically we thought, “Oh, they’re too politicized; they don’t want to hear from us, they don’t trust us.” But we’re finding that they’re much more open to that.

Carl Hausmann: I see the role of the private sector as connecting the farmer to the end consumer. We have a big role that covers the entire value chain: ensuring markets for spot deliveries and spot purchases, infrastructure, storage, transportation. Seems old-fashioned and simple, but transportation is a very big part of the private sector’s role.

Ever since the Seattle Ministerial Conference, globalization of trade continues to grow, grow, and grow. The reality is inescapable, regardless of what you think of it. Furthermore, food security is more enhanced by globalization. The world can’t be depending

on each country to produce its own product. So globalization is part of the answer, not a problem.

Interdependence is getting more important as we go forward. Certainly, interdependence between surplus countries and deficit countries, but also interdependence [between] everyone in the value chain. If we look back historically, we’ve been very comfortable with rural and urban interdependence. But on a global basis, interdependence [is] between importing and exporting countries. Is this growing interdependence going to be carried out? Are we going to be living in a very conflictive environment or an orderly environment?

For us to meet the challenges of food security around the world, we’re going to have to be much more comfortable with the interdependence of importing countries and exporting countries; the interdependence of reducing export tariffs and reducing import tariffs in the various countries to succeed; the interdependence between rich countries and poor countries, even the interdependence between NGOs and the private sector.

It is absolutely critical that [the private sector] play a part in advocating for good ag policy. I don’t think we can leave it just up to the governments. Governments tend to be elected by their national citizens and often are being pushed towards more nationalistic ag policy than good ag policy. We need to push for not only WTO agreements but regional agreements. We need to find ways to work with NGOs to bring broader-based support for this new model for agriculture to meet demands.

Robert Lane: We are in business to invest other people’s money to deliver a great business over the long run in returns. The only way we can deliver those returns is by satisfying our customers in distinctive ways. In this case, we’re trying to think about all of the people of the world who we would be thrilled if there wasn’t anyone who was hungry.

“Ag policy is too important to be left to a solely domestic perspective. We could have more, better international ag policy negotiated. Even the WTO – we don’t reach success, and yet every one of the negotiators who went there knew this was a win-win situation. We don’t know how to dress up our win-win situation to sell it in the home markets.”

CARL HAUSMANN
CEO, Bunge North America

Deere has been known for very sophisticated equipment. Farmers here in Iowa know this large, productive equipment. And Deere has been investing heavily to cause these farmers – through their own energies, of course, but using these tools – to be able to be much more productive. This equipment allows much less fertilizer to be applied, much better care of the expensive seeds that are being developed and planted very carefully. With GPS, as the tractor is coming along, the fertilizer can be stop being applied at key points. The seeds can stop being applied. It’s very hard to go up and down the rows for 15 hours a day and not overlap or leave a gap, even the best operators. With these mobile information machines, there can be no gap. This just improves productivity.

Ten years ago, together with other executives from John Deere, I was walking over a field in India, an empty field, and we wondered, “Is there a way that we could be building small tractors here that would allow us to do something that we just haven’t been able to do before, and that is come up with a profitable tractor, one that can be sustained over many years that would meet the needs of more emerging farmers?” Today that tractor is coming out of India. It’s one of the most modern, integrated plants that Deere has. We build diesel engines there, transmissions, full tractors. About half the production goes into India. We export to about 66 countries. But how do we link in with those who have the seeds and the fertilizer, the distribution, the storage, the roads? There are so many parts of this chain.

Sheri Schellhaass: When you think of “field to fork,” I’m really on the fork end of the business. Some may even consider that a silver-spoon end of the business, because many of the products that General Mills make are fairly high-end products from a value standpoint, when you think about developing nations.

Our mission is to nourish lives, nourish communities, and nourish the future. And we do have examples where we have nourished communities in developing nations. We have trained farmers in the



northern regions of China, near the Siberian border, how to grow corn that we can convert into Bugles snacks sold in the markets such as Shanghai and Beijing. I have witnessed the transformation that seven years can make by doing this. I have seen farmers who lived in mud houses with thatched roofs now living in beautiful homes with electricity and TV sets. Their children go to the university. And that is when we hit all three of those – nourishing lives, nourishing communities, and nourishing the future.

In most parts of Africa they are not able to purchase the kinds of products that we make. Yet we feel the responsibility to enter into Africa and to try to make an impact at this point to invest in our future. Our efforts there are with partnerships, mainly philanthropic. They have to do with projects that we're doing with NGOs on the village level but also a new effort we have,

“We need to feed some parts of the world but have, at the heart of our policy, the capacity of local groups to feed themselves. That will only happen where the overall trade environment encourages and enables local farmers to be competitive in global markets, which means reducing trade barriers.”

SAMUEL WORTHINGTON
CEO, InterAction

offering our 1,200 food scientists and engineers located here in the United States to help NGOs and local governments be able to transfer technology so that we can help preserve the food that is coming out of the fields, even in the local regions.

Samuel Worthington: The U.S. nonprofit community is a community of significant scale. InterAction members manage some \$9 billion of programs around the world. It's a partnership with the UN, governments, local groups on the ground. It's operating up a value chain, ensuring that food [aid] from this country, from Europe, enables a village or, as in Darfur, a camp of 44,000 to survive. But ultimately we're about working with individuals so that they can feed themselves. We cannot feed the world from America. We need to reach out and help others to be able to feed themselves.

The challenge always put forth, looking at NGOs, is, “You do small work” – while you're talking to a community of 250,000 staff around the world who are looking at issues of scale. Some of them are investing over \$100 million a year in Africa, in specific countries. The parts on the ground learned a long time ago that the only way to get to scale is to reach up into markets.

We are engaged in those parts of the countries farthest away from the government outpost, and the only operational extension agents are from Catholic Relief Services, or Heifer International, or Save the Children, or other groups helping small landholders reach up to a value chain. And we're looking for corporations who are interested in reaching down. We're interested in successfully linking those small-scale farmers up with other activities. There are plenty of successful examples. A more recent one was Winrock and two beverage companies successfully getting very small-scale farmers to reach up to those companies to enable them to have a steady flow of grain from populations and farmers that they were not accessing in the long run.

There is a need for a triangular relationship between government, business, and the NGO community. It is the only way that we



will get out there into these populations. When we talk about extension, about reaching way out there in the rural parts of the world, there is a community – the international NGOs and the smaller, local NGOs – that now recognizes the only way we will be able to address food security is through new and innovative partnerships with the private sector, of which we are part.

Jerry Steiner: What I heard is that the role of the private sector is, take investors' money and invest it. And we have to earn a return over a period of time that's satisfactory. We do that by creating products and services that have to add value. And in these markets, for anything to start up and turn into something, it has to add value relatively quickly. That probably means within a season. Very clearly, no one believes you can do this alone. It takes some creative and probably some uncomfortable partnerships to deliver this. We're going to be partnering with people that we don't agree on everything with. But what we agree on is far more important than what we don't.

Sometimes it's going to start with philanthropy, but philanthropy will only take us so far. It has to become a market if it's going to become sustainable. And that takes, as Carl pointed out,

intelligent policy for that market to be formed. So what policy shifts do we need to see in order for more of these success stories to turn into development?

Carl Hausmann: As people face increasing prices of food – we've seen recently, in Argentina and in Ukraine – the knee-jerk reaction of national government is to have export embargoes or to increase export taxes to lower prices in the domestic market. In the long term, we need to be more comfortable with these interdependencies across borders than we have been. We need policy that has a little bit more of a global approach and less of a nationalistic, “defend your local consumer” approach.

Robert Lane: The understanding and the ability to realize what [Bob] Hormats said – that the demand for food is going to be very high over the longer period of time, just given the growth in the population and the standard of living – is the way that's going to keep countries from making these reactions you just described. I would agree with that, because it all of a sudden causes countries that could be importing to get nervous because exporters are putting up boundaries. Ultimately, we're in the business of helping farmers, the best producers, compete. And we would see that everybody is better off in a situation where there is competition around the world under appropriate rules that have to be negotiated.

Samuel Worthington: Over the next two years the U.S. is going to invest \$5 billion to alleviate hunger around the world. \$4.5 billion of that is in the form of food aid, and only \$500 million is in the form of helping individuals improve their agricultural capacity – and that needs to flip. We need to help people feed themselves. But our strategy over the last 15 years, of the U.S. government going from 20 percent of assistance down to 3 or 4 percent of assistance focused on agriculture, has been a policy of feeding the world. We need to stop that policy. The capacity of local groups to feed themselves will only happen where the overall trade environment encourages and enables local farmers to be competitive in global markets, which means reducing trade barriers.



“Water is going to be one of the great scarce resources this century [but] is often not priced in any way that causes it to be considered a scarce resource. There needs to be public policy to preserve it and keep it clean. This is an area of great opportunity for public policy and the private sector to contribute to human flourishing.”

ROBERT LANE
Chairman and CEO, Deere & Co.

Sarah Hull: Another trade barrier is just general access to technology, where farmers could be producing a whole lot more than they are. Many of you in the audience wish you had access to some of these tools, but the political nature of the discussions around the technology have totally overwhelmed the science-based introduction to technology.

Jerry Steiner: No one is saying to lighten up on the science and [not] ensure things that are safe. But when we've got a decade of difference between countries evaluating the same dossiers, we know that there's more than science involved here. It goes beyond biotechnology. The dean [at the University of Wisconsin] talks about vegetable varieties she developed and could never get through the regulatory systems, likely because of protectionist policies on domestic companies.

We really want policies so that farmers can thrive. The farmer is the one who makes the decision to actually produce more. That means that we need to look at all aspects of that farmer thriving, from finance, risk management, access to technology, access to markets. We need to think about the farmer and how we can make the farmer succeed. But sometimes that's going to look a little unconventional. For example, one reason why finance isn't happening as broadly as it should is we don't have enough respect for contract law. All of these things get integrated into a set of policies.

Robert Lane: Seventy percent of freshwater is used in agriculture. It's going to be one of the great scarce resources over this century. One prediction might be that there will be more wars fought over water than over oil. Today, water is often not priced in any way that causes it to be considered a scarce resource. It's a common resource, so there needs to be public policy to preserve it and keep it clean.

I'm not an expert on complex public policy related to water, but externalities typically are a difficult thing for the markets to deal with. It's a legitimate role for government to play. When there's no one individual owner of a resource, externalities like that are appropriate for rules of the game, to then allow the market to work out specifics.



Samuel Worthington: Many of the populations where NGOs work are outside the market. Government policies pass, but they are living in areas where there is no relationship directly with markets, or in fact with government policy. There are enormous populations living in areas – they’ve been there for millennia – that do not have access to water and oftentimes have a water table that’s dropping. That challenge needs to be met head-on. And it does take policy, it will take the market; but unfortunately, sometimes, neither is present.

Carl Hausmann: I find it frustrating that we try to get the market to do things that truly are the role of the government. Do we have such incompetent government, or such little confidence in our government? If there is a fight between the farmers and the citizens of San Diego over water, I don’t think the market can [solve] this. If you look where we have the greatest poverty and lack of food security, we’re talking about Somalia, North Korea. I don’t think it is the quality of the soil in these countries. It is the quality of the government. So let’s make sure that we have governments doing what they need to do and not trying to work around them.

More and more people say, “Oh, the WTO doesn’t work because they won’t agree.” Well, they have to agree. We are all inhabitants of this Earth; we are all depending on some of the major agricultural production areas of the world to feed us all. And, yes, even those soils less fertile than the Midwest, than the Pampas in Argentina, than Ukraine, need to be developed to feed their share of the population. We have worldwide resources that must be used wisely, and we need governments to help us allocate these.

Jerry Steiner: We could fill multiple conferences talking about alternatives to oil, because there are alternatives to oil and we’re all developing technology to do that. But there isn’t an alternative to water. So when we think about water, we have to use it and steward it. And I would agree, that’s the same role, that government has an important and legitimate role to play in that.

“The Lugar-Casey [Global Food Security Act] is something that we should all support. This is where we’re going to finally get a strategic alignment with the money that we’re spending as taxpayers and from our government.”

SHERI SCHELLHAASS
Vice President of Research and Development
General Mills, Inc.



Carl Hausmann: We need interdependence on global trade – but we can’t rely totally on it. We don’t want to have all of the food requirements in certain countries be imported. We absolutely need to understand, however, that we will not meet the challenge of the future without global trade. And independent of the WTO, we have been seeing global trade increase remarkably every year.

We need domestic production to be as efficient as possible and to produce value wherever we can. But we cannot expect to rely on that solely. I am convinced we will see in the future continuing increases in global trade, but I agree completely that we need a domestic market that is vibrant and functioning. It is a source of jobs and nutrition for people in all countries. And we must work on this front also.

