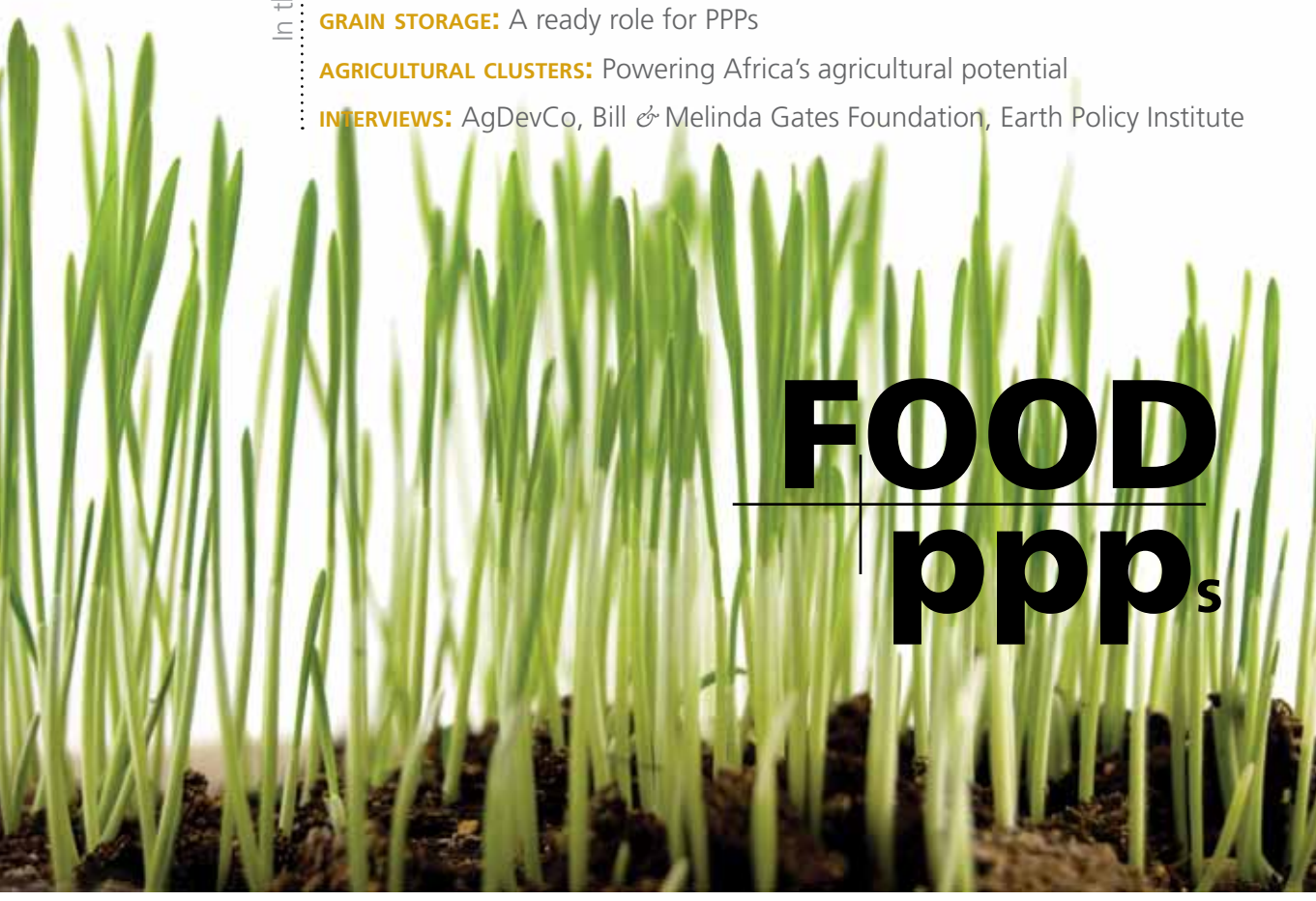
Issue #5

handshake

IFC's quarterly journal on public-private partnerships

In this issue



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Issue #5 – April 2012

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Letter from IFC

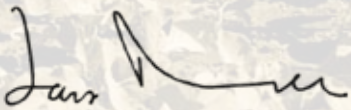
Almost a billion people are hungry. And the effects on food production from drought and sudden spikes in prices for fuel and fertilizer can very quickly swell the numbers of people suffering from malnutrition. Further complicating the equation is a global population that will grow by a third, to 9 billion, by 2050.

Yet insufficient production is only part of the problem. Compounding it is fragmented and insufficient innovation, massive waste resulting from poor storage and distribution, and the complex and ever-growing effects of climate change.

As U.S. Secretary of State Hillary Rodham Clinton said in a 2011 speech at the International Food Policy Research Institute, "A hunger crisis is not solely an act of God. It is a complex problem of infrastructure, governance, markets, education. These are things we can shape and strengthen."

IFC is responding to this call for a comprehensive approach to feeding the world. The private sector, working alone and in partnership with governments, is part of the solution. Private sector capital, skills, and technologies can have a big impact through increased innovation and efficiencies.

In this issue of *Handshake*, focused on public-private partnerships across the agriculture value chain, leading thinkers explore many different aspects of and solutions to food scarcity. These voices from industry, from nongovernmental organizations, from foundations, and from across the World Bank Group, bring to life the seriousness of the challenge ahead. These voices also inspire us, because working together, we can make survival more certain for a billion people around the world.



Lars Thunell
Executive Vice President and Chief Executive Officer, IFC

White House Kitchen Garden, Washington, D.C. Photo © Adam Fagen

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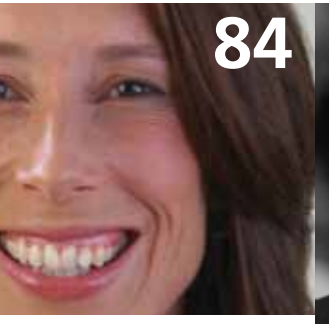

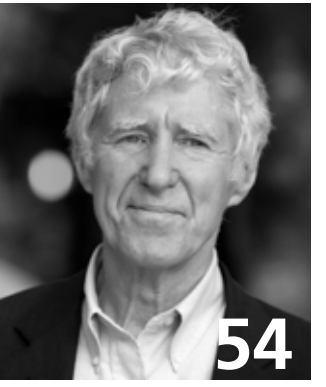

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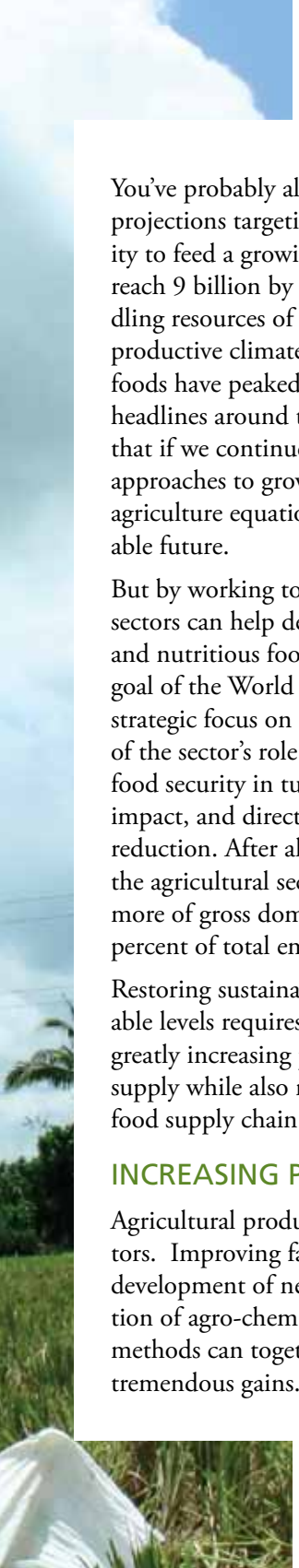
By German Vegarra & Gene Moses

FEEDING *the* FUTURE

Photo © Danilo Pinzon



You've probably already heard the Malthusian projections targeting our planet's finite capacity to feed a growing population—projected to reach 9 billion by 2050—in the face of dwindling resources of suitable land and water in productive climates. Prices for basic commodity foods have peaked twice since 2008, making headlines around the world. Most experts agree that if we continue to use today's techniques and approaches to grow food, the math in the global agriculture equation won't add up to a sustainable future.

But by working together, the public and private sectors can help deliver abundant, affordable, and nutritious food for all—a key ongoing goal of the World Bank Group. Likewise, IFC's strategic focus on agribusiness is critical because of the sector's role in food security. Sustainable food security in turn creates broad development impact, and directly contributes to poverty reduction. After all, in low-income countries, the agricultural sector often accounts for half or more of gross domestic product, and 60 to 80 percent of total employment.

Restoring sustainable food security to manageable levels requires a two-pronged approach: greatly increasing productivity of the food supply while also reducing losses within the food supply chain.

INCREASING PRODUCTIVITY

Agricultural productivity relies on many factors. Improving farming techniques through the development of new seed varieties, the introduction of agro-chemicals, and improved irrigation methods can together and separately lead to tremendous gains.

Productivity is also driven by increased access to finance, access to better and more timely information, and the ability of farmers to manage business risks. All of these gains result in higher food production. They also allow farmers to generate more income, raising living standards for a population that is heavily concentrated in developing countries.

Increased productivity spurs concerns as well—because climate change and steady pressure on natural resources are key challenges for the agriculture sector. Sustainability should be the driving force behind strategies to reach maximum productivity.

REDUCING LOSSES

Preventing food losses is the second half of the food security equation. This area presents the biggest opportunity to quickly address food security, because large gains can be made in preventing these losses through relatively straight-forward improvements in distribution and infrastructure. PPPs can often be a good conduit for these improvements.

A 2011 study commissioned by the Food and Agriculture Organization of the United Nations (FAO) concluded that roughly one-third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tons per year. In low-income countries, food is lost mostly during the early and middle stages of the food supply chain; little food is wasted at the consumer level (unlike in middle- and high-income countries).