Samuel Worthington: I have been in a room of members of the U.S. Senate who said, “There’s a constituency to feed people, but not necessarily a constituency to have people feed themselves.” I’m hoping that will change, because we all know that it’s the capacity of individuals to pull themselves up out of their own poverty that will make things sustainable. We could do that, and there will unfortunately still be plenty of places where we’ll need to feed people.

Jerry Steiner: Building up the universities in [the countries where we work] is really important. I think we need to figure out how to do this. This strikes me as an ideal partnership that, rather than solely relying on a relatively modest number of people that we can bring to the U.S. or Europe for education, to think about how we can really build the colleges there and get to a whole bunch more people. As a company that relies on a technology-savvy workforce, when we’re looking ahead, knowing that we have to build people’s capabilities over a career right here, finding that pipeline of talent is really important.

Robert Lane: I would support that. One of the great needs when



“The private sector is going to continue to invest in innovation. That’s what our shareholders are asking us to do. But we can get much more creative about how we partner locally, with NGOs, with international government organizations, which I think we’ve not been successful in doing in the past.”

SARAH HULL
Global Head of Public and Government Affairs, Syngenta

you’re dealing with agricultural equipment, especially as it gets more sophisticated, is to train and educate people to take care of the equipment, to understand it. This is a need all around the world, so promoting education is vital.

Sheri Schellhaass: It is our responsibility to help in the education of developing nations, in keeping up the number of individuals that are going into agriculture and into food science. There is an organization in Zambia that is having difficulty in adding value to their rice products. They have broken rice kernels, and they’d like to extrude those and make a value-added product. And they’re also having issues in making some of the WFP-contracted corn/soy blend. The farmers have now grown so much soy and rice, because they’ve had good agronomics, that they no longer have a food insecurity issue, but they’d like to make money by selling the product.

Well, there are 1,200 of us [at General Mills] that spend a lot of time on extruders and extruding ready-to-eat cereal products and fortifying those with vitamins and minerals. So we bought them a very simple extruder. And volunteers came out of the wall, scientists and engineers that have expertise in this area, and we were able to help this NGO develop some products that they will be able to sell in Zambia. We are also bringing in students who now would like to go to Africa and help in ways. And we will train them on extrusion, so when they get to Africa they can really help some of these NGOs.

This has great business purpose for General Mills. It is not that we are just kind of heart, but we are. We are currently in a war for food scientists and engineers, of which we have a shortage in the United States. And people that are in their 20s and 30s, pick our company because we do these kinds of efforts.

Sarah Hull: As we’re expanding into new markets where smallholders are really the focus, it takes a whole different way of working with them than what we’re used to. So education is where

I think the partnerships going deeper and broader absolutely needs to come to the forefront, definitely, in the whole education field. We have to get much better at [knowledge sharing], with ag extension. The solutions are there if we can come together among the industry [and] the public sector to help bring that technology to the smallholders.

Samuel Worthington: Tap the NGO community. Many times we have a corporation coming into an country where you have NGOs quite at scale, been there 20-30 years, and we don’t talk with each other. We’ve seen many groups stumble because you don’t have local knowledge. So here’s a community that is reaching out to you, asking you to tap it, and that [is] open to partnerships. If you’re trying to get out to the small-scale farmer, you will find that there’s a professional community interested in working with you with lots of expertise.

Sheri Schellhaass: I would say to the NGOs, it’s often been thought that corporations in the U.S., multinational corporations make money and the NGOs and governmental agencies do good things. Rely on us to help you do good things. We have a lot to give into this situation even before we can receive back the full profits from it, and we’re willing to do it. Many of us in consumer products have been trying to think of how we can join with the agriculture developers and have value added locally much sooner than we have currently imagined in the value chain, in order to drive profit back to the local farmer.

Carl Hausmann: The challenge in front of us is huge – doubling food production over the next 50 years. I feel very optimistic that we have the potential to meet this challenge, but not very optimistic that we will do it as smoothly as we need to. We all need to get more comfortable with these new interdependencies. We corporations need to develop a more healthy relationship with the NGOs and not one based on conflict. They are critical for having broad-based public support, if in fact we are to meet the challenge of the next 50 years. ■





ROBERT ZOELICK
President,
The World Bank

LEADING THE RESPONSE TO INTERNATIONAL CRISIS

One of the things unusual about this financial crisis is it came up in the developed world, not the developing world. Slowdown in the U.S., Europe, and Japan is going to run through developing economies, which are often export industries as capacity builds up. Many of them are now trying to deal with the second-order effects of higher food and fuel prices, so they have tighter monetary policies. If they get business failures with tighter monetary policies, they could have trouble with the banking systems. Given food and fuel and their very strong interconnections – we’re moving into a different phase of this danger.

Food prices have come down a bit, but even with declines in 2009-2010, they’ll still be some 40 percent above 2004 levels. And a lot of these price changes haven’t flowed through yet. So this remains a real crisis. Over the course of the past year there are 44 million new people that are now suffering malnutrition – it’s almost up to a billion.

What can we do to turn this crisis to the advantage? We’re going to try to increase our investment, not just in safety programs but in agriculture in sub-Saharan Africa. Sub-Saharan Africa over the past 10 years has had about two-thirds of the population in

countries that on average have grown about 6.6 percent. [They] have been doing things that people saw in Europe 40 or 50 years ago: infrastructure, energy, regional integration, global markets, private sector. We need to keep our eye on the possibilities for sub-Saharan Africa 15 or 20 years from now being a pole of growth. And agriculture can be a big piece of that story.

Income gains from agriculture have about three times the effect of overcoming poverty that they do in other sectors. What we’re trying to do in looking at increasing production and productivity is look across the value chain. It starts with property rights and the ability of women to hold property. It goes on to seeds, fertilizers, irrigation – under 5 percent of the agriculture in sub-Saharan Africa is irrigated, compared with 40 or 50 percent in South Asia – storage, transportation, [and] the sanitary and phytosanitary standards of developing countries so they can export.

Part of the lesson of the financial rescue is, we need to be thinking about the human rescue and how we make the international system work better for these things. This goes to the question of vulnerability in those bottom billion who suffer most when these big crises occur. While people are talking about new Bretton Woods structures and different currency and financial regulation,

we need to apply the same thinking to help those at the bottom end of the process.

Malnutrition is part of the first Millennium Development Goal, but I refer to it as the “forgotten Millennium Development Goal” because it didn’t get anywhere near the resources as the others, yet its influence ran through everything. We have data that shows how malnutrition in earlier years, particularly the negative nine months to 24 months, will affect growth and capabilities for children and economies for their whole life. That’s why school-feeding programs become very important, particularly if you can use them to reach some of the younger children as well – they affect schooling, productivity, maternal health, as well as the hunger issue.

Some of my staff, as analytical purists, have been troubled by school feeding – for good reason. They say, “It gets kids a little older. We need them in the pregnancy period to 24 months.” We need to figure out how to build on those programs, use this institutional network to reach those most in need, [and] keep an eye on these nutrition issues, particularly at an early age.

It’s a little nuts and bolts, but you could make international organizations work a lot more effectively. We estimated you could save the World Food Program 20 percent of its costs and be more effective. What we need is governments to just give us a little freedom through some of these funding mechanisms. About 90 percent of WFP’s assistance has restrictions. WFP has very little ability to anticipate and manage market risks, liquidity risks, operational risks in advance. If we could get [WFP] some core or multi-year funding or some credit line, we might be able to use financial hedging techniques, commodity hedging techniques. How do we modernize the old concept of large stocks kept in a country and use some of the tools to help get product where it’s needed more efficiently, [and] more effectively deal with changes and exchange rates?

When the food crisis hit, agricultural markets around the world started to break down. Over 40 countries started either export bans or export restrictions. What we need to do is create the security and assurance for the countries that are most vulnerable, so they won’t pull out of the market but try to make the market work. For goodness’ sake, can’t the world agree at a minimum not to have an export ban or high taxes for WFP or humanitarian [food] purchases? And beyond that, for poor countries? What does it take to have some accord to do that?

In the international trading system the start of liberalization focused on goods, then slowly moved to agriculture. It’s deeply disappointing to see the Doha Round on the precipice or worse. When I helped start this round, my hope was to make some significant cut in trade-distorting subsidies. One of the benefits

“People are now recognizing the interconnection of food and fuel – well, it’s really going to be food, fuel, and water. And how those issues will drive the future is going to be quite important.”

of being a trade negotiator is that if you liberalize or cut subsidies, which the other guy wants you to do, you’re actually helping your own country. But you have to manage the politics of that. I have a multilateral position, but these deals don’t happen if the U.S. isn’t playing a leadership role. Right now what I hear in the U.S. political debate on trade doesn’t make me think we’re playing the leadership role we’re going to need to play.

Some of the biggest uncertainties out there are related to climate change. We’re trying to play a support role for the UN FCCC negotiations. We just raised some \$6 billion for various climate investment funds. Whether the issue is carbon trading, forestation or deforestation, adaptation, we can play a role linking this on the development side. That’s the big uncertainty out there.

The field of development is changing, how you interconnect all these players. In 2006 there were 70,000 aid transactions, an average size of \$1.7 million. The average developing country had 260 visits a year. Vietnam last year had 752. Particularly for a country coming out of conflict or in a weakened condition, this can overwhelm. One of the challenges in Afghanistan is two-thirds of the aid to the country doesn’t go through the budget. That’s partly a function of the government’s capacity, but if you’re going to build Afghanistan’s capabilities, you’re going to have to build that capacity. [So] we try to put all our resources through a national budget.

There’s one other [point] that I want to draw attention to, because it doesn’t get enough attention. It was brought home to me in India last year. One of the Indians said, “You know, the farmers who committed suicide were not subsistence farmers.” They were people just starting to move into the marketing economy and they had no cushion. Somebody, frankly, might have convinced them to drill a well, they didn’t hit water, they had a big debt – they were hopeless.

I am concerned, as we try to support small-holder agriculture, that we also have to think about basic risk-management services. IFC, our private-sector arm, is trying to think of efficient crop-insurance approaches. We’ve worked with Malawi to measure rain in the country – basically a form of insurance. But I’m most concerned about it at the individual farmer level, because for these small farmers it’s such a small margin of error. Without necessarily replicating the Common Agricultural Program or U.S. subsidies, how can we manage the risk? ■



THE 2008 LAUREATE AWARD CEREMONY



2008 Laureates George McGovern and Robert Dole are presented the World Food Prize by Ambassador Kenneth Quinn and John Ruan III. In the back row, Rwandan Minister of Education Daphrose Gabakwa, Iowa Lt. Governor Patty Judge, and U.S. Secretary of Agriculture Ed Schafer look on.

The 2008 World Food Prize was awarded to former U.S. Senators Robert Dole and George McGovern on October 16 at the Iowa State Capitol in Des Moines, at a ceremony featuring dignitaries and experts from more than 60 countries.

Senators Dole and McGovern were given the World Food Prize for their collaborative efforts in encouraging a global commitment to school feeding. The McGovern-Dole program has dramatically enhanced school attendance and nutrition among millions of the world's poorest children, especially girls.

On a sad note, the 2008 ceremony marked the first time since the first World Food Prize was presented in 1987 that founder and Nobel Peace Prize Laureate Dr. Norman Borlaug did not attend. Although Dr. Borlaug made the trip to Iowa, his health forced him to return home to Texas prior to the ceremony. Although he did not join the celebration, his spirit permeated the evening. The 94-year-old was honored with the premiere performance of an original musical composition, "All Growing Borlaug Wheat," that traced Dr. Borlaug's remarkable career and paid tribute to his moral character.



Renowned soprano Monica Yunus performed in honor of the Laureates.

While the Laureate Award Ceremony serves as a night of celebration to recognize the remarkable achievements of our Laureates, the World Food Prize is first and foremost about fighting hunger. Nosa Ali, a fourth-grade Des Moines student originally from Sudan, gave a stirring reading of "In Any Language," a poem by Iowa native Lucille Morgan Wilson that has become a traditional part of the World Food Prize ceremonies.

The ceremony also featured two brilliant performances by Metropolitan Opera star Monica Yunus, whose father is 1994 World Food Prize Laureate Muhammad Yunus. For her final performance, Ms. Yunus was joined by two young singers from her Sing for Hope program and over 30 young girls from the Iowa Youth Chorus for a stirring rendition of "This Little Light of Mine." Each young girl held a candle that represented one million lives that have been improved by the achievements of Senators Dole and McGovern.