The causes of food losses and waste in low-income countries are mainly connected to

harvesting techniques, storage and cooling facilities in difficult climatic conditions, and other agri-related infrastructure deficits. The benefits of good grain storage are especially obvious: simple solutions like storing surplus grain in vertical silos instead of warehouses or open platforms can reduce losses due to rot, theft, and misuse by a staggering 20 percent.

Functional roads, rails, and ports—often requiring serious investments to connect rural areas to urban markets—allow farmers to sell more and waste less. Since many of the places with the highest food losses are in hard to reach locations that can least afford it, transportation is a challenge that can't be ignored any longer.

With SAGCOT in Tanzania and Beira Corridor in Mozambique, the public sector has carefully planned for the success of its agri-infrastructure projects. In Kenya, the national rail project transports freight to and from the port at Mombasa, with approximately 30 percent of its goods comprised of agriculture products. In these cases, the public sector provides the core transportation needs, and then relies on the private sector to build upon them. In these large investments, PPPs or private sector initiatives are driving the change.

INNOVATIVE SOLUTIONS

Innovation doesn't require mammoth changes—indeed, basic agriculture has sustained human beings for over 10,000 years—but information and communications technology breakthroughs in the past century have improved productivity in a way that would stun our forebears.

Not all improvements, however, owe thanks to technology; they simply require examining old problems in new ways, and with a concerted spirit of partnership. Rural productive alliances, irrigation via integrated agri-cluster initiatives, and agricultural extension programs are linking groups through cooperative efforts. Collaborative financial products like warehouse receipts, weather insurance, and farmer finance are reducing the risks inherent to the sector by surpassing the traditional boundaries of financial services.

But we can't make this progress alone. To succeed, we need to increase our partnerships with our World Bank colleagues, leading agri-focused organizations, and influential donors. Together, we can increase meaningful research and development, augment agri-infrastructure, and promote technology transfer and farmer training, paving the way toward progress.

And on this road, even the tiniest products symbolize progress. The development of drought-tolerant and flood-tolerant seeds in India and Bangladesh, for example, means that farmers who used to lose a rice crop once every two or three years are now able to sustain their productivity even under extreme weather conditions. That gives them the ability to get their children to school and to invest in their family's health.

As the Gates Foundation's Prabhu Pingali tells *Handshake*, "That's the transformative power of agriculture." Transformations like these—rooted in partnerships—are key to our collective future as our planet's resources shrink and human demand grows.

The agriculture chain

① **Inputs:** seeds, water, fertilizers, and pesticides

② **Harvesting**

③ **Storage**

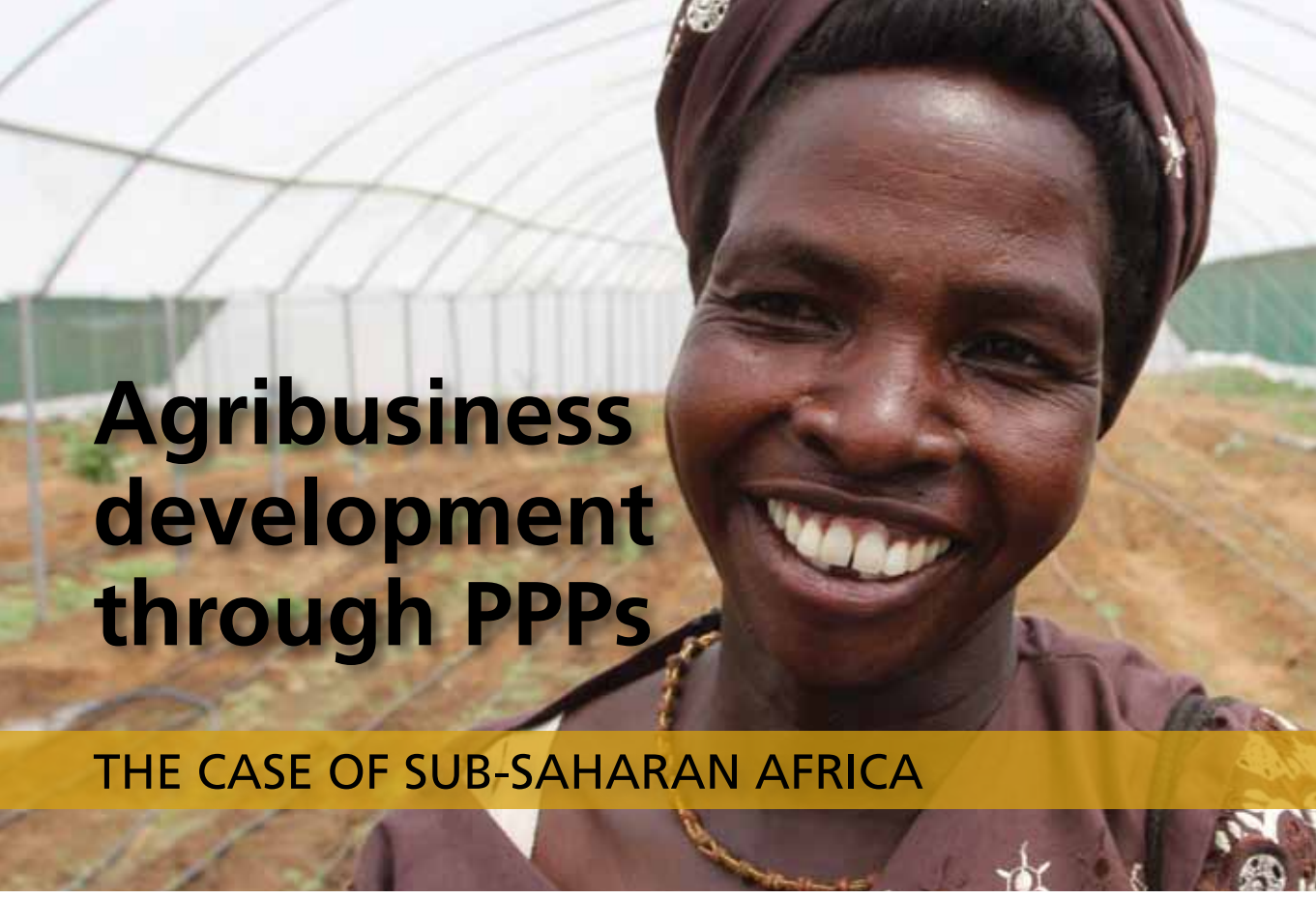
④ **Distribution:** airports, ports, and roads

⑤ **Markets**

⑥ **Consumers**

⑦ **ICT**

⑧ **Innovation**



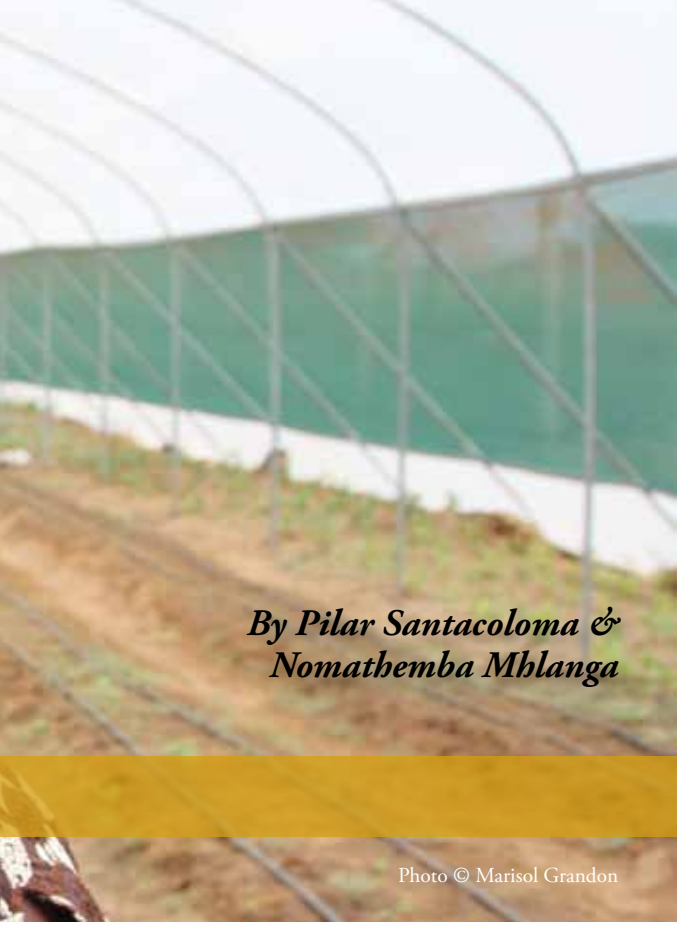
Agribusiness development through PPPs

THE CASE OF SUB-SAHARAN AFRICA

High risks and limited governmental financial resources require partnerships in agricultural development. PPPs are particularly important for enhancing social and environmental sustainability and the commercial viability of food supply chains.

Agriculture's positive potential for sustainable development and poverty reduction in developing countries is well recognized. Nowhere is this potential greater than in Sub-Saharan Africa (SSA), where the agriculture sector contributes between 20 to 50 percent to the national gross domestic product and employs approximately 65 percent of the population. However, the high risk (actual and perceived) of doing business in agriculture often deters private sector participation.

Simultaneously, the high level of investments required in the region means that the public



By Pilar Santacoloma & Nomathemba Mhlanga

Photo © Marisol Grandon

sector cannot go it alone. An estimated net annual investment of approximately $11 billion is needed if Africa is to address its food security concerns by 2050. Against such a backdrop, public-private partnerships (PPPs) are an important institutional mechanism for gaining access to additional financial resources, risk sharing, and addressing other constraints in pursuit of sustainable agricultural development.