Two Iowa students also received recognition for their selection as top Borlaug-Ruan International Interns. Hemali Batra of Clive was given the Ahmanson Intern Award, while Zachary Stewart of Harlan was honored with the John Chrystal Award. The awards are given to the two students who have been judged to have performed best in their Borlaug-Ruan International Internship. Each summer, the World Food Prize sends 13 students to leading facilities in Asia, Africa, and Latin America for eight-week, all-expenses-paid agricultural research assignments.

The Honorable Patty Judge, lieutenant governor of Iowa, presided over the ceremony, which was attended by nearly 800 guests. ■



Ten-year-old Nosa Ali, originally from Sudan, reads the opening poem "In Any Language."



Hemali Batra (front, second from left) and Zachary Stewart (front, second from right) are recognized as top Borlaug-Ruan Interns from John Ruan IV (far left) and Rachel McLean (far right), grandchildren of John Ruan.

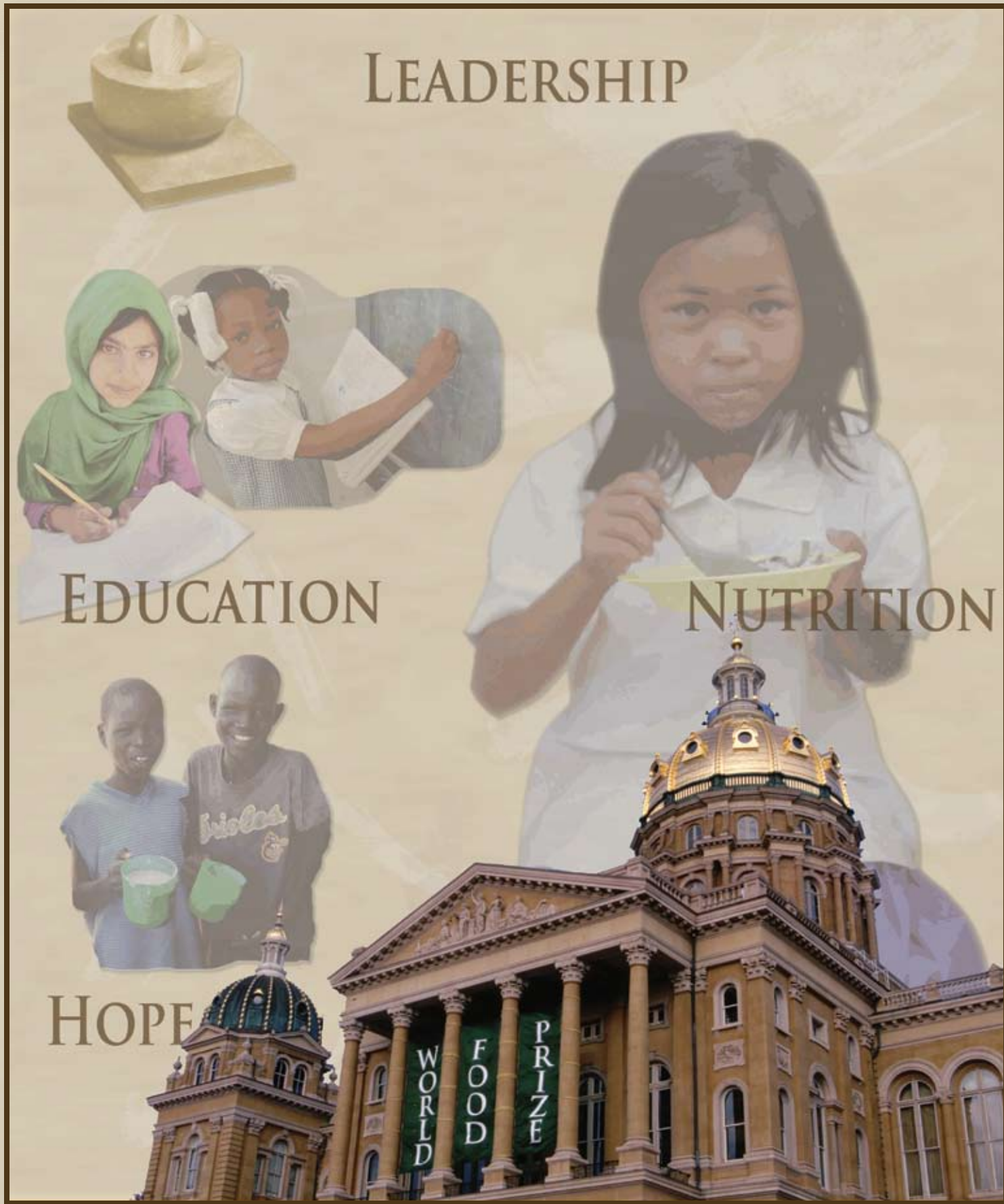


The World Food Prize Brass Quintet performed "All Growing Borlaug Wheat," an original composition written in honor of World Food Prize founder Dr. Norman Borlaug.



Girls from the Iowa Youth Chorus sing "This Little Light of Mine." Each of the 40 young girls held a candle representing one million lives impacted by the McGovern-Dole feeding program.





THE 2008 WORLD FOOD PRIZE LAUREATES

The inspired, collaborative leadership of former U.S. Senators George McGovern and Robert Dole has encouraged a global commitment to school feeding and enhanced school attendance and nutrition for millions of the world's poorest children, especially girls.

The McGovern-Dole international school-feeding program was established by the United States in 2000. Since then, it has provided meals to feed more than 22 million children in 41 countries and boosted school attendance by an estimated 14 percent overall and by 17 percent for girls.

The success of the McGovern-Dole program has also led to dramatically increased international support for expansion of school-feeding operations in developing countries around the world. As one example, the UN World Food Program's school-feeding operations have nearly doubled since 2001.

A COMMON GOAL TO ERADICATE HUNGER

Throughout their careers, Senators McGovern and Dole have dedicated themselves to the elimination of hunger at home and abroad. In the 1970s, as leaders of opposing parties, they worked together to reform the Food Stamp Program, expand the domestic school lunch program, and establish the Special Supplemental Food Program for Women, Infants, and Children (WIC).

During the following decades, they built a non-partisan consensus for anti-hunger and anti-poverty programs. By the early 21st century, the national school lunch program they fostered was providing meals to approximately 30 million children. Building upon this success, Senators McGovern and Dole began working toward reviving and strengthening global school-feeding, nutrition, and education programs. They were committed to creating a program that would provide poor children with meals at school in countries throughout Africa, Asia, Latin America, and Eastern Europe.

President Bill Clinton supported the senators' initiative and, in July 2000, his administration established a two-year pilot program, the Global Food for Education Initiative (GFEI), funded at \$300 million. The U.S. Department of Agriculture administered the program, which initially provided nutritious meals for children in 38 countries.



ENDING THE CYCLE OF HUNGER AND POVERTY

Hungry children have difficulty learning, and malnutrition often leads to permanently stunted physical and cognitive development. By exerting tireless and creative leadership, Senators McGovern and Dole took significant steps toward ending the cycle of hunger and poverty that affects as many as 300 million chronically malnourished children.

School enrollment increased as a result of the GFEI, particularly for girls. More broadly, the benefits of school-feeding programs have been shown to include: improved cognition and better all-round academic performance; increases in local employment and parental involvement in school activities; and participation by local governments in supporting school-feeding efforts.

With the strong support and urging of Senator McGovern

and Senator Dole, Congress passed legislation establishing a permanent international school-feeding program. In May of 2002, President George W. Bush officially signed into law the George McGovern-Robert Dole International Food for Education and Child Nutrition Program (known as the McGovern-Dole program). This hallmark effort has fed children in schools across the globe every year since then.

The McGovern-Dole program reignited global interest in supporting school feeding, which had become a relatively low international priority by the 1990s.

With increased funding, the World Food Program's global school-feeding initiative – the world's largest such program – was able to double its operations between 2000 and 2005. By 2006, its efforts reached more than 20 million children in 74 countries. Eleven million of these were in Africa, and just over 50 percent of them were girls.

BENEFITING YOUNG GIRLS

The McGovern-Dole program emphasizes benefiting girls and young women and overcoming gender inequalities in literacy and access to education. Traditionally, young girls in many developing countries are often kept out of school to work in the home performing child care, elder care, and other domestic chores, or are sent out to earn a living.

However, when meals are available at school, and/or take-home rations are available, girls and young women are much more likely to be allowed—even encouraged—to enroll, with numerous benefits. For example, studies in Mexico have shown that school-feeding programs there have led to girl students' finishing school at higher rates, marrying later in life, and having fewer children.

VARIOUS FORMS OF AID

Thousands of tons of commodities have been shipped to participant countries under the auspices of the McGovern-Dole program.



Former Senators Robert Dole and George McGovern became the 29th and 30th recipients of the World Food Prize, often referred to as the “Nobel Prize for Food and Agriculture.”

These resources are used by local officials to provide school meals and snacks to children. The program is moving toward increasing the amount of cash awarded while also implementing a new bartering system to diversify the commodities the program provides. Organizations and governments often combine school-feeding resources and programs with interventions that include: construction of school kitchens and sanitation facilities; teacher and staff training; HIV/AIDS education; de-worming and inoculations; and local purchase of foods to strengthen markets. These efforts in turn have a multiplier effect of enhancing education, community development, health, and gender equity.

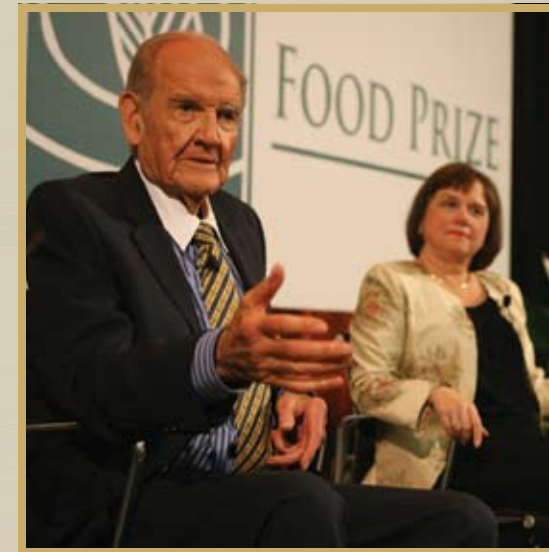
ELIMINATING HUNGER IN THE 21ST CENTURY

The path-breaking accomplishments of the 2008 World Food Prize Laureates – Senator George McGovern and Senator Robert Dole – continue to inspire leaders in the United States and other countries to move their efforts forward to ever greater heights, with the goal to end world hunger.

For the millions of children it has touched in the past, and the millions who will benefit in the future, the McGovern-Dole program and other collaborative school-feeding initiatives can break the cycle of hunger and poverty and provide life-altering opportunities through education and improved health. ■

THE LAUREATES IN THEIR OWN WORDS

During the Borlaug Dialogue, 2008 Laureates George McGovern and Robert Dole held an open public forum at the State Historical Building of Iowa. The two political icons had a free-flowing conversation, led by 2003 World Food Prize Laureate Catherine Bertini, that reflected on their collective upbringings and their bipartisan cooperation in fighting hunger at home and abroad in front of an audience of more than 500.



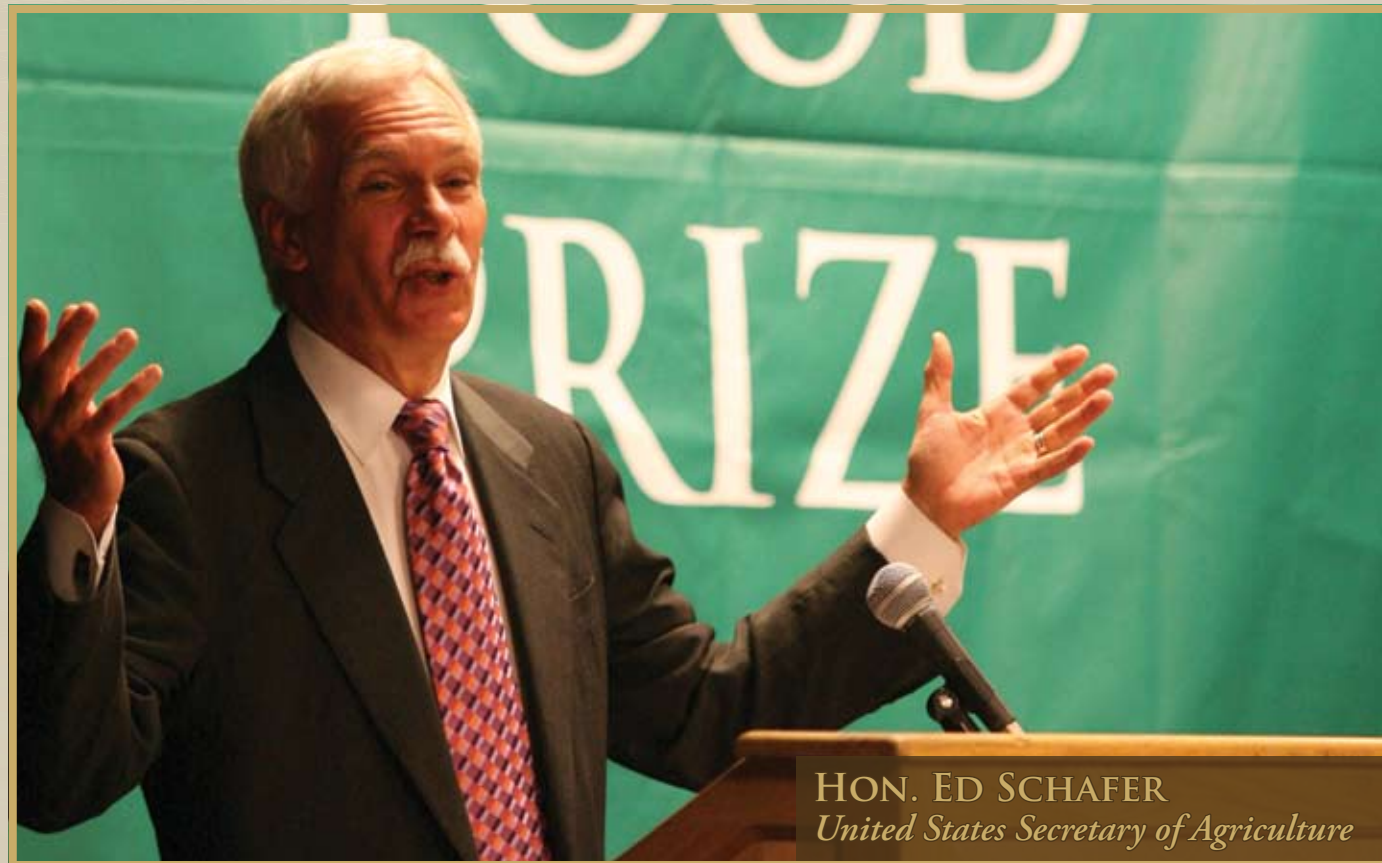
“The majority of the hungry children are girls because of the favoritism to boys, and when girls are hungry they stay home from school and when they stay home from school they marry as early as age 10. By the time those girls are age 20, they’ve had six children.”

“My friends used to tell me that we’d never get on top of the famine problem without cutting the population. I learned it was the other way around. You feed people and the population comes under control.”

“My grandparents were tenant farmers [in Russell, Kansas]. Some made it, and some didn’t. And they didn’t. As county attorney at the time, I had to approve welfare checks, and two of those went to my grandparents.”

“You learn that there are people out there who need help. They may be very poor people. They may be disabled. They may be senior citizens. They may be dependent children. We do have a responsibility, when nobody else is going to do it.”





THE SECRETARY'S ADDRESS: NEW PARTNERSHIPS FOR AGRICULTURE

Two great humanitarians, Senator Dole and Senator McGovern, are well-deserved of the World Food Prize. They share a common vision of what America's agriculture and the American people can do to relieve hunger at home and around the world. And now the challenge falls to us to help those who are still hungry every day. We face a reality of the world population growing by 50 million people every year, and we're not adding any new land, so we need to figure out ways to feed these new mouths.

In June I [led] the U.S. delegation to the FAO High-Level Conference on Food Security in Rome, [where] we committed \$5 billion over the next two years to help countries develop their agriculture...so they will have the food, fiber, and fuel supplies their growing populations demand. I chaired a panel at the FAO about sustainability of agriculture. The sub-Saharan African countries talked about missing the Green Revolution because they didn't

have the infrastructure, and said, "Now as we look at expanding the food supply in the world, we don't want to miss it again."

We need to make sure that infrastructure goes forward. We need to invest in scientists and research institutions, in market information systems and distribution networks and storage facilities. We must improve water management and irrigation. We must provide access to rural credit and livelihood programs for farm families.

And we must work together to widen the use of existing and new technologies with the potential to significantly boost yields for commodity

products. In some countries this might mean adapting the most recent Green Revolution technologies that are available, such as hybrid varieties. In other countries with greater challenges, environment and climate issues, new biotechnology-based solutions should be considered.

"Rather than just surplus commodities that we produce and ship around the world, our focus should be on sharing the technology, equipment, know-how, processes and procedures that made these surpluses possible. We must find ways to help farmers do what the American farmer has been doing successfully for decades."

Biotechnology is one of the most powerful tools that we have for boosting productivity and building prosperity among the rural poor. Last year the amount of land around the world devoted to biotech crops grew by 12 percent to over 280 million acres. Biotech crops were grown by more than 12 million farmers in 23 countries. About 10 million of those farmers were small and resource-poor in developing countries. And for the 2008 crop year, the United States has already exported \$2.5 billion of coarse grains and oil seeds that were biotechnology-driven to the European Union.

I encourage other countries to follow Burkina Faso and Egypt, which [are] commercializing biotech corn and are working on biotech cotton as well. Two other African nations have initiated biotech field trials for food crops, South Africa for sorghum and Uganda for bananas. Biotechnology is especially helpful for economically important tropical crops, which traditionally have seen breeding be a prohibitively slow process.

The United Nations agencies, the G8, the World Bank, and other partners are critical resources to move these technologies into helping people in need. In a developing country, more equitable access starts with establishing science-based regulations that can support the development of these technologies.

Farmers also need open markets for the crops produced through these technologies. Countries should adopt enabling regulations that give the private sector incentives to develop new technologies. They should also honor WTO obligations to facilitate the free flow of goods, services, and food across borders to where people need them. They should support international treaties like the Cartagena Protocol on Biosafety that encourages the development of new technologies, protects biodiversity, and opens up agriculture trade.

The citizens of the United States are very proud to provide more than one half of the food disaster relief around the world. But we can't do it alone. At the same time we must focus on a long-term solution rather than just responding to immediate needs. Hunger and malnutrition affect every aspect of an individual's life – from health to education, the ability to work and produce and to take care of the family.

USDA [has] provincial reconstruction teams working in agriculture in Iraq, a country [where] the agriculture infrastructure was neglected for 20 years, and in Afghanistan, where the agriculture infrastructure was never developed. Our teams are helping develop that infrastructure. They're working on water systems and farm-to-market roads. They're providing reliable sources of electricity for refrigeration and storage capacity for after-harvest programs.

These teams work shoulder-to-shoulder with people in the agriculture arena to help grow food for their families and for their neighborhoods and for their regions. And they said, "You know, we're invited into their homes. We sit with them at their meals. We play with their children. We go to their weddings and their funerals. And they have become our friends."

That is the language of agriculture. It is the friendship we can spread throughout this world. When you have peace in the home, with people who are well-fed and warm and comfortable, you have peace in the neighborhood. And peace in the neighborhood leads to peace in the city. And peace in the city certainly gives you peace in a country. And if we have peace in the countries through agriculture in this world today, I know that the language of agriculture will bring peace to the world. ■



Following Secretary Schafer's address, he and Ambassador Quinn signed a Memorandum of Understanding, agreeing that in coming years USDA and the World Food Prize will expand their ongoing partnership in support of mutual goals to improve food security and nutrition globally.

"We follow powerful world-changing precedents: Dr. Borlaug, Senators Dole and McGovern. We must continue honor their legacy by finding new ways to harness our agriculture productivity to feed a hungry world," said Secretary Schafer.

"Toward that end, we're formalizing not only the relationship between the World Food Prize Foundation and the United States Department of Agriculture but our shared commitment to science and research and providing a nutritious and sustainable food supply for people the world over. We're going to sign this document, but it's words. It doesn't matter unless we put it into action. And that's our call today."





H.E. JOAQUIM CHISSANO
Former President of Mozambique



CONVERSATION: LESSONS LEARNED FROM INVESTMENTS IN AGRICULTURAL DEVELOPMENT

ROGER THUROW (MODERATOR)
Senior Writer,
The Wall Street Journal

RAJIV SHAH
Director of Agricultural Development,
The Bill and Melinda Gates Foundation

H.E. JOAQUIM CHISSANO
Former President of Mozambique

H.E. RITA SHARMA
Secretary to the Government of India,
Ministry of Rural Development

LOOKING AHEAD FIFTY YEARS: A VISION FOR AFRICA

For once, food security has become as important to the rich as it has always been to the poor nations. World population is expected to reach 9.2 billion in 2050. All of the growth will take place in less-developed countries and be concentrated among the poorest populations in urban areas. How will these people be fed? At what cost? And by whom?

Yields of most important food grains, tubers, and legumes are no higher today than in 1980 [and have] seriously eroded the competitiveness of African agricultural products on world markets. Africa's share of world agricultural trade fell from 8 percent in 1965 to 4 percent in 2007. [This] is the result of policies that have favored investments in urban infrastructure and industries over those in rural areas and agriculture.

I am very much encouraged by the global optimism that the 21st century is for Africa. African leaders have set a target to increase agricultural production by 6 percent a year for 20 years from 2003. Improvements in total factor productivity are expected to contribute about 3 percent to this, with the remainder coming from increased investment. No region of the world has had total factor productivity increase by more than 2.5 percent per year over a sustained of time. For Africa to reach this level of productivity

will require agricultural research systems that generate knowledge and technologies to increase agriculture production without destroying the environment; technology-delivery systems that bring innovations to farmers and agribusinesses; and mechanisms that reduce the costs and risks of adopting new approaches.

Infrastructure support, such as roads, are vital to the success of transforming agricultural development of developing countries into instruments of food security and poverty eradication, particularly in Africa. It is, therefore, gratifying that donors, development partners, financial institutions, and beneficiary countries are coming together under the Paris Declaration to streamline support and delivery of their assistance. The Paris Declaration will also reduce the rampant corruption that has in the past greatly reduced the impact of aid.

Support for education and healthcare is vital. As new technologies and skills move the world forward, developing countries get marginalized because of the digital divide. Malaria and HIV-AIDS compound the situation. In the context of gender, it becomes obvious that special attention needs to be given to the empowerment of women in all structures of development. ■



Rajiv Shah: As we've looked at other partners making investments in agricultural development, it seemed that one determinant in being successful was designing programs focused on the customer – smallholder farmers in particular. Our breeding programs employ participatory methods so that farmers can comment on preferences for taste, color, and texture of various crops. They talk about what their demand characteristics are, and then breeders and scientists can work with them to develop things that meet their specific needs and aspirations.

We also implemented a gender strategy because a number of the larger existing programs were dominated by extension and other service-delivery systems focused on or implemented entirely by men. We felt it was important to help women take more roles as extension officers and researchers, working with farmers – and we've seen some of that work.

We run the risk of not fully leveraging the capacity of large and mid-size farms to bring credit, resources, organization, and knowledge to transform agriculture in those areas. One question we have is the role of large-scale agriculture in a program designed to reduce poverty by investing in small-scale agriculture.

A second learning is that we cannot just invest in science, technology, and production. You have to also have market-access programs so that small farmers have the ability to market their crops, earn incomes, reinvest, and have incentives to purchase and adopt improved seed varieties, fertilizer as appropriate, and other types of costly inputs that are critical.

We've spent approximately \$900 million so far in agricultural development – just under 40 percent is in science and technology. The remainder [is in] programs to support extension efforts, support farmers' organizations, help farmers market in high-value product chains like coffee or dairy. A challenge has been [to] geographically overlap the things we support with the more numerous and important activities implemented by governments. In a lot of efforts that have been unsuccessful, one donor will do a market-access program in the northern part of a country, another will do a seed-breeding program in the southern part – and people aren't benefiting from the synergies.

A third major learning has been partnerships. Based in Seattle, we rely

on so many outstanding partners to execute and implement the programs. The Alliance for a Green Revolution in Africa is our biggest program partner; the CGIAR system has been our second-largest. The work we do through those two account for nearly half of our spending so far.

As we go forward, I'm eager to hear how we can work in a way that fosters new partnerships and particularly engages better South-South partnerships. We have efforts in China to invest in hybrid rice, in India to explore innovative uses of information technology. Often the innovations, knowledge, and implementation capacity in India, China, or Brazil might be more relevant to sub-Saharan African agricultural development than what we have in other parts of the world. That's an area where we would like to concentrate our efforts going forward.

Roger Thurow: One thing [that] went on in the Green Revolution, with government partnerships to support Dr. Borlaug and the Rockefeller Foundation, Indira Gandhi tore off her front and back lawn and planted Dr. Borlaug's wheat varieties, as an example to the rest of the country that this is very important and vital. President Chissano, I don't know if any of the Mozambican residences of government ministers have been torn up to become farms or bigger gardens. But Raj's greater question [was] about the possibilities of partnerships and the example that African governments can set in terms of working with the Gates Foundation and the work they're doing.