To enable informed formulation of policies and programs to effectively facilitate PPPs, the Food and Agricultural Organization of the United Nations (FAO) undertook an appraisal of PPPs used to improve productivity and drive growth in the agriculture sector in SSA. The appraisal focused on 26 cases in five countries: Ghana, Kenya, Nigeria, Tanzania, and Uganda. Overall, the cases illustrate how the partnerships engaged the complementary strengths of the various actors and bridged gaps that they would otherwise have faced alone.

TYPES OF PARTNERSHIPS

Some of the PPPs are formal and contractually-based, while others are loose statements of intent and purpose. Most involve a wide range of governmental partners at various levels. These include specialized public sector institutions creating an enabling environment for private sector participation, nongovernmental organizations (NGOs), and private sector participants acting as market facilitators. Other partnerships involve donors and bilateral agencies. Where global food companies are involved, their interest is in product development and improved supply chain

Partnerships covered many topics and intervention areas but were mainly focused on new technology development and introduction.

coordination. Most partnerships involve many partners; narrow partnerships are the exception.

Other PPP arrangements range from jointly implemented development programs, to grants for private sector services, to co-equity investments. There are also ongoing dialogue and cooperation platforms and broad programmatic initiatives, as well as projects targeted to specific farmers or enterprises. Most of the partnerships focus on primary production and helping small-scale farmers; there is less attention given to post-production enterprises.

Overall, the partnerships covered many topics and intervention areas but were mainly focused on new technology development and introduction. There were several regional and sub-regional initiatives, where similar issues were faced in a specific sub-sector in multiple countries.

PARTNERSHIP IMPACT

When PPPs are well executed, they impact positively on the people involved. Overall, the cases have demonstrated strong performance for delivery of benefits to the intended stakeholders. For example, in a partnership between the private company Olam and Kwara State of Nigeria, rice farmers that benefited from the PPP initiative have recorded an average yield of 3.25 tons per hectare, against the national average of 1.25 tons per hectare. In monetary terms, this translates to an increase in farm earnings from $235 per hectare to $1,000 per hectare. This partnership, which started on just 250 hectares of land in 2007, currently has an area of 5,163 hectares involving 3,500 farmers from five local governments in the Kwara State of Nigeria.

Leveraging investments is another important indicator of PPP performance. For example, in Ghana about $4.6 million was invested in the Cadbury Cocoa Partnership in 2010. This partnership included Cadbury International (private partner), Ghana Cocoa Board (public partner), several NGOs, and the cocoa-growing community.

To achieve success, all parties need to recognize that their goals complement each other. An enabling economic, regulatory, legal, and political environment is the cornerstone of sustainable private sector participation. The public sector must establish an appropriate macro-economic and legal environment to raise the confidence of the private sector. A clear understanding of the roles and obligations of the parties is also critical for optimal PPP operation. In case of failure, these success factors become challenges constraining the expected benefits of PPPs.

To achieve success, all parties need to recognize that their goals complement each other.

MOVING FORWARD

Partnerships might address:

Private sector voluntary standards
to reduce costs and risks while increasing benefits from capacity to supply in line with market requirements;

Fair and equitable contracting
to improve the efficiency and alignment of supply and utilization along food chains while mitigating risks and protecting interests of farmers;

Responsible business practices
to mainstream business models and practices that support the public development agenda; and

Food loss reduction
to take action on losses along the food chain.

If these objectives are achieved, FAO believes that PPPs can continue to be important for enhancing social and environmental sustainability and the commercial viability of food supply chains. In the process, they can also increase value addition and capture by small-scale producers and processors.

Photo © IRRI

Public Pensions Partnerships: The new "PPP"

By Jeff Delmon

Mea culpa. Yet another column not directly focused on the topic for this edition. How about this: agriculture is all about sowing and reaping, reaping and sowing, just like pension funds, which are like very long-term grain silos. There are opportunities to use that grain in the interim, before the farmer needs it back to take to market, for very productive purposes. And so we turn to pension funds and infrastructure. The U.K. government announced in November 2011 its intention to mobilize £20 billion from pension funds to finance infrastructure. This was followed by an MOU with the National Association of Pension Funds in the U.K. But of course the devil is in the detail.

Money is deposited in pension funds to be paid back gradually, giving these funds enviable access to long-term, patient capital. Funds need to optimize their investment portfolio across a broad range of assets, of different duration and levels of risk, to make a solid return and be ready to pay out as and when people retire. In most countries, pension funds have few investment options outside of government bonds at the longer end of the spectrum—alongside more risky equity and real estate investments.

This makes a marriage between pension funds and infrastructure sensible on many levels. Long-term opportunities for pension funds plus long-term capital for infrastructure projects equals economic growth for the country. Given the generous size of many pension funds, even a few percentage points of the portfolios allocated to infrastructure could make a significant impact.

There are a number of different opportunities for pension funds in the infrastructure space. Some are already active, in equity and debt for utilities and companies that focus on infrastructure, operation, equity, and refinancing of debt for existing assets (for example, operational PPP projects) with proven demand and revenue. However, the U.K.'s announcement implies new construction and new assets. This is a more challenging prospect for pension funds.

RETIREMENTS AT RISK?

Who among us wants our comfortable retirement on the golf course or the beach (or just not in line at the soup kitchen) dependent on whether the government gets its infrastructure strategy right? Or whether these PPP projects are as robust as we had hoped?

Pension funds should be managed with caution—even more cautiously than banks manage money—and the government should not confuse funding pensions with political priorities.

The irony of the U.K.'s approach is that this government has been particularly critical of PPP, dragging the Treasury through a painful process of defending its work. Of course, good will come of the criticism, as iron sharpens iron, and Treasury is being pushed to further improve the PFI program. But if government is serious about using pension funds to support infrastructure, it will need to create a safe environment for pension funds, and PPP will assume an even more critical role.

In addition to the deal offered to private investors under PFI (roundly criticized by the government as being too generous), pension funds may need additional comfort. They may even need guarantees to move them to invest, such as the certainty that their infrastructure investments will never yield less than an investment in government bonds would. (Rumors suggest that the sole incentive to be offered by the government to pension funds is a reduced management fee for infrastructure investments, though it is hard to see how pension funds can act without a bit more enticement.)

So how will the U.K. provide this extra something to protect the pension funds? Treasury was to announce more details of its plan as this column was going to press.

ONE SIZE DOESN'T FIT ALL

The U.K. is not alone in facing this challenge. Governments have been trying to match pension funds with infrastructure for some time. But infrastructure debt is a complex investment, reserved for the most sophisticated of investors, and few of the pension funds have the in-house capacity to drive credit assessment of a PPP project, much less arrange PPP debt. Also, prudential rules make it difficult to invest in greenfields, or even most existing assets, without credit enhancement. The monoline insurers—traditional providers of credit wraps that would take some of the key risk out of such investments—have fallen away, with only limited signs of re-emergence.

Some governments, like Brazil and Russia, mandate big banks (Brazilian Development Bank and Vnesheconombank respectively) to allocate pension fund resources directly or indirectly, in the manner believed most expedient. Others create financial intermediaries to provide credit support to infrastructure to protect or attract pension funds, like the India Infrastructure Finance Company Limited or the Indonesia Infrastructure Finance Facility. Some use legal mechanisms and political encouragement, like *certificados de capital de desarrollo* in Mexico. In others, the government provides comfort letters, funding, and other support to bring in pension funds. The new infrastructure debt funds in India are good examples of this.

Each approach has its shortcomings. The arranged marriage between pension funds and PPP, though perfect on paper, is difficult to do well in practice. As Ben Franklin advised, "Keep your eyes wide open before marriage, and half-shut afterwards." But do we have that luxury?

Smallholder agriculture

THE PATHWAY TO A HUNGER-FREE BANGLADESH

By Prabhu Pingali

I am an agricultural economist by training and by passion. It is my core belief that agriculture development is fundamental for hunger and poverty reduction and for jump-starting economic growth.

My belief in the transformative role of agriculture is not just based on reading textbooks on economic development—it comes from experiencing the incredible impact that the Green Revolution had on my own life.

My roots are rural. I was born and brought up in a small rice-growing village in the coastal delta region of Andhra Pradesh in South India. During my lifetime, I have seen the village transform itself from growing a single crop of low-yielding rice, mainly for subsistence, to producing two crops of high-yielding rice. I was a young boy when my village first started planting the high-yielding rice variety. I remember my father and grandfather discussing how to store and market the surplus that was generated from this new variety—a novel problem for the village.

I am a first-generation beneficiary of the Green Revolution and very proud of it. My schooling and my college were paid for from the surpluses generated on our farm. My ability to leave the farm was made possible by the farm's productiv-

ity growth. My early experiences have made me a passionate spokesman for the role of agriculture in economic development and for the transformative role that technology, markets, and policy can play in raising agriculture productivity growth.

Despite the enormous success of the Green Revolution, countries like India and Bangladesh still have unacceptably high levels of hunger and poverty. We have made progress, but we are moving too slowly.

Photo © Gates Foundation

There are several new opportunities that can make an enormous difference to the lives of the poor:

Flood-tolerant rice developed by the International Rice Research Institute (IRRI) helps a rice crop survive underwater for up to ten days. Given the amount of flooding in Bangladesh, and the additional risk of extreme climate events anticipated due to climate change, submergence-tolerant rice is an important source of security for poor farmers.

Golden Rice, which is enhanced with B-carotene, can prevent Vitamin A deficiency-related diseases, a severe problem in Bangladesh. Improving access to Golden Rice varieties can have an enormous impact on the nutritional status of farm households, especially for women and children.

Cell phones are becoming ubiquitous in urban areas, and their use is growing rapidly in rural areas. There are 65 million cell phones in Bangladesh today, covering 40 percent of the population. Our ability to provide services to farmers, such as extension advice, banking, and market information, is significantly enhanced due to the spread of cell phones. Cell phones have also provided farmers fast and novel ways of marketing their produce.

History has shown us that when conditions are right, farmers have consistently responded with dramatic improvements in productivity growth. Consider the case of dry-season rice production in Bangladesh. Boro rice production has increased from 10 percent of Bangladesh's rice production in 1966, when the Green Revolution started, to 61 percent in 2008. The additional rice cultivated with improved varieties now feeds nearly 22 million people annually.