Joaquim Chissano: Foundations like the Gates Foundation are very important for Africa, not only working with the states but with the many civil-society organizations who are pursuing the same objectives and who are lacking resources. The challenge with donor organizations is they require a presentation of projects, and sometimes they expect projects to be presented by people who hardly know how to write or read. And even those who know how to write or read, they are not living in this world where many concepts are put. One thing that's very important is education and

“Although it seems as though the Gates Foundation, with our significant resources, has the ability to do a lot in this field, we're very cognizant of our place. Relative to the needs out there in agriculture and infrastructure, we are a very, very small part of the overall puzzle.”

RAJIV SHAH
*Director of Agricultural Development,
 The Bill and Melinda Gates Foundation*



training in all levels.

The role of big farmers would be to serve as schools to bring new technologies, because the peasants are very conservative. We try to tell them, “Look, you have to put only one maize seed in each hole, so that you have a strong plant.” But after the extensionist goes away, they will put five seeds, they will put four seeds. [And] the peasants don't appreciate putting fertilizer or manure on maize when planting. They could apply it for cabbage, tomato, onion; but when it comes to cereals, they say, “Why? We never did this.” But if they see a big farmer who has got expertise, then they would believe, because a peasant wants to see results before anything.

Biotechnology was spoken about today, and the resistance to better technology. But I don't think it's a question of resistance. It's a question of understanding and of having this as your way of doing things. Biotechnology is something that you tell the peasant, “You do this, do that.” He plants it and then he has the crops and selects the best seeds [for the next season]. And then he puts them the field and they don't grow. He will not know that they won't because the seeds were genetically modified. He will just say, “I will not do what they're telling me.”

Roger Thurow: Small African farmers behave precisely like farmers in the United States and elsewhere did, with the introduction of hybrid seeds early on. “That farmer's crop is doing extraordinarily well – what did you do?” And so they learn from each other. Rita, you have experience with a number of organizations that have come with investments and pilot projects, and the step to go from pilot projects to scaling up nationwide.

Rita Sharma: I endorse that foundations play a small but a very vital part. [In] the mid-'60s, when miracle seeds and high-yielding varieties were coming to India, [the Ford and Rockefeller foundations] played an important role to take this technology to the farmers. So the foundation may be small, but if they are on the cutting edge of demonstrating new technologies or delivery mechanisms, working with farmers, they have that flexibility, which very often bureaucratic systems don't. These new ways of doing things and the lessons we learn from them – if they're successful, we are able to very quickly mainstream them and then put it into the regular government format and upscale the effort.

“One missing link in the African Green Revolution has been markets. Because of the Sasakawa Foundation and Dr. Borlaug, they were able to have tremendous increases in production in Mozambique, Ethiopia, the West African countries. But that almost toppled because, when the bumper crops came, there were no markets and prices collapsed and farmers lost their incentive.”

ROGER THUROW
Senior Writer, The Wall Street Journal



Having said that, we recognize that Africa, which is now on the verge of a Green Revolution, needs to take into account some of the mistakes made during the Green Revolution in Asia. There were dramatic increases in production, but the technologies were suitable to the irrigated areas. The rain-fed areas were by and large bypassed. Even in India today, 60 percent of the area is rain-fed, and a lot of work still needs to be done.

The technologies were restricted largely to the wheat-rice kind of commodities. And [for] a large number of other commodities, the technologies were not up to responding to those requirements. With incomes increasing, the consumption patterns are changing and more horticulture, vegetables, dairy products are coming onto the table.

Pesticides and an indiscriminate use of fertilizer also led to soil health declining. And as a result of that, even in the irrigated areas, there was stagnation of productivity. And, therefore, sustainability, or the Doubly Green Revolution, now becomes center stage, and will come when we look at nutrient management rather than just fertilizer application, [when] we look at integrated pest management rather than pesticide application. And we look at conservation agriculture with zero tillage, with laser levelers, with the Systems of Rice Intensification, which are using lesser water.

And the most important issue which you raised was, what about the large farms? A very major survey in 2003 indicated that small farmers get most of their information and technology from large farmers. Extension workers, television, radio, newsprint come much lower down in their priority. Institutions such as the Farmer Field Schools are an excellent way of learning from those who have the ability and the risk-taking capacity to try out new technologies.

Rajiv Shah: The [Purchase for Progress] program I visited in Uganda was organized by one large farmer who owned 700 acres of land. Forty small farmers did follow his lead; when he adopted



improved hybrid varieties, they adopted improved hybrid varieties. When he started using fertilizer, they started using fertilizer. And they followed [him] in getting access to WFP's market, which offered them about a 40 percent price premium over what they were getting selling to local markets. I wonder if there are other ways we should be working with large-scale farmers, in a way that avoids the mistakes of the past, where small farmers are excluded from the process.

Rita Sharma: One of the strengths is in capacity-building [and] social mobilization. While you have a learning process from the large farmers, there is great strength in people and small farmers, especially women farmers, coming together.

The Gates Foundation could build capacities for coming together,



“You are looking at not just optimizing productivity per unit of land, but per unit of water – and now also per unit of energy. These are the things in which the Gates Foundation need to be working, so that we can learn what is required at the field level.”

H.E. RITA SHARMA
*Secretary to the Government of India,
Ministry of Rural Development*

develop these – people can keep small accounts, write books, learn to keep accounts. The self-help group credit movement has taken off in a very major way because small farmers have been able to come together, through microfinance or linking up to big financial institutions. These intermediate institutions, the self-help groups, are able to manage inputs much better than if they were doing it individually. And it also helps for marketing, because individuals may find it difficult to reach markets. Whereas, if people are able to pool their resources, they can achieve higher prices and better value for their produce.

Joaquim Chissano: Education has to be reoriented in Africa, because [it] does not gear people to be entrepreneurs. Educated people tend to remain in towns because they don't have incentives in the countryside, to link with agriculture. We cannot speak about a Green Revolution if we don't have educated people in agriculture. We cannot speak about biotechnology, about fertilizer, if the educated people are not there.

Food processing is an element which is very important. If there were processing in the rural areas, you would pin down a lot of

youth and avoid emigration into the towns, into slums. They think [agriculture] is something for uneducated people. So we have to have an activity in the rural areas that can pin down them. We can start with things related to developed agriculture, food processing, crops preservation, storage, and so on. Foundations, and donors in general, can help create the commercial network where small farmers can sell products in small quantities. And these would be carried out, if infrastructure is there, to be sold in the towns.

Roger Thurow: As small farmers learn from the bigger farmers, are governments also learning from each other? Malawi started its own fertilizer and seed-subsidy program, against the advice of the World Bank and other organizations. Ethiopia began a commodities exchange, with the support of the government. What are you learning from yourselves, in your own countries and from India or China or Brazil?

Joaquim Chissano: Taking the example of Mozambique, we have Indians working [with] rice, because we know that they had very successful experiences. We have Brazilians; we are working with Embrapa and other institutions in food processing, drying tomatoes or banana or onions – we are learning from both India and Brazil. We have China, but in a lesser degree, because they tend to base in intensive labor, which we

may not have. India also has big numbers, but their technologies are accessible to us.

Demography growth in some countries in Africa goes beyond three percent per year. You may increase production, but growth of population is much higher. We have to learn how big countries like India and China are coping with this demographic course and can feed their people. But we have to learn also from small countries, like Japan. How do they manage with that big population? They feed their own people, and they still [sell to us].

Rita Sharma: India last year clocked almost 9 percent growth. Services are growing and jobs are being created for people who may not have very high level of skills. There are surpluses in agriculture, and, despite new technologies which would lead to higher productivity, we need to draw away surpluses from the land, because demographics is not going to, in the long run, allow for agriculture to sustain such a huge number of people.

One of the areas in which foundations can help is in the skill and capacity-building of rural youth, who don't want to be so much in



“Educated people in Africa tend to remain in towns because they don't have incentives in the countryside with agriculture. We cannot speak about a Green Revolution, about biotechnology, about fertilizer, if the educated people are not there.”

H.E. JOAQUIM CHISSANO
Former President of Mozambique

agriculture but have no other means to develop their capacities, in service sectors – hospitality, retail, information and communication technologies, computer, data-entry. If organizations like the Gates Foundation could work with the private sector – most of this skill development is in the private sector – then there would be a diversified portfolio of smallholder family income. One member would be working off-farm and be able to insulate home income from disasters and other risks which agriculture is subject to.

Roger Thurow: Dr. Swaminathan once said, “Through the Green Revolution we've conquered the famine of food. Now we've got to conquer the famine of jobs.” And that's the next step of his Evergreen Revolution and the second Green Revolution.

Rajiv Shah: Some of the best examples we've seen of that have been in India, with Reliance Fresh or the e-Choupal. These efforts to use information technology to bring information and market connectivity and to help communities diversify have been great.

Roger Thurow: You were both addressing soils and the issue of nutrients and fertilizer. I was wondering from the experiences of India – water and the stresses the Green Revolution put on water – what Africa and the Gates Foundation should be paying attention to in terms of proper use and management of water resources?

Rita Sharma: One of the issues which our country faced – and a lesson which Africa should learn – is that subsidizing electricity and water without taking into account soil requirements, the agro-climatic conditions, very often led to over-mining of these scarce resources. We've had situations where they're growing rice or sugarcane in areas where the water table has already been depleted very significantly. So we need to guard that our policies should not lead to over-exploitation of the natural resources.

We are now trying to correct that and are looking at nutrient management as a whole, cropping patterns more in conformity with the kind of water available. We have the eastern part of

the country, on very high tables of water, looking at more intensive water crops, whereas, in the dry land rain-fed areas, you are looking at crops and technologies which are much less water consuming.

Joaquim Chissano: The perception about water in my country is, “Water belongs to everyone. Our great-grandfathers and grandmothers lived drinking

water from this well, from this river, from this lake. No one is fabricating water. Why should we pay?” This has to be changed, and it's very hard to change it. It has been in many cases a hindrance to production. A balance must give incentives for people to use water and make use of land.

This also has to do with seeds. We cannot indefinitely receive seeds from outside. We should produce in our own country seeds which are more resistant to drought, so that we make less utilization of water and get the same or better results. The same as fertilizers – we should try to find ways of producing fertilizers in our own countries. Mozambique has got gas, but we are importing urea, ammonia. Why? Also organic fertilizers – why don't we produce locally? The answer is lack of knowledge and lack of capital.

And the same for water. We can multiply our resources of water because we have so many rivers. But our rivers are undisciplined. You have droughts and floods in the same year – droughts in the south, floods in the north, and vice versa. So we need to bring discipline to the rivers. And for this, knowledge and capital.

Rajiv Shah: The top priority for our crop-improvement programs has been drought-stress tolerance or water-efficient products. Water-efficient maize is a program where we have a partnership with the African Agricultural Technology Foundation and Monsanto. We have projects with CIMMYT developing drought-stress tolerant maize using conventional technologies. We got some data back from Nigeria that they're performing very, very well. One company in particular tripled the metric tons sold in just two growing seasons, based on those varieties.