Another example is the rising popularity of women-managed homestead gardens across Bangladesh that produce micronutrient-rich fruit, vegetables, and poultry. The homestead garden food production program, started with 1,000 households in 1990 by Helen Keller International and Bangladeshi nongovernmental organizations, now covers more than 4.7 million individuals in 870,000 households across the country. Homestead gardens increased food supply and improved nutritional status, especially for women and children, in the poorest households.

These are just a couple of amazing examples of the ability of farmers to rapidly grasp opportunities when they make sense to them. In that respect, farmers in these two countries are no different from farmers anywhere else in the world.

The route out of hunger and poverty starts with smallholder farmer productivity growth. What poor farmers need from us are the innovations, institutional support, and the enabling policy environment that will allow them to profitably enhance their productivity.

I believe we can see a hunger-free South Asia in our lifetime, but it will require us to take urgent action to re-energize the agricultural sector. It will require us to focus on rapidly enhancing farm productivity. We must seize the opportunities to win the war against hunger and poverty.

This was originally published on Impatient Optimists, *a publication of the Bill & Melinda Gates Foundation.*

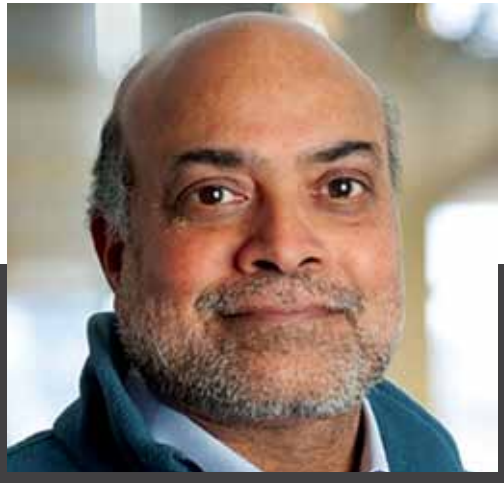
BANGLADESH SEED PROJECT

Adaptive measures for vulnerable communities

As a result of rising sea levels, Bangladesh faces the risk of losing 17 percent of its land mass. Salinity intrusion, floods, and drought damage millions of hectares. Crop yield in affected areas has dropped to as low as one metric ton per hectare, compared to the average yield of 4.5 metric tons per hectare. These and other effects of climate change threaten the country's agriculture sector.

In response, the private seed sector in Bangladesh—with support from IFC—is developing ways to enhance production, distribution, and adoption of high-yielding and stress-tolerant seeds. Methods include training farmers and supply chain members and monitoring progress on quality and performance. IFC's partnerships with leading seed companies such as Lal Teer, Supreme Seed, and ACI offer additional adaptive measures for the farming community. The partnerships will increase production and supply of high yielding varieties, including stress-tolerant rice and vegetable seeds that can withstand harsh weather conditions. This is a crucial initiative to ensure national food security and reduce economic vulnerability of farmers in stress-prone regions.

Seeding change



Gates Foundation's Prabhu Pingali on PPPs' role in transforming agriculture

Interview by Alison Buckholtz

Prabhu Pingali is the Deputy Director of Agricultural Development at the Bill & Melinda Gates Foundation. He has also served as Director of the Agricultural and Development Economics Division of the Food and Agriculture Organization (FAO) of the United Nations and as an agricultural economist at the International Rice Research Institute and the World Bank's Agriculture and Rural Development Department. He has authored ten books on food policy, technological change, productivity growth, and resource management in the developing world. He has received several international awards and recognitions for his work.

> “The primary source of productivity growth is the smallholder farmer, and that’s been very clear for us from the beginning.”

What do you see as the big-picture challenge for agriculture in developing countries?

One of the biggest challenges that many developing countries face today is how to sustainably feed their growing urban masses. Specifically, how do you get smallholder agriculture to connect up to the retail systems that provide food for the urban masses? As governments gear up for this challenge, they have to depend on private sector investment to connect the farm to urban consumers.

What role can public-private partnerships (PPPs) play in agriculture?

As we observe the changes taking place in agriculture over the last couple of decades, we’ve seen increased levels of PPPs throughout the value chain. There are many examples upstream, where the private sector has moved rapidly in genomics and genetic research and engineering. There’s also significant private sector investment in crop and livestock improvement activities.

Governments can play different roles in productivity areas. In some cases, governments have

been very active in getting this knowledge and technology deep into particular countries. In other cases, they've been catalysts, as in the case of OECD country governments working with developing countries in accessing these technologies. Moving forward, we'll be seeing more of these joint investments in infrastructure, around seeds, and in technology dissemination activities.

Is government involvement in R&D key to enhancing a nation's food security?

Yes. Let's take the example of advances that are taking place in genetic engineering for corn—advances in drought tolerance or advances in resistance to various diseases. A lot of these advances are being funded by private sector companies in the U.S. and Europe. The challenge is, how do you apply these technology advances to maize production in Africa? The transfer is essential, as the African public sector's R&D is weak. It doesn't have the same level of modern science to address the problems around drought and disease. So the public sector in many African countries compensates for this weakness by using conduits: multilateral agencies, governments in OECD countries, or private foundations. They can then access these advances and adapt them to the local conditions, and then release the resulting improved varieties in their countries.

How can PPPs serve this need for greater investment in R&D?

The private sector has been reluctant to make major investments in lower-potential production areas because returns on these investments have been quite low. That's where PPPs make the most sense. What the public sector can do is underwrite the risk that the private sector would face in making R&D investments. We have some very successful cases of this. Flood-tolerant seeds, for example, came out of a fairly intense couple of decades of R&D work at the International Rice Research Institute in the Philippines. Those varieties were tested and adapted to local conditions in India and Bangladesh, and then the private seed companies got into the game and carried out the adoption of these varieties throughout the whole region. These partnerships were very effective because the public sector took on the risk of making the investments into R&D in creating these varieties. Once it was clear that these varieties were going to make a huge difference, the private sector took them over.

The ultimate positive impact is on smallholders who essentially faced enormous flooding risk and would lose a rice crop once every two or three years, and who are now able to sustain their productivity even under high flood conditions. That then has a big impact on their food security, it has an impact on their ability to get their children to school, it has an impact on how they invest in health and education. That's the transformative power of agriculture.

Where do you see today's opportunities?

There are tremendous opportunities for much stronger collaboration between the international private sector and governments, especially

public sector R&D enterprises in many African countries. It's not a willingness problem. There's a willingness to do it. I think the problem is not having the regulatory capacity within the country in order to be able to screen and use these advanced technologies. More local capacity is needed in terms of scientific manpower to be effective partners in the process, providing some level of demand-side input. Countries have to be able to say, "These are our specific needs, these are the technologies we're interested in." That's going to be a challenge for quite some time.

Photo © Gates Foundation

The RISE & FALL of food crops

VIDEO

Photo © Ilya Bushuev

One crop seed becomes extinct ***every single day.***

10,000 BC **8000 BC** **6000 BC**

It took over 10,000 years from the advent of agriculture for crop diversity to develop...

SEEDS

USA

93% of the varieties sold in 1903 were extinct by 1983

RICE

PHILIPPINES

Out of thousands that once thrived, only a few hundred remain

WHEAT

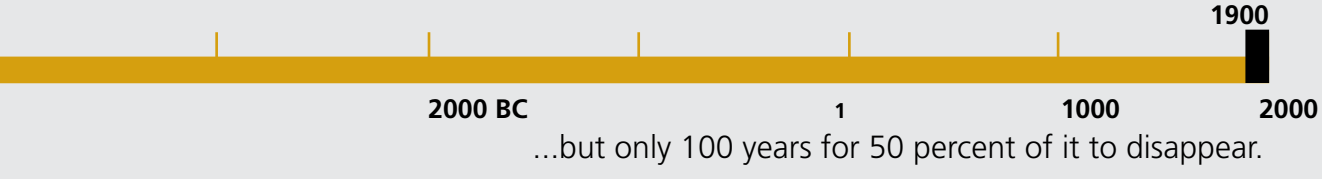
CHINA

90% of the varieties grown in the last century have been lost

Evidence indicates that humans first started eating grain seeds and subsequently planting crops around 10,000 BC. Since then, farmers' selection turned wild plants into a rich variety of agricultural crops. Each of these varieties was not only different in terms of nutrition, flavor, and culinary qualities, but also carried genes that helped it survive pests and disease, floods or droughts, as well as temperature extremes. It is these resistance traits that we will need to adapt our food crops to a changing climate. However, this genetic diversity is being lost at an unprecedented rate.

As commercially mass-produced seeds replace family and heirloom varieties that once were handed down from generation to generation, the genetic variety in fields is reduced. As corporations continue to patent the genetic code of new seeds as well as the seeds themselves, new varieties from that plant can no longer be bred—or its seeds replanted. As a result of these factors and others, an estimated half of all crops have been lost in the past century.

To solve this problem, seeds must be preserved for future generations in seed banks such as Norway's Svalbard Global Seed Vault, the most secure and advanced protector of crop specimens.



...but only 100 years for 50 percent of it to disappear.


Photo © Mari Tefre

At the end of the world

Svalbard (Norway) is geologically stable, well above sea level (130 meters/430 feet), and enjoys low humidity and no measurable radiation. In addition, the arctic permafrost offers natural freezing so that in the event of mechanical failure, seed samples remain frozen, even without electricity, for 25 years.