It speaks to that earlier point about doing things that farmers tell the breeders and researchers are their priorities, and then when you meet those priorities, you can get relatively rapid adoption of those types of varieties. And hopefully they will remain robust in locally adapted environments. ■





CONVERSATION: THE CHALLENGE OF AN AFRICAN GREEN REVOLUTION

SIR GORDON CONWAY (MODERATOR)
*Chief Scientific Adviser,
 UK Dept. for International Development*

H.E. DAPHROSE GAHAKWA
*Minister of Education,
 Rwanda*

RICHARD MKANDAWIRE
*Agriculture Adviser,
 The New Partnership for Africa's Development*

NAMANGA NGONGI
*President,
 Alliance for a Green Revolution in Africa*

H.E. ARMANDO PANGUENE
*Ambassador of Mozambique
 to the United States*

PEDRO SANCHEZ (WORLD FOOD PRIZE LAUREATE)
*Director, Tropical Agriculture & Rural Environment,
 Columbia University*

H.E. SPECIOSA WANDIRA
*Former Vice President and Minister of Agriculture,
 Uganda*

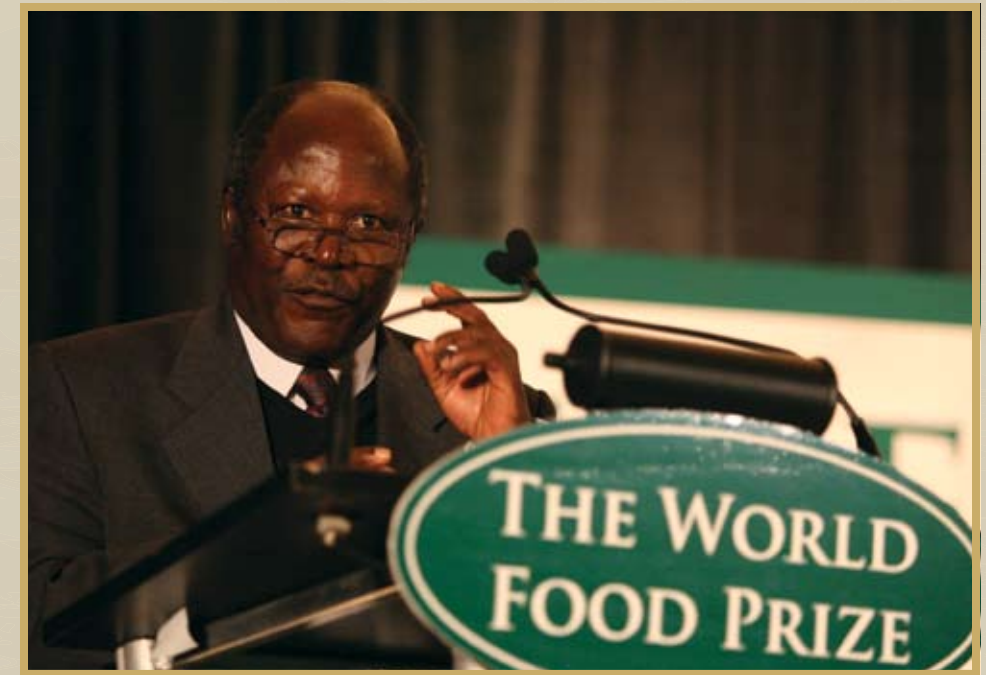
Namanga Ngongi: If somebody asked me, "If you were going to do only one thing in Africa, what would you do?", [it] would be infrastructure. The road or rail is a dynamic for bringing inputs in, taking outputs out, making people connected to markets. If you ask me the second challenge, I would say capacity-building, education, teaching, research, and extension. Great efforts were made in the early years. But those efforts have fallen down. Africa has less people working than in 1980. Country after country, they are retiring.

The third challenge faced by African agriculture [is], financial services or resources in the rural environment are just not there. For Tanzania, agriculture represented 2 percent of all bank loans in the country, in which 70 percent of the population is in agriculture – more in rural areas. Agriculture is about 40 percent of GDP. Another constraint would be land, not just ownership but security of tenure. Why would people concentrate effort to be developing, maintaining land that they do not own or over which they do not have real security of tenure? The fifth constraint, which cuts across, [is] access to markets, the opportunity to make a living out of agriculture.

Those are long-term problems. AGRA was created to solve more practical issues today, to engage partners to address in the long term these kinds of problems. AGRA is a dynamic partnership working across Africa to help millions and millions of people – especially farmers and especially small-scale farmers, mostly women – lift themselves and their families out of poverty, through especially productivity emphasis on their farms.

Africa's productivity is one metric ton per hectare. Why is it difficult to bring about technological changes in Africa? The great diversity of soils means we have to tackle small agro-ecologies to be able to make differences. The first program was in seeds: training people to improve breeding by agro-ecologies; to have African seed companies and agro-dealerships, trying to bring about connectivity between production and farmers. There are many innovative ways to bring this about: 170 master's degrees, 80 PhDs and 1,250 new crop varieties. In terms of capacity, it sounds like a lot; but it's not enough, because of the various agro-ecologies.

Many countries in Africa are losing more than 60 kilograms of



"All of us need to think creatively to create opportunities, not only directly in agriculture but in the rural areas, to have capacities to retain young people in agriculture and out of agriculture, to turn young people into entrepreneurs in their own milieu, rather than running away to the cities."

NAMANGA NGONGI
President, Alliance for a Green Revolution in Africa

nutrients per hectare a year – \$4.5 billion worth of loss in a year. That has to be replenished not only [by] mineral fertilizers but an integrated soil-management system, which uses everything including cows and goats and sheep, which are able to give us material that can be turned into fertilizer.

Credit initiatives are not new. But they have been done in small communities for short periods of time, and not really recognized. AGRA has put together a system to bring this to the attention of governments to be able to take it on. We now have many contacts with a lot of banks expressing interest. Imagine if 20 countries in Africa were able to mobilize \$100 million, each just for their own internal financial resources, that would be worth \$2 billion. It will not eliminate the needs of financing in African agriculture, but it will close the gap.

Richard Mkandawire: We from Africa consider this a decade of hope for African agriculture, after almost two decades of neglect of





“I stress the fundamental role that smallholder farmers will play to achieve food security. This should be based on grassroots. The government is a facilitator, so that farmers can transform their subsistence agriculture to commercial-based agriculture. That is fundamental. If that cannot be done, then it will be a failure – like those years in the ’60s.”

H.E. ARMANDO PANGUENE
Ambassador of Mozambique

this sector. African leaders are committing themselves to supporting African agriculture. Within the context of the Comprehensive Africa Agricultural Development Program (CAADP) and NEPAD and the African Union, agriculture has been positioned on top of the development agenda alongside infrastructure.

The commitment is to deepening regional integration to make sure African markets are opened up. With the prospect of Africa reaching almost a billion in the next couple of years, there is a huge market within Africa for African commodities.

It is also committed to ensuring that there is new opening up of spaces for the private sector. We have seen over the past decade the mushrooming of NGOs across Africa in rural areas. This is a reflection of the political and economic governance that has

rooted itself in Africa.

This stability also is reflecting the growth trends – economic growth as well as agricultural growth we’re seeing. Over the past five years, almost 12 countries have achieved at least 12 percent agricultural growth rate. This is unprecedented and a reflection of emerging political commitment.

Africa needs additional financing to really move towards achieving its growth target of 6 percent per annum by 2015. When talking of ownership, African governments must commit their own public financing to agriculture. When talking of global financing, we are hoping this can be in partnership with African institutions, more importantly in support of an African-defined agenda. Africa has seen a flow of resources over the past 50 years from all over the

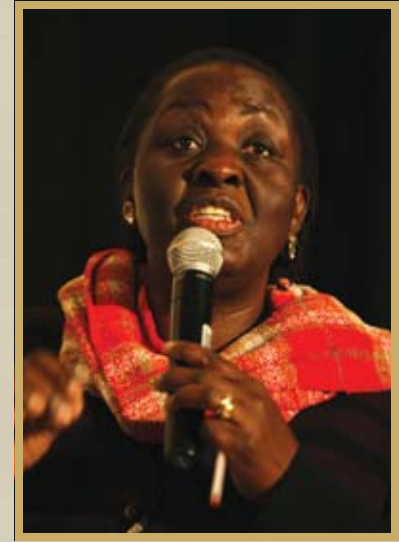
“Political commitment is absolutely necessary to attaining any efforts towards a Green Revolution. Without political stability, we’re not going to develop. And Africa needs to be applauded for the efforts being made ensuring that there is stability.”

RICHARD MKANDAWIRE
*Agriculture Adviser,
The New Partnership for Africa’s Development*



“A Green Revolution is possible if we are coordinated in terms of policy, all money being put in the same basket. But at the ministry level, after the budget is read, everybody’s doing their own thing. The technical people are doing their own thing. And everybody is taking this fragmentation right up to the farmer in the rural areas.”

H.E. SPECIOSA WANDIRA
Former Vice President and Minister of Agriculture, Uganda



world, but these resources made a very minimum dent on poverty and hunger.

The tendency in the past has been to paint a negative picture of Africa. It’s important that the international media recognizes the major strides being achieved within Africa in the agricultural sector, in the area of governance; all these need to be highlighted.

Gordon Conway: You’ve got tremendous commitment from African leaders. You need more funding from outside, but also to increase the amount of funding that individual African governments give towards agriculture. Are you seeing that happen?

Richard Mkandawire: There’s been not as we expected in terms of the resource commitment by national governments, but there has been a movement towards increasing budget allocation to agriculture. Countries such as Rwanda, Mali, Malawi, Chad, Niger, Senegal have moved towards – they’ve surpassed the 10-percent target commitment. And it’s our hope that we can continue to engage national governments to increase this allocation to agriculture.

Armando Panguene: I will stress the fundamental role that the family, smallholder farmers, women’s organizations, farmers’ associations will play in order to achieve food security. This should be based on grassroots, so that the farmers do not depend only on the product system, which starts from the top, to let them know what to do.

A role for the government is a facilitator. It should carry on extensive research so that they can discover the best quality of crops for the farmers and disseminate information on new technology to boost productivity, so that the farmers can transform their

subsistence agriculture to commercial-based agriculture. That is fundamental. If that cannot be done, then it will be a failure – like those years in the ’60s.

The government must resolve land ownership once and for all, so that there is no confusion to whom the tenure of the land can belong. And the government should motivate banks to provide lower financial loans to farmers. Banks in our country do not dislike agriculture, but agriculture profitability takes a long time, so they’re not keen to it.

It’s the role of the government to also devise holistic infrastructure development: roads, schools, and to guarantee the market to farmers. I only have good experience of the partnership of farmers in Ghana, who export their products to America. That’s not found in many other African countries. So we have to do that.

My final point on this challenge for the government is to create incentives to motivate experts and the young people to the rural life. This is not so easy. Governments even doubled [experts’] salary, but they’re not ready to go to the rural area. We have seen cases where trained people, doctors or other experts, even prefer to resign from their post if they are forced to work in the rural area – even for a short period.

Gordon Conway: Can I take a slightly contrary view in terms of small farmers. You’ve got an enormous potential in the Lower Zambezi for irrigated sugarcane, irrigated rice, even for biofuels. You could become one of the great biofuel producers of Africa.

Armando Panguene: I see no contradiction. You can support the small farmers, and if conditions exist for bigger farmers to operate, yes. And this becomes – they know the roads, where



“The biggest infrastructure constraint is the poor state of African soils in terms of being depleted of nutrients and suffering from unreliable water supply. That is to me the most important infrastructure constraint.”



PEDRO SANCHEZ
*Director, Tropical Agriculture and Rural Environment,
 Columbia University*

to bring investment from big foundations and other partners in the world. It's investment.

Speciosa Wandira: I've been at the policy level. My observation from that perspective is that we need a lot of coordination. Researchers are talking about the diversity in genetic material. We have funders talking about the need to increase productivity, research, extension, and everything within agriculture. And the thrust of what we are talking about for Africa is increasing agricultural productivity in the short run.

What is this person that we are talking about, the individual? We are saying that we want to target the individual. When we are talking about change, real change will come from people themselves. I heard about nutrition, but go to African countries. What is the home for the policy on nutrition? There is a struggle. Is it the Ministry of [Health] or the Ministry of Agriculture? So at the policy level, we need not only governments to come together and really internalize what we are talking about. Are we really looking to the interest of this farmer whom we are all targeting?

Even though I'm no longer within the executive, [I] have been charged with responsibilities to disperse credit for the farmer. I get there, and what do I find? The extension agents are working on their own; the plethora of NGOs are all working on their own; the Ministry of Health has a separate credit program for mothers to feed their malnourished children. The ministry responsible for environment has a separate credit program

We are going to this poor farmer, this family. Today it will be health. Tomorrow it's agriculture. Another day, it's veterinary. Because within each project, each ministry, there is a project a director of that project, with a commissioner, and it's total

confusion. Even extension – were they given the skills to mobilize people? You get these experts, scientists. When I was minister of agriculture, I marched all of them out to the field, but they could not explain the results of their science to the poor farmer.

I want to ask whether any of us has engaged in a study to find out how many women would like to be in agriculture. Why aren't the men in agriculture? Every time there's a better opportunity, men go and women remain behind. If we want to give capacity to these women, there should be a separate program geared to these women, educating them, giving them the skills as individuals, so that they can also make the decision when to get out of production to go into trade and to do other things. Otherwise, we are really overburdening these women, who are also doing everything else, but giving them no hope of ever getting out of the drudgery of using the hoe.

Pedro Sanchez: The African Green Revolution is alive and well and it's happening. At the village scale, out of the UN Millennium Project came the Millennium Villages. There are 80 villages, each of about 5,000 people, in 10 countries of sub-Saharan Africa representing 14 hunger hotspots in different agro-ecological regions.

Starting with subsidized fertilizers, hybrid maize seeds, treadle pumps – I said starting, because now that subsidy is changing into a market-based credit system – but starting with that, these farmers have tripled their maize yields, roughly from one to almost four tons per hectare. And I tell you, nothing empowers women more than high maize yields – I can assure you of that.

Caloric hunger is over in those villages. But this is not going to accomplish the first MDG of reducing poverty, because there has to be the shift to high-value crops in the markets, and the

transformation of what used to be subsistence farmers into small-scale entrepreneurs. That is beginning to happen, and it's very, very exciting in many, many fronts.

At the national scale, Malawi made a decision to support what the Millennium Project Hunger Task Force was recommending – subsidized improved maize seeds, mostly hybrids, and subsidized fertilizers. This transformed the country from a 44 percent deficit in production and having a third of their people depending on food aid, to now a three-year surplus. And Malawi has become even a food-aid donor to neighboring Lesotho and Swaziland.

The biggest South-South cooperation that is happening – ministers of agriculture and finance of 10 countries developed a proposal for the next harvest, to support inputs. The total ask to the donor community was \$660 million. But they put in out of their own budget \$440 million. Roughly 40 percent, this is what is meant by commitment. This is South-South cooperation.

Daphrose Gahakwa: There is a quote that I use. “If I could see far, it is because I stood on the shoulders of giants.” Sitting here, at the Borlaug Dialogue, the hard work has been done. So let us not keep on talking. Let's implement.

I have seen what AGRA is doing. If we did what the AGRA program does, we would achieve a Green Revolution. We just don't have to continue talking about it. We have got to implement and get it to the farmers. In Rwanda, when I left the Ministry of Agriculture for the Ministry of Education, the CAADP framework had been done, signed, and handed over for implementation. It is still on the shelf. So the problem is implementation – resources for implementation. Let's get the resources.

In Rwanda we have success stories. We have the Millennium Village. We also have our own crop-intensification program,

where we selected a few crops and put all of the resources to the production of cassava, maize, wheat, bananas. And then we pulled all the resources from about six ministries. The Ministry of Agriculture designed the program and then we handed it over to the Ministry of Local Government so that they can implement.



“The problem is not that the Green Revolution in Africa is not possible. It is possible. So why didn't it take place? I will use a quote. ‘We are as strong as our weakest link.’ And the weakest link is education.”

H.E. DAPHROSE GAHAKWA
Minister of Education, Rwanda

Together with local government, Ministry of Land and Natural Resources, Ministry of Infrastructure, Ministry of Agriculture, Ministry of Defense, and the police, we helped the farmers. We purchased improved seeds, we purchased fertilizers, and after 2007, the first harvest, agricultural production had increased by 16 percent. Now the farmers are demanding inputs, and the private sector has moved in.

Unless we invest in education, higher education in particular, we will not get the breeders who will improve the crops, who will improve infrastructure. We will not get people who will fight climate change, we will not get people who will design irrigation dams. And we need to unleash all the potential from our farmers so

that they can move from production to industry and service sectors, so that the land is left for a few people who can use it effectively.

Gordon Conway: I like the way you've been stressing not just implementation but implementation to scale. You've done a tremendous amount in Rwanda in the last few years.

Namanga Ngongi: There are a lot of points of synergy that come together. First, women. The organizational capacity of the African woman is very much under-evaluated. All over I go, there are women's groups. I spent two days visiting women's groups in Kenya before coming here, 25 to 30 members in a group, and they're all forming a network of 500 groups. That's considerable. And they were organized for access to inputs, seeds, technology, and microfinance. I wish men in Africa could be organized in a similar fashion – we'd be far, far ahead. ■





JUDITH RODIN
President,
The Rockefeller Foundation

GENDER AND POVERTY IN THE AGE OF CLIMATE CHANGE

You've heard a lot about the Rockefeller and Gates foundations' aspirations to seed transformational agricultural productivity in sub-Saharan Africa. Since the launch of AGRA two years ago, Rockefeller has contributed about \$75 million and some of our best and brightest to this effort. And while our commitment to AGRA continues, we also seek and support other innovations across the field of agricultural development.

Weather and climate remain among farmers' greatest vulnerabilities, as throughout history. But decades of continued climate change are on the way, regardless of whether we get emissions under control. [Agricultural] subsistence slips further from reach as climate-sensitive natural ecosystems deteriorate. Vulnerable people lose clean water for drinking, habitat for grazing, and fertile soil for farming.

The countries of sub-Saharan Africa will be among the most severely affected by climate variability. In the next decade climate change could shorten sub-Saharan Africa's growing season by

several weeks and decrease yields from rain-fed agriculture by as much as half. Small-scale African farmers stand to lose \$28 per hectare per year for every 1 degree Celsius rise in global temperature. If you earn less than \$2 a day, that is a devastating blow to your well-being.

The risks will be especially severe for African women, who harvest 80 percent of the continent's food. Climate change only intensifies the hazard. Men may migrate to cities for their work, but because of climate change the women who remain will spend more time harvesting less-productive crops and walk further distances to gather fuel and collect water.

Because of gendered land-tenure policies, men and women have access to different kinds of resources as well. When extreme weather events occur, men will still own their land. Women's wealth, however, is what they harvest. And girls – not boys – are the ones more likely to be pulled from school when the families can no longer afford the uniforms or books or enrollment fees or when they need extra help in the fields.

“Women disproportionately bear the burden of malnourishment. They grow and buy and cook, but usually eat only after their husbands and children. As food becomes scarcer and costlier, less is left over, and it's the women, not the men, who starve first.”

We must implement more resilient farming methods and food-supply systems. We must [also] implement pro-poor adaptation and mitigation climate strategies, [and] do more to empower African farmers and institutions to mobilize the next Green Revolution in a world that will continue warming, no matter what we do.

Farmers need better and timelier seasonal-climate forecasts to prepare for adverse events like drought, and to seize the opportunities that climactically favorable seasons may present. The science that enables this is improving by leaps and bounds, and tools are growing more reliable. From more than 15 African nations, meteorologists, agriculturalists, and leading scientists [are] wired into networks with capacities to make forecasts and inform local adaptation methods. These forecasts, however, will always be based on probabilities, and a forecast that's 70-80 percent reliable still leaves farmers 20-30 percent uncertain.

Farming, and especially rain-fed agriculture, is risky business. Rockefeller is scaling pilots on weather-indexed insurance for smallholders, partnering with the World Bank, ILRI, Swiss Re, and local insurers. We're supporting FSD-Kenya's efforts in creating a package that reimburses input costs, should farmers lose their crops to an independently and objectively documented weather event. While the insurance is provided by private companies, it takes an added subsidy from our sector to make policies more accessible and affordable for smallholder farmers.

The payment thresholds are clear and simple, and the benefits will flow throughout the whole agricultural chain. Josephine Okot, the founder and director of Victoria Seeds in Uganda, told us that climate challenges posed the greatest risk to her profitability. If the rains don't come early in the season, farmers don't buy seeds. If the rains don't come late in the season, then farmers can't afford to pay for the seeds they already purchased on credit. Weather-indexed crop insurance for her clients will help.

These tools and technological advances must be intentionally tilted to reach smallholder farmers in the most vulnerable communities, not only the large-scale farmer. We have to ensure that resilient, entrepreneurial people can mitigate risk and have the opportunity to seize new economic opportunities that climate change may create.



Josephine Okot and countless other women are active, able partners in all of this work. They nourish, and they build communities, often with their bare hands. The challenge of climate change may afford new opportunities to industrious, resourceful women, if we maintain focused attention on assuring economic growth with equity.

International carbon-trading systems last year facilitated over \$63 billion in exchanges, but have yet to work for women and families laboring in the fields and tending the forests. Kyoto Protocol rules do not recognize that sustainable agricultural practices could mitigate carbon emissions. It will be absolutely critical to reform Kyoto's Clean Development Mechanism at the UN Framework Convention next year. With this single reform, governments and donors could direct funds from carbon markets to reward local terrestrial carbon sequestration.

Strengthening resilience to climate change is a poverty-reduction strategy. These incentives could reduce deforestation, which today leaves roughly the same carbon footprint as all of the trucks and cars and planes in the world, [and] could encourage reforestation, ecosystem restoration, conservation tillage, and other practices that boost soils' organic content. The benefits must not go exclusively to governments. They must go to smallholder farmers, to women, who are much more likely than men to reinvest income in nutrition, health, education, family farms and small businesses. ■





“You can make wonderful investments in productivity, but if you don’t have a policy environment in which farmers can operate, their incentives to produce and grow into the farming systems we need will be severely diminished. The road is long, as any of us [know] who have been wrestling with U.S. policy reform and watching WTO negotiations; but just because it’s long doesn’t mean it’s not worthwhile.”

ANN TUTWILER

Managing Director, William & Flora Hewlett Foundation

CONVERSATION: TRADE AND UNTAPPED ECONOMIC GROWTH IN DEVELOPING COUNTRIES

Hosted by the International Food & Agricultural Trade Policy Council

ANN TUTWILER (MODERATOR)
*Managing Director,
William & Flora Hewlett Foundation*

ROBERT THOMPSON
*Gardner Chair in Agricultural Policy,
University of Illinois*

KYM ANDERSON
*George Gollin Professor of Economics,
University of Adelaide*

H.E. RHODA PEACE TUMUSIIME
*Commissioner for Rural Economy and
Agriculture, the African Union*

H.E. PEDRO DE CAMARGO NETO
*President, Brazilian Association of
Pork Producers and Exporters*

Ann Tutwiler: Over the last 10 or 15 years, the narrative about agricultural trade policy has been focused around the price-depressing effects of OECD policies. Now that we have a higher-price environment, a lot of people who weren’t big fans of reform to begin with are saying, “We don’t need to bother reforming U.S. and EU and other countries’ policies, prices are high.” We’ve also seen export bans [and] restrictions in response to the higher food prices. And there has been a severe erosion in governments’ willingness to trust the international marketplace.

Kym Anderson: [Since] their independence, many developing countries placed export taxes on their products. Manufacturing-protection policies and overvalued exchange rates discourag[ed] investment in agriculture. Rich-country subsidies and protectionism depressed prices in international markets for food products. But both rich and poor countries have insulated domestic markets from international markets. And when each country does that, it makes it harder for remaining countries to engage internationally because those markets get thinner, more volatile.

Rich countries have somewhat reduced subsidies, for less trade-distorting measures. Developing countries have got rid of a lot of export taxes. But while export taxation has declined, import protectionism in developing countries for agricultural products has been growing as countries became more affluent.

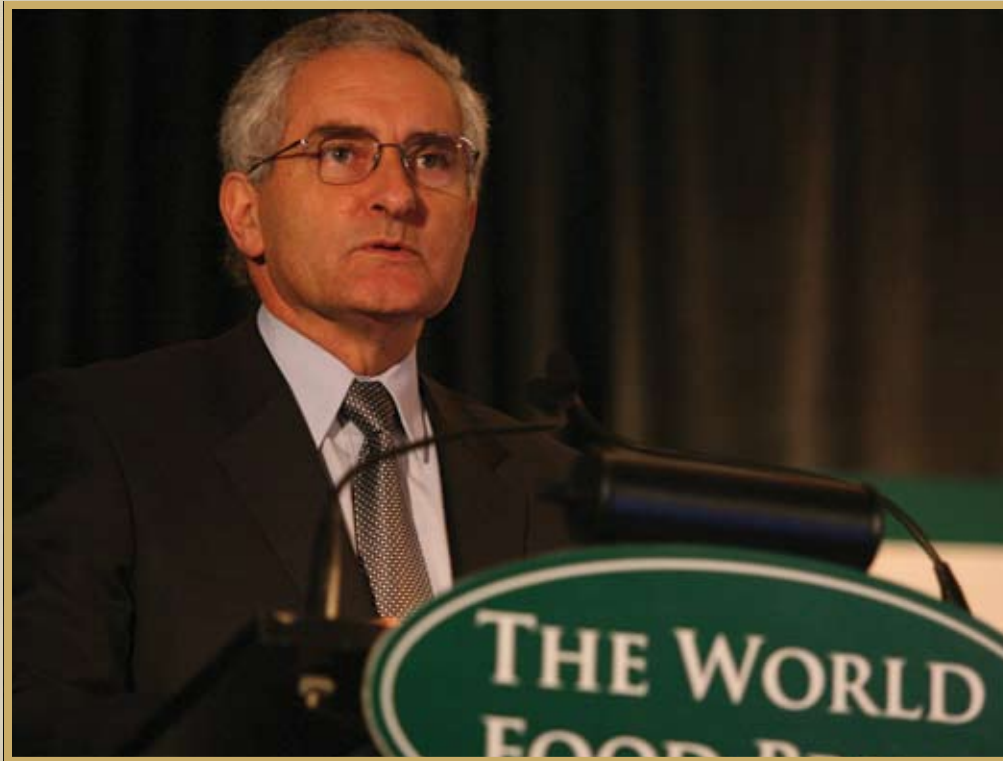
Nominal rate of assistance to [developing-country] farmers – the

extent to which price was above or below international markets – over the ’60s and ’70s were about 25 percent below international levels. The late ’70s started a diminution in taxation of agriculture, and by the late ’90s, there was slightly positive assistance to farmers across those countries. Rich countries started in the ’50s with a 20-percent rate, nearly 60 percent during the export-subsidy war years of the late ’80s. We’re looking at well over \$10,000 per farmer in rich countries compared with, in developing countries, almost nothing – but \$140 a year was a lot when a huge proportion of those farmers were living on less than \$1 a day.