Photo © Mari Tefre

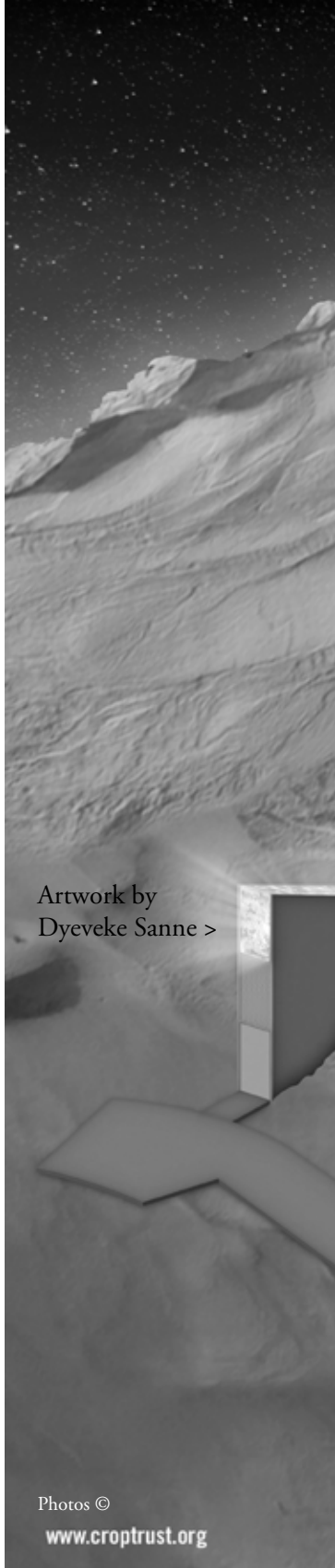
A global seed bank

The world needs new crop varieties which can be productive in a changing climate and feed growing populations. To develop these new varieties, plant breeders and farmers need access to the genetic diversity of all crops. But seeds are becoming extinct at an unprecedented rate, and national seed collections are often lost due to war and mismanagement.

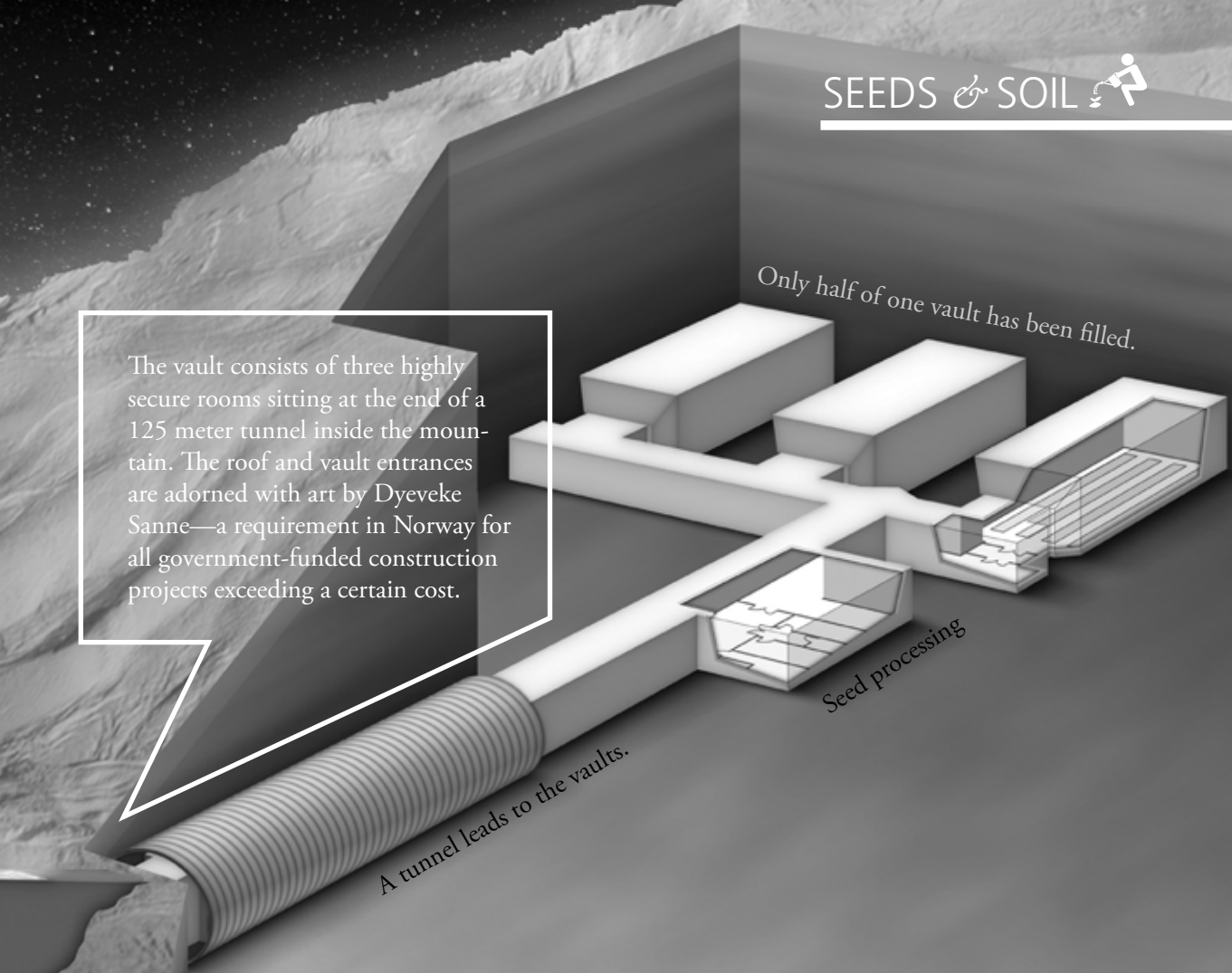

Photo © CIMMYT

Over 740,000 seeds

Since 2008, the vault has received more than 740,000 seed samples, making it the most extensive collection of crop diversity in the world. Seeds are stored and sealed in custom-made three-ply foil packages. The packages are sealed inside boxes and stored on shelves inside the vault at -18°C (-0.4°F).


Artwork by Dyeveke Sanne >

Photos © www.croptrust.org



The vault consists of three highly secure rooms sitting at the end of a 125 meter tunnel inside the mountain. The roof and vault entrances are adorned with art by Dyeveke Sanne—a requirement in Norway for all government-funded construction projects exceeding a certain cost.

A modern Noah's Ark

VIDEO

In March 2008, the Svalbard Global Seed Vault opened with 268,000 varieties of seeds from across the globe. About 1,100 kilometers from the North Pole, it was designed to withstand global warming, earthquakes, and even a direct nuclear strike. It now holds an estimated three-quarters of the biological diversity of the world's major food crops to protect humanity from crop extinction and starvation.

Investing in IRRIGATION

Strengthening private sector participation

By Cledan Mandri-Perott & Jyoti Bisbey

Irrigation of agriculture is central to rural development and growth. To achieve the best results, governments must carefully consider how investments can improve the use of existing water resources. Public-private partnerships (PPPs) can improve delivery and management of irrigation services. The construction method, the way investment is recovered throughout the life of the project, and terms by which agricultural production is linked to the project are critical aspects of the design of sustainable irrigation PPPs.

Many aspects of the irrigation sector have changed throughout the decades, but not the basic development paradigm. Public funding for capital investment, combined with public management and a subsidized supply of water resources to farmers, has until recently moved the sector forward incrementally but dependably. Now, climate change, constraints on water resources, and the need for increased agricultural yields to resolve food security have altered the rules of the game. Governments concede that public resources are limited, and they need to prioritize to achieve better value for money for the agricultural sector. One promising solution involves a combination of public and private expertise for improved sector management and delivery of irrigation services.

continued on page 30

IRRIGATION

PPPs in irrigation have a limited track record, but some form of concessional financing is typically implemented to allow for private sector involvement. In most cases, schemes would not be sustainable without some form of public support.

GUERDANE, MOROCCO (2004)

Project costs: $85 million
Farming activity: Cash crops
Size & scope: Up to 10,000 ha
PPP model: Design Build Operate
Scope of private contract: Irrigation Only
Bidding variable: Lowest tariff
Bidding Status: Two bids.
Operating successfully.

WEST NILE DELTA, EGYPT (2011)

Project costs: $450 million
Farming activity: Mixed
Size & scope: 80,000 ha
PPP model: Design Build Operate
Scope of private contract: Irrigation Only
Bidding variable: Lowest tariff
Bidding Status: One bid (not opened).
Project was restructured.

CHANYANYA, ZAMBIA (2008)

Project costs: $2.5 million (pilot) +
$32 million
Farming activity: Subsistence
Size & scope: 300-2,600 ha
PPP model: Build Operate Transfer
Scope of private contract: Irrigation Only
Bidding variable: Lowest tariff
Bidding Status: InfraCo led development.
Operating successfully.

MEGACH-SERABA, ETHIOPIA (2011)

Project costs: $47 million
Farming activity: Subsistence
Size & scope: 4,040 ha
PPP model: Operate & Maintain
Scope of private contract: Irrigation Only
Bidding variable: Quality-based &
minimum OMM payment
Bidding Status: Five bids.
Under negotiation.

continued from page 28

HOW TO IMPROVE IRRIGATION SCHEMES?

Resulting from decades of massive investments in water development schemes, irrigation today waters one-fifth of the world's cultivated land. Much of this investment has taken place in developing countries, and many of the world's poorest people depend on food produced on irrigated land.

Irrigation investment reached its peak during the mid-1980s, when $2.5 to $3 billion per year was committed by external funding agencies globally. However, since the 1980s, total investments have substantially decreased. The World Bank now invests less than $1 billion per year in irrigation projects, and total spending by all donors and financial institutions averages around $2 billion per year. This fall is partly a result of the general decline in agricultural finance since the mid-1980s.

Lower levels of investment in irrigation schemes

While some irrigation systems have operated successfully for long periods of time, high and increasing construction costs of the schemes, poor production performance of many irrigation systems, falling real prices of crops, and concerns about negative environmental impacts of projects have led to a slowdown in the rate of irrigation investment. This has also significantly reduced the willingness of donors and international financial institutions to invest in irrigation activities. And the tight financial position of many governments limits their ability to fund projects from domestic budgets.