Insulation in world food markets persists, and the volatility of international food prices continues. That’s a worry as we move into climate change, because we’re expecting greater volatility in yields. It does raise questions about whether there should be more discipline, perhaps through WTO, on what happens to export policies.

The reform picture is even stronger if we look at the rate of assistance to agriculture relative to non-agricultural tradables. In the ’60s and ’70s developing-country farmers were getting half the price they should have been if there were free markets in those countries. That has gone from a relative tax level of 50 percent to basically zero – a phenomenal change in the history of trade policy. The most reform has taken place [in Asia]; obviously China and India dominate. The trend is the same: remarkable reform in non-agricultural trade policy and consequent improvement in incentives for investing in agriculture. The least reform has





“How far have reforms reduced disarray in overall world agricultural markets? Since the early ’80s until this decade of the current century, we’re about halfway towards that free-market setting. That’s a pretty remarkable change in just a quarter of a century. But agriculture still accounts for about 60 percent of market distortions around the world.”

KYM ANDERSON

George Gollin Professor of Economics, University of Adelaide

been in Africa, although it has moved in [that] direction.

Many people ask [whether] emerging economies will push up international food prices. There is no question that China’s growth has been pushing up minerals’ and energy raw-material prices. But because of increase in assistance to agriculture, those countries have remained more or less self-sufficient in farm products. If relative rates of assistance stay at zero, there won’t be increasing incentive for farmers over time anymore, so they [may] become more import-dependent and push prices. If they follow Korea and Taiwan into agricultural protection, we have increasing distortions. India and China are following pretty much the same path. They’re at zero-point now. Will

they keep on that path, or remain relatively open and undistorted?

Things talked about in this symposium – agricultural R&D, rural education, and infrastructure – can provide alternative ways of assisting farmers to move out of poverty in a developing country than just providing price and trade support. Maybe aid-for-trade is one way we could contribute through WTO.

Pedro de Camargo Neto: When you don’t have policies, safety nets, the small farmer gets less protected. That’s the side of what happened in Brazil that we’re not proud of. We have more or less nearly forgotten the small farmer. You can have research, macroeconomic policy, but the farmer cannot be forgotten – or you don’t have agriculture.

How did Brazil become this agricultural trading powerhouse in the past 20 years? We changed a number of policies biased against agriculture, and this [gave] us the opportunity to grow. A major structural economic transformation happened – liberalization, deregulation, extinction of commodity authorities. There were better improvements on ports. We eliminated our export tax [and] a value-added tax on primary products, and that increased competitiveness. When you lower tariffs, farmers who were paying more [for fertilizer] started paying less. So this was a major push forward for Brazilian agriculture. This is not [to say] that if you spend less on agricultural policy, you get more production – absolutely not. It is to say that, even if you spend less, you can have production.

The other side of the coin is, when you don’t have these policies, which are enormous safety nets, the small farmer gets less protected. That’s the side of what happened in Brazil that we’re not proud of. We have more or less nearly forgotten the small farmer. Production has increased through a very hectic macroeconomic environment, so that to survive you have to be very, very strong.

Because of the financial crisis, in a savage period, you survive by yourself, and the small farmer was forgotten in the process.

We don’t have public extension like we once had. The large farmer has his own agronomist; the average-size farmer does it with his neighbor, and what about the small farmer? Hedging instruments are there for large [farmers]. Many average-size farmers don’t do the hedge. We still do not have a minimum, decent system of climatic insurance, so the risk is always on the farmer. The small [farmer] ends up suffering more.

There was [also] migration. What happened in Brazil was very strong migration in the Cerrados, small farmers from Rio Grande do Sul, Sao Paulo, Parana, that moved west. They had the culture in farming, education, entrepreneurship. Migration was the essential element. You can have research, macroeconomic policy; but the farmer cannot be forgotten – or you don’t have agriculture.

Rhoda Peace Tumusiime: The share of Africa’s agricultural trade globally is very small, and African countries depend on traditional primary commodities for exports. Over the years there has been increased production, but the prices have been low and the competitive advantage hasn’t been really right. Africa’s agricultural exports to the world decreased from 5.4 percent in 1985 to 3.2 percent in 2006. This is because of lesser value of primary commodities on the global market.

Intra-Africa trade still is not big enough, and yet there is potential. At the moment the continent imports about \$20 billion, and if this was to be sourced within the continent, intra-continental

trade would be growing.

On international markets, there are many difficulties which African governments face. When we are discussing with the EU or the USA, market access is a key challenge. While some commodities could find their way to Europe or the USA, trade barriers are still there. Although Everything But Arms is an open envelope for us, when value addition is done it ceases to be EBAs. That means we should continue to export primary commodities, where there is no value at all in real terms.

In essence, we need to have an internal market on the continent. We need to add value to our products. And we need to have sustainable financial services support investment in agriculture and agroprocessing. Many challenges which relate to credit, inputs like seeds and fertilizer – all those lead to incapacities.

How can we stimulate value addition, or agroprocessing? It is encouraged by legal frameworks. The private sector has to invest in that. This is not a public good but a private-sector undertaking. There are certain conditionalities put into place, incentives to attract the private sector to invest. There are [other] things the public sector has to do, like utilities.

We’d like to see countries committing to a minimum 10-percent budget allocation of their GDP to agriculture. I’d like to see increased participation of the private sector in agriculture and the flow of development assistance [to] increase. But having a



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H.E. PEDRO DE CAMARGO NETO

President,

Brazilian Association of Pork Producers and Exporters





“[From] 2000-2005, no African country was among the world’s 20 leading exporters of processed products. Africa has to move toward the production of high-value export commodities. Value addition is extremely important.”

RHODA PEACE TUMUSIIME

Commissioner for Rural Economy and Agriculture, the African Union

good trade arrangement with our key partners, the EU and USA – this will also give the farmer incentive to produce more.

Robert Thompson: High-income country protection policies tend to be greatest in exactly the commodities in which low-income countries have the greatest comparative advantage: labor-intensive manufacturers like textiles and footwear, and agricultural commodities like sugar, rice, cotton, other tropical crops. If we want to see trade-promoting development occur, high-income countries have got to import the products. It’s been demonstrated over and over again that trade is a vastly more powerful engine of economic growth than foreign aid.

We’ve been pushing to move away from trade-distorting forms of support linked to the production of specific commodities, more in the direction of decoupled, green-box support. Total support to agriculture determines total investment in the sector, vis-à-vis other sectors of the economy. So no question, even if you have

large green-box support, you induce larger investment in the sector as a whole. What we’ve seen throughout the developing world is an under-investment in green-box measures, not so much the decoupled income transfers but the investments in public goods – infrastructure, research, etc.

The fact that most agricultural support gets capitalized into the price of farmland means, over time, you’re raising your long-term cost of production and undercutting your competitiveness. High-income countries are cutting their own throat in terms of their ability to compete if they overprice the most important capital asset in their agricultural sectors.

Developing countries have been demanding “policy space” in the [Doha round] negotiations – the ability to increase protection in the future. One of the most important benefits of negotiations is the bindings we would negotiate, even if they’re not actually binding today, they would limit backsliding in the future.

Subsidies have expanded biofuels-feedstock use in Europe and North America – a new form of price support on the horizon created through demand expansion rather than artificially supporting producers. Because we’ve expanded demand faster than growth in production, we’re opening up opportunities for other countries – including developing countries that make the necessary investments in infrastructure, research, human capital, and policy. Biofuels is likely, at least the next several years, to create far more trade opportunities for developing countries than the Doha Round would have.

My great concern today is the erosion of trust that occurred over the last two years as a result of policy decisions taken by about 40 developing countries. Embargoing exports of commodities, taxing exports, subsidizing imports, price ceilings on commodity prices domestically have undercut the confidence that food-importing developing countries have in the world market’s ability to ensure their food security.

Sometimes in our discussions we get confused about advocating self-sufficiency for self-sufficiency’s sake. We’ve had decades of under-investment in infrastructure, research, the business-friendly public-policy environment, protecting property rights, contract sanctity. With the appropriate legal and policy environment with these green-box investments, there’s no excuse why Africa shouldn’t be self-sufficient.

A significant contributor to demand in recent years was income growth – purchasing-power growth. Where people are spending more than half their income on food and you have a doubling of food price, there is going to be a significant reduction in demand. We’re probably underestimating the demand-depressing effect of price increases of food in the next decade, as we underestimated the contrary in the last decade, and I think we’re going to see smaller total demand than we’ve been anticipating because low-income people no longer can afford as much food, edible oils in particular.

No country in the world solved the problem of rural poverty and agriculture alone. Every country that successfully solved rural poverty did raise productivity in agriculture, but they created non-farm jobs so that smallholders could either exit agriculture completely or become part-time farmers. In Europe, North America, Japan – you cannot lift all the people trying to eke out a living in agriculture out of poverty by leaving them with no other income source.

We do have to look seriously at institutional innovation. What is an effective WTO of the future going to look like? The critical thing is that we have a rules-based international trading system. How we set those rules and reform them over time is the issue, not whether or not we need the rules-based trading system. ■

“Net taxation of agriculture as a result of developing countries’ own policies continues in a number of parts of the world. Governments are tying the hands of their own farmers, 75 percent of the extreme poverty in the world, [and] turning terms of trade against agriculture depresses the earning potential of the already-lowest income members of society.”



ROBERT THOMPSON
*Gardner Chair in Agricultural Policy,
University of Illinois*



THE 2008 GLOBAL YOUTH INSTITUTE



Sir Gordon Conway interacts with Youth Institute participants Vivian Bernau, Joanna Demkiewicz, Nicole Westergaard, and Elizabeth Westendorf

The World Food Prize Global Youth Institute brings together select high school students from across Iowa, the United States, and other countries each October to interact with Nobel and World Food Prize Laureates and other experts in agriculture, health, and international development.

Each year, participating students present and discuss papers they have researched and written on critical food security issues, including: risks to the world food supply, the implications of biofuels on food security, global water scarcity and conflict, agricultural sustainability, infrastructure and development, microfinance and agricultural development, and global trends in malnutrition and obesity.

Teacher mentors attending the conference with their students also have the opportunity to interact with distinguished Laureates

and global experts during an annual “Professional Development Session” as part of the World Food Prize Symposium and Youth Institute. The World Food Prize Foundation has worked with Heartland Area Education Agency (AEA) in Johnston, Iowa, for the last eight years to develop the prospective program, offering these teachers the option to earn advanced or relicensure credit.

In 2008, over 100 high school students from Iowa, Ohio, Nebraska, Texas, Minnesota, Illinois, Indiana, California, Delaware, Georgia, Florida, Missouri, New Hampshire, and Wisconsin, as well as Mexico, Nigeria, Russia, and Tanzania attended the Global Youth Institute and had the opportunity to interact with the more than 700 policymakers, business executives, and leading researchers from over 65 countries attending the Norman E. Borlaug International Symposium.

By participating in the three-day Global Youth Institute, students become eligible to apply for a Borlaug-Ruan International Internship placement.

The Borlaug-Ruan International Internship program provides select high school juniors and seniors an all expenses paid, eight-week “hands-on” experience, working with world-renowned scientists and policymakers at leading agricultural research centers in Africa, Asia, and Latin America.

To date, over 100 students have participated in this valuable experiential internship program. In traveling to Bangladesh, Brazil, China, Costa Rica, Egypt, Ethiopia, India, Indonesia, Kenya, Malaysia, Mexico, Peru, Philippines, Taiwan, Thailand, and Trinidad, interns witness poverty and hunger first-hand, experience diverse cultures, and take part in groundbreaking research in the field.

The Global Youth Institute and Borlaug-Ruan International Internship programs provide a unique educational experience and life-changing opportunity to increase awareness of global food security issues among high school students and inspire the next generation of world leaders in food, agriculture, and natural resource disciplines.

For more information on the World Food Prize Global Youth Institute and Borlaug-Ruan International Internship Program, contact Lisa Fleming at lfleming@worldfoodprize.org.



Kawinzi Muiu of the UN World Food Program listens to Borlaug-Ruan Intern Nate Looker describe his experiences in Peru.



Borlaug-Ruan Intern Philip Day shares a moment with 2008 World Food Prize Laureate George McGovern.



In addition to interacting with renowned experts, Global Youth Institute participants present their research papers to their peers and discuss issues in small groups. Each group then selects a spokesperson to debrief group conclusions to all attendees in the main auditorium.



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