Lack of financing for operations and maintenance

The dramatic expansion of irrigated areas in the world has not been matched by a similar expansion in financing the management of irrigation systems after construction. Consequently, in many systems water is wasted in the upper and unavailable in the lower sections, while water deliveries are often untimely and unreliable. Pumping stations, canals, gates, and metering systems are in disrepair, and only about 25 to 30 percent of water diverted into large canal systems in developing countries reaches thirsty crops.

Insufficient cost recovery

Low water charges and poor recovery rates risk the efficient maintenance of the existing water infrastructure as well as additional investments on future water-development projects. Charges rarely reflect the cost of production, consumption increases beyond the optimum level, and subsidies that may be in place disproportionately serve the better-off. This pattern of financing creates a vicious cycle: financial difficulties cause irrigation departments to defer maintenance to the detriment of the water system, while farmers complain about the poor services and have little incentives to pay for services. Despite all this, the politically-rooted system of public provision and subsidized water charges protects the water economy from the influence of actual market forces.

Emphasis on physical infrastructure

Government efforts to improve the management of irrigation have focused mostly on building hydraulic infrastructure and on the creation of physical capital in the form of dams, aque-

ducts, diversion weirs, and canals, and less on institutional and implementation arrangements. However, persistent problems with the design, construction, operation, management, and use of irrigation projects have led donors and national governments to reevaluate the emphasis on engineering and technical design in irrigation planning and management.

PRIVATE PARTICIPATION: A POSSIBLE SOLUTION?

In response to these challenges, governments have delegated management responsibility to other institutions, notably user associations or private companies. However, along with the pressures to decentralize and transfer the management of irrigation systems comes a need to understand the factors that contribute to the long-term success of irrigation schemes. Understanding how to design and manage this sub-sector is necessary for market forces to improve irrigation systems' performance and sustainability.

Including private participation in this sector is complex. The system needs to be designed sustainably from an engineering and environmental perspective, and also in terms of operations and maintenance (including any linkages between production and capital investment). Appropriate institutional arrangements and contractual frameworks need to be put in place to transition seamlessly from one implementation arrangement to the next. Most importantly, the right incentives need to be created for the private sector, farmers, public agencies, and others to achieve a sustainable, truly collaborative scheme.

GOVERNMENTS WILL CONTINUE TO PLAY A MAJOR ROLE

As this incipient market evolves, the need to create the necessary linkages between the private sector and the public becomes even greater. Regardless of the level of private sector involvement (for example, in construction, financing, and agricultural production), some form of active public sector collaboration is needed to make these projects successes. This underscores the fact that in irrigation PPPs there is a need to create a market that is prepared to invest in long-term assets, and that the necessary incentives are in place to ensure sustainability. Innovation is needed in structuring projects, whether it is in contract design, financing structures, or procurement.

A number of other factors will affect success, and they are all rooted in understanding that the currently constrained financial markets will affect the design and type of any developing PPP structure. Strategies and projects must be adapted to new market conditions. These include an early focus on bankability of the proposed scheme and a clear delineation of roles among the construction of assets, their maintenance and operation, and the production of agricultural goods. Flexibility in bidding to allow financial close is also key. Most important, rethinking the manner of government support—both financial and regulatory—will transform today's limited progress into the next generation's irrigation success story.

Legal complexities in irrigation PPPs

By Victoria Delmon

By their nature, public-private partnerships (PPPs) involve many legal issues, from the legal frameworks that guide their structure to the day-to-day implementation of the contract itself. These legal issues can take on new dimensions and complexity when applied to irrigation. Here are some of those specific to irrigation PPPs:

LAND

All irrigation PPPs involve the use of land, and are therefore complicated by laws and regulations governing ownership, title, and use.

Ownership: Land ownership may be limited to local parties or may prohibit ownership by the private sector. In Ethiopia, rural land is owned by the government and only individuals who were willing to farm it personally are entitled to own land.

Title: Land title can also be difficult to establish, particularly in countries where there are significant customary land rights (common in Sub-Saharan Africa).

Use: Complications can arise from restrictions on land use for irrigation generally or particular types of irrigation, which can be compounded by variation in these restrictions within a country from one jurisdiction to the next.

WATER EXTRACTION

Restrictions on extracting water (the key input to irrigation PPPs) can significantly affect the structure and feasibility of a transaction.

Levels: Water extraction can be limited by national or international law. Bodies of water that are defined as international waterways are subject to international law that can restrict water extraction. Waterways in the Nile Basin fall under a treaty of the Nile Basin Initiative that limits the amount of water that can be extracted, as well as its use.

Permits: Extracting water usually requires a permit, often issued by the ministry of water or the ministry of the environment, or sometimes both. Water user associations sometimes also play a role. Determining who grants permits and the process for obtaining them can be difficult and can lead to delays in project implementation.

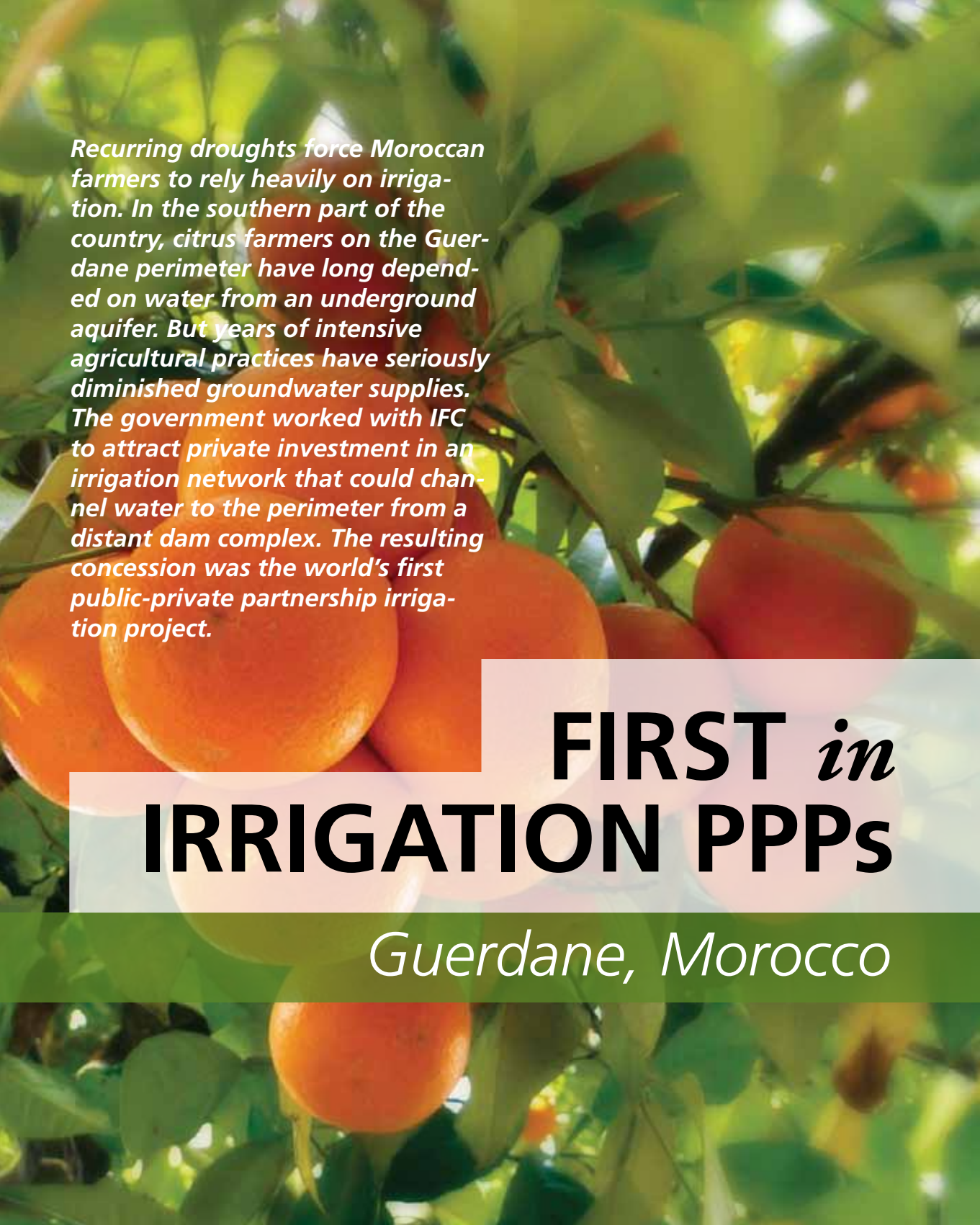
Charges: The pricing regimes for water extraction can be complex and vague, making it hard to determine how they are set, who sets them and whether there are different rules for raw water and for irrigation. The price of water is critical to determining the financial feasibility of a potential PPP. The private provider needs certainty regarding the price of raw water, the price at which it can on-sell irrigation water, as well as the quantities it is allowed to sell.

PUBLIC COUNTERPART

Complex institutional arrangements can make it difficult to determine who the appropriate public counterpart is for irrigation PPPs—typically, the national entity in charge of irrigation services. However, competing claims from the authority responsible for water resources or the ministry of environment can complicate this. Local entities may also play a role. An important consideration is whether the relevant entity has the power to enter into PPP arrangements—a subnational authority or a parastatal may need express power to do so.

For more on legal and commercial PPPs in irrigation, together with precedent contracts, visit the PPP in Infrastructure Resource Center at www.worldbank.org/ppp.

Photo © CIAT



Recurring droughts force Moroccan farmers to rely heavily on irrigation. In the southern part of the country, citrus farmers on the Guerdane perimeter have long depended on water from an underground aquifer. But years of intensive agricultural practices have seriously diminished groundwater supplies. The government worked with IFC to attract private investment in an irrigation network that could channel water to the perimeter from a distant dam complex. The resulting concession was the world's first public-private partnership irrigation project.

FIRST *in* IRRIGATION PPPs

Guerdane, Morocco

The perimeter of Guerdane, in the Moroccan province of Taroudant, covers approximately 10,000 hectares and produces 50 percent of Morocco's citrus crops. For years, private wells pumping into the Souss underground aquifer were the only source of irrigation water for about 600 citrus farmers, but due to overexploitation, the level of groundwater was decreasing by an average 2.5 meters a year. Many farms were abandoned as private wells dried up or pumping costs became unaffordable. The threat to Morocco's high value citrus industry was undeniable.

To alleviate the lack of water in the perimeter, the 1995 Watershed Management Plan of Souss-Massa allocated an average yearly volume of 45 million cubic meters of water originating from the Mohamed Mokhtar Soussi-Aoulouz dams, about 40 miles away. The government sought a private partner to construct a 300 kilometer water irrigation network to transport the water and a distribution system to deliver it to farmers based on the size of their citrus groves. The surface water allocated for the project met half of the water needs of the citrus farms in the perimeter.

The Moroccan government entered a 30-year concession with Omnium Nord-Africain to build, co-finance, and manage an irrigation network to channel water from the dam complex and distribute it to farmers in Guerdane. The total project cost was estimated at $85 million, with the government providing $50 million, half as a grant and half as a subsidized loan. The private partner provided the balance.

The concessionaire has exclusivity to channel and distribute irrigation water in the perimeter. Operational, commercial, and financial risks related to the project were allocated to the various stakeholders. The construction and collection risks were transferred to the concessionaire, and the government was responsible for ensuring water security. The demand/payment risk was mitigated by a subscription campaign; farmers paid an initial fee covering the average cost of on-farm connection. The concessionaire's construction obligation did not begin until subscriptions were received for 80 percent of the water available. The risk related to water shortage was allocated to the concessionaire, the farmers, and the government.

The unique selection criteria was the lowest water tariff, which supported the government's goal of making surface water accessible to the largest number of farmers possible. The public subsidy was designed to maintain water tariffs equivalent to current pumping costs. The winning bidder provided a tariff significantly lower than the price that farmers in Guerdane had typically paid for groundwater supplies.

RESULTS

- Safeguarded a citrus industry that provides direct and indirect jobs for an estimated 100,000 people.
- Made surface water available to farmers at an affordable price.
- Mitigated the risk of depleting underground water resources.

VIDEO

Photo © Amy Goodman

DESALINATION

By Edouard Perard

Agriculture consumes the most fresh water of any other sector. Globally, agriculture is responsible for an average of 70 percent of fresh water consumption; in some countries, that figure jumps to 80 to 90 percent. Given the forecasted global population increase, the agriculture sector will have to produce 70 percent more food by 2050, according to estimates from the Bonn 2011 Conference: The Water, Energy and Food Security Nexus. This will stress water resources even further. Governments worldwide, facing a possible water crisis in arid regions, are searching for options to ensure a reliable water supply for agriculture, and desalination is one of those options.

Desalination for drinking water is a well-established technology. The International Desalination Association counts more than 10,000 desalination plants around the world, 99 percent of which are small scale projects. Many of these projects are implemented under public-private partnerships (PPPs), but most are established as engineering, procurement and construction projects. Most plants are located in Algeria, China, Kuwait, Saudi Arabia, Spain, United Arab Emirates, and the United States. The most active private firms in the desalination market include Doosan, General Electric, Hyflux, Suez, and Veolia Environment.

During the last several years, important technological improvements have significantly lowered energy requirements—the primary operating cost. In the early 1970s, desalination plants consumed more than 20 kilowatt hours of electricity per cubic meter. Currently, desalination plants consume between 3.0 and 4.5 kilowatt hours of electricity. At this rate, the cost of desalinating water per cubic meter ranges between $0.75 and $1.25 for seawater, according to the International Desalination Association.

Wider use of salt water for irrigation would free freshwater for other uses and increase food security for people living in dry coastal areas. As *Wired* reported in 2010, a British company has developed a low-cost irrigation system that allows saline and brackish water, which contains more salinity than freshwater, to be used for growing crops. The Dutyion Root Hydration System uses a network of underground pipes to deliver water directly to a plant's roots. Water

for AGRICULTURE

then diffuses through the walls of the polymer pipe because of differences in moisture levels, which act as filters and leave contaminates behind. Almost any water source can be used—even industrial wastewater—without the need for secondary purification.

As always, environmental costs also need to be taken into consideration, especially air pollution and greenhouse gas emissions for large desalination plants. There may also be damage to marine life due to the pumping of seawater into the plant and discharge of residual salts and minerals.

At its current price level, desalinated water is still not economically viable for most agricultural use, considering the tremendous amount of water necessary for food production (1,300 and 3,400 liters of water required for one kg of wheat and rice, respectively). However, desalinated water has become more affordable for high value crops such as fruit and citrus products, which are less water-intensive (13 and 50 liters of water required for one tomato and one orange, respectively).

While the experience with desalination for agriculture has so far been limited to some projects in Israel, Spain, and high-income Middle Eastern countries, several projects are currently under consideration in low- and middle-income countries. In Morocco, for example, the government is planning a PPP to build a new desalination plant in the Chtouka region to provide water for high-value crops. (IFC is the project advisor.) In Chile, a private firm has proposed to develop a 2,000 ha unoccupied government-owned agricultural land, combined with a desalination plant, under a PPP in Llanos de Caldera. The land would be rented to farmers, who would then pay for desalinated water to be used in irrigation.

Though desalination for agriculture is still at an early development stage, technological improvements leading to lower-cost solutions may make it a more viable option to ensure a reliable water supply for agriculture. For the foreseeable future, however, desalination will remain limited to high-value crops.

Photo © Nico Saporiti

Where there's MUCK there's MONEY

Reinventing the economics of sanitation

By Miriam Otoo, John E.H. Ryan & Pay Drechsel

Urbanization in low-income countries—which typically takes place against a backdrop of poverty and food insecurity—strains the allocation and use of land, water, and nutrients in peri-urban and urban areas. One of the resulting challenges is what to do with the daily generation of millions of cubic meters of solid and liquid waste. Sanitization of this waste is seen traditionally as a public sector obligation, and consumes a large part of municipal budgets. Until recently, private sector participation has been limited to the extraction, treatment, or conveyance of solid waste or fecal sludge from on-site sanitation systems to disposal sites.

Now, an emerging set of innovative entrepreneurs are recognizing the opportunities in waste. Private companies can profitably transform nutrients, water, energy, or organic fertilizers from the waste streams into vital agricultural resources. In Ghana, for example, Waste Enterprisers contracted with a municipality to transform the existing wastewater stabilization ponds into thriving aquaculture facilities. Fish, well fed on the nutrients from the waste, are then sold by the company for a profit. Part of the income is being spent on maintaining the wastewater treatment ponds, guaranteeing a share of the spoils for all partners.

Waste Enterprisers' business model works, according to Founder and CEO Ashley Murray, because it is built around harnessing economic value from human waste. "By rebranding human waste as a needed input instead of a waste output, our waste-based businesses create both a physical and financial demand for waste, completely reinventing the economics of sanitation," Murray said.

Wastewater from agro-industrial applications is also being reused to generate energy to meet the internal thermal and electric power requirements of the industries and to sell to the local electric company. For example, plants run by the Thai Biogas Energy Company convert wastewater from the processing of cassava and other agricultural commodities into biogas. This then fires the turbines that generate electricity for the internal requirements of the agro-industries and distribution in the local grid. Any excess can then be sold to the local grid. The purified waste water is used for irrigation or returned to the public canals.

Energy recovery is another evolving part of the reuse equation, as it can provide the economic leverage for the recovery of nutrient or water resources to address soil fertility depletion and water stress.

NEW ROLE FOR PPPs

Public-private partnerships (PPPs) have an important emerging role in transforming waste into a business opportunity because of the potential cost leverage for sanitation services. Until now, the magnitude of waste resource recovery has remained very limited and largely restricted to the informal sector, even though the agricultural value of these waste resources is well recognized.

The Resource Recovery & Reuse program led by the International Water Management Institute (IWMI-CGIAR) is hoping to change this situation. In partnership with the International Fund for Agricultural Development, the Swiss Agency for Development and Cooperation, and the Bill & Melinda Gates Foundation, the new program is identifying innovative enterprises in low-income countries that reuse domestic and agro-industrial waste resources, including fecal sludge. Data analysis will allow testing of a variety of scalable business models.

IWMI's initial research has found that entrepreneurial initiative and well-crafted PPPs are vital to the success of these new waste entrepreneurs. There are limits in public capital and a need to leverage private capital and entrepreneurial talent to bring about change. Therefore, emphasis must be placed on analyzing the role of entrepreneurship and PPPs in relation to the sustainability and up-scaling potential of existing and prospective waste reuse businesses.

Though potential opportunities for business in waste reuse are clear, it has also become apparent that public and private actors must work together to ensure scaling-up and sustainability of such businesses. For example, composting of solid organic waste into organic fertilizer is recognized as a reuse system with multiple benefits, especially in areas where resources for agricultural production are limited or fertilizer prices are increasing. However, most composting plants set up by researchers or nongovernmental organizationions remain biased toward technical results and hardly survive their pilot phase.

Successful organic fertilizer producers, on the other hand, have leveraged key strategic partnerships with the public sector as well as community-based organizations and other private entities. These relationships reduce risk associated with high capital investments and optimize the allocation of resources and activities while increasing market access. This opens the door to profit—and the sustainable solutions that profits ensure.

CONSTRUCTED WETLANDS

Recycled water feeds residential gardens

By Maggie Haslam

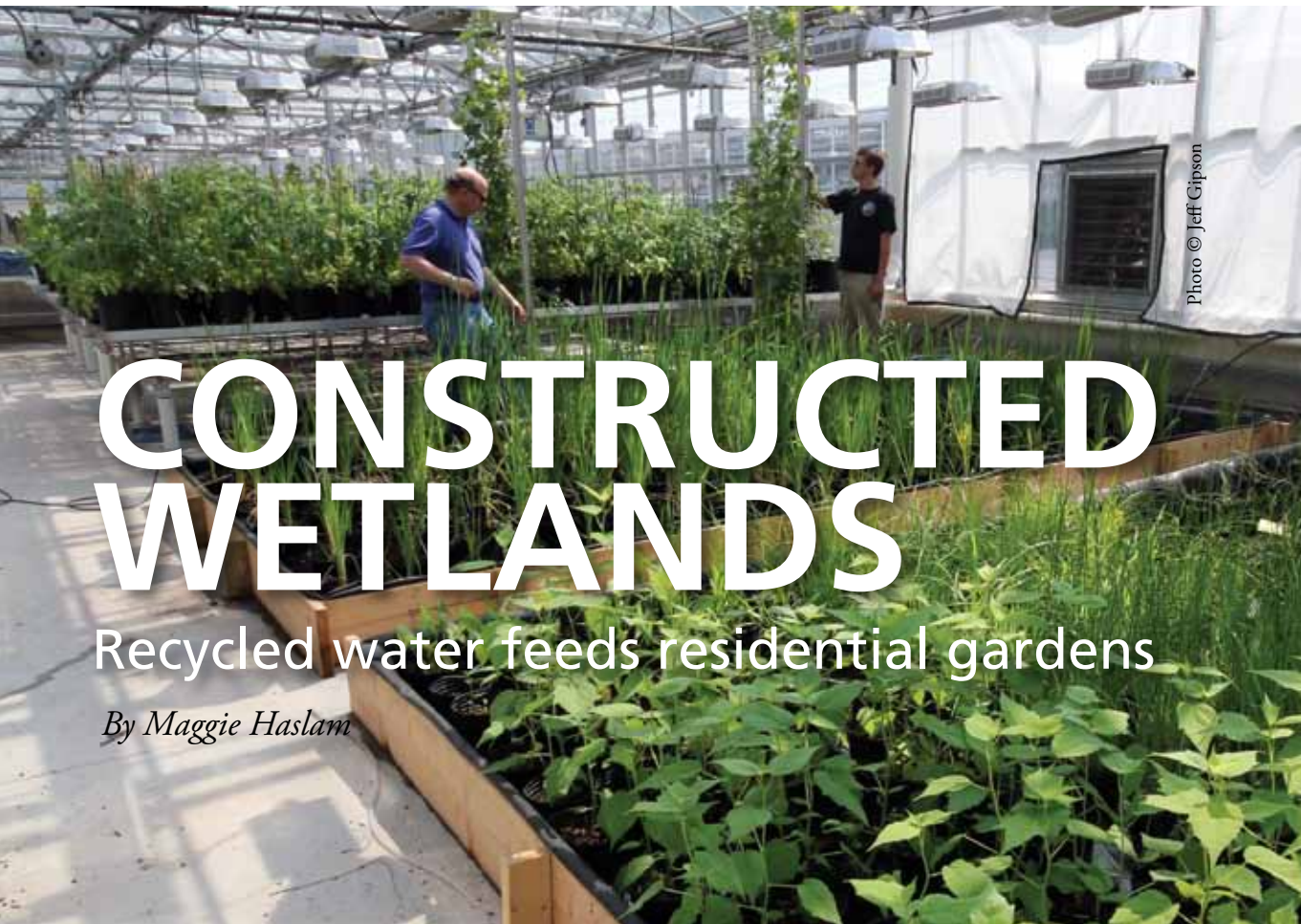
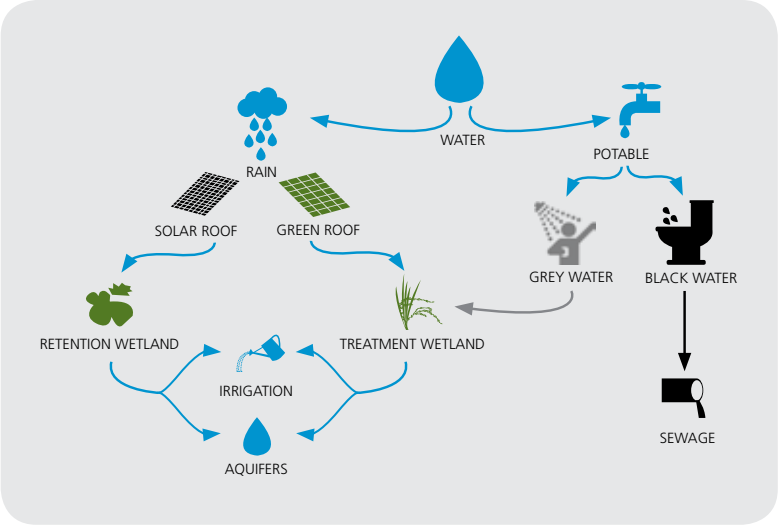


Photo © Jeff Gipson

Not all wastewater is the same. Yet in many cities, rain, greywater, and blackwater receive equal billing when it comes to treatment: all flow directly into municipal sewer systems. That's why a team of University of Maryland students, faculty, and professional mentors designed WaterShed, their first place-winning entry in the U.S. Department of Energy Solar Decathlon 2011.

Though the primary objective of the Solar Decathlon is to challenge teams to build and operate solar-powered homes, WaterShed's team saw the contest as an opportunity to take sustainable design a step further. With the nearby Chesapeake Bay, on the U.S.'s eastern seaboard serving as inspiration, the team made water conservation and reuse a priority, creating a sustainable home that is functionally and aesthetically in harmony with its environment while protecting and producing resources.

One of the team's primary goals was to incorporate constructed wetlands into the design as a way to recycle rain and greywater. WaterShed's design, successfully used for years in commercial installations, offers a compact version fit for a residential scale. WaterShed's constructed wetlands allow the homeowner to harvest and reuse both rain and greywater for landscape irrigation and to support its on-site edible gardens.



	Water type	Use
	Potable	Drinking
	Rain	Irrigation
	Grey water (no biosolids)	Irrigation (w/filtering)
	Black water (biosolids)	Any (w/treatment)

It blends in seamlessly with the home's architecture and landscape. There are other benefits, too. Recycling greywater minimizes impact on sewer systems, saving money, energy, and above all, water. Irrigating with water processed by constructed wetlands can reduce water usage by 30 to 50 percent a year.

WaterShed's constructed wetlands resemble the natural marshes found in the Chesapeake Bay. They are effective water filtraters in all kinds of weather, including temperatures below freezing. The water harvested on site comes from two primary sources: storm water, which funnels directly from the home's inward sloping roofs; and greywater from the bathroom shower and sink, which sit directly above the wetland beds. Water enters the wetlands, where native plants work with microorganisms to strip it of soap, pollutants, excess nutrients, and other pathogens. Once filtered, the water can be used for irrigation, stored for future use, or returned to the water table.

All of WaterShed's irrigation water is recycled greywater from the home's wetlands. Combined with compost made on site, it feeds over 15 types of fruit, vegetables, and herbs in the garden, as well as the surrounding landscape. This provides the homeowner low-cost and relatively low-maintenance access to fresh, organic food while controlling their impact on the environment.

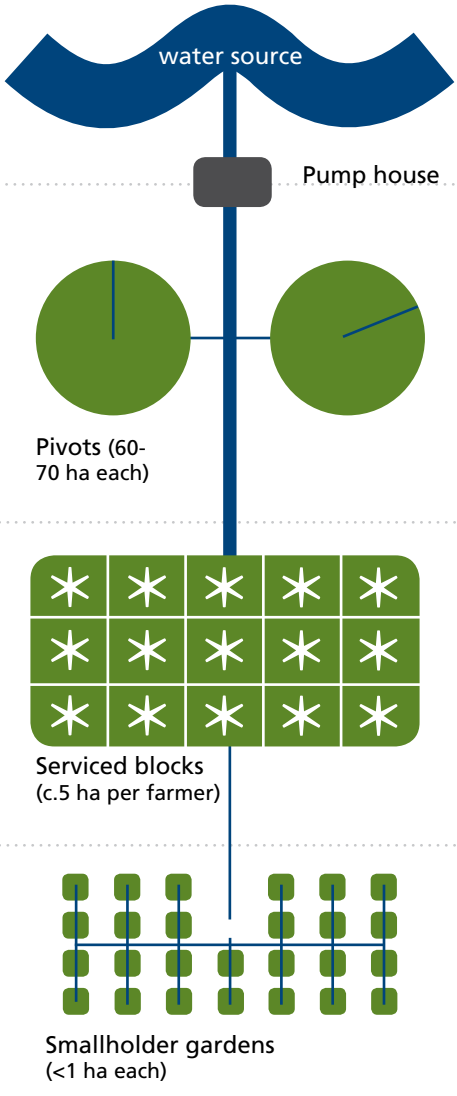
Small farmers, BIG DREAMS

Growing entrepreneurs

Zambia's Irrigation Development and Support Project is an integral aspect of the country's initiative to build multi-level, self-contained farm blocks to create economies of scale and volume and more flexibly respond to consumer demands. The Irrigation Development and Support Project enhances income generation within these farm blocks by irrigating small plots for household use. Successful smallholders partner with each other to expand their reach, and these groups then team up with commercial farmers for greater access to resources, ultimately enhancing the country's food security.

Contributed by Indira Janaki Ekanayake, Francois Onimus, and Barnabas Mulenga, with assistance from Cambridge Economic Policy Associates, Ltd.

Photo © Charles Schug/istockphoto

Tier	Irrigation Model
BULK WATER INFRASTRUCTURE: Pump and mains pipes; may include dam/reservoir.	
Professionally managed pivot irrigation growing marketed food and cash crops, purchasing produce from emergent farmers, and providing support services. TIER 3	
Serviced blocks for emergent farmers growing food and horticultural crops under sprinkler or other irrigation for sale to and supervised by the professional farmer. TIER 2	
Smallholder gardens or land currently farmed can grow vegetables for local and subsistence consumption under some basic form of irrigation (e.g., furrow). TIER 1	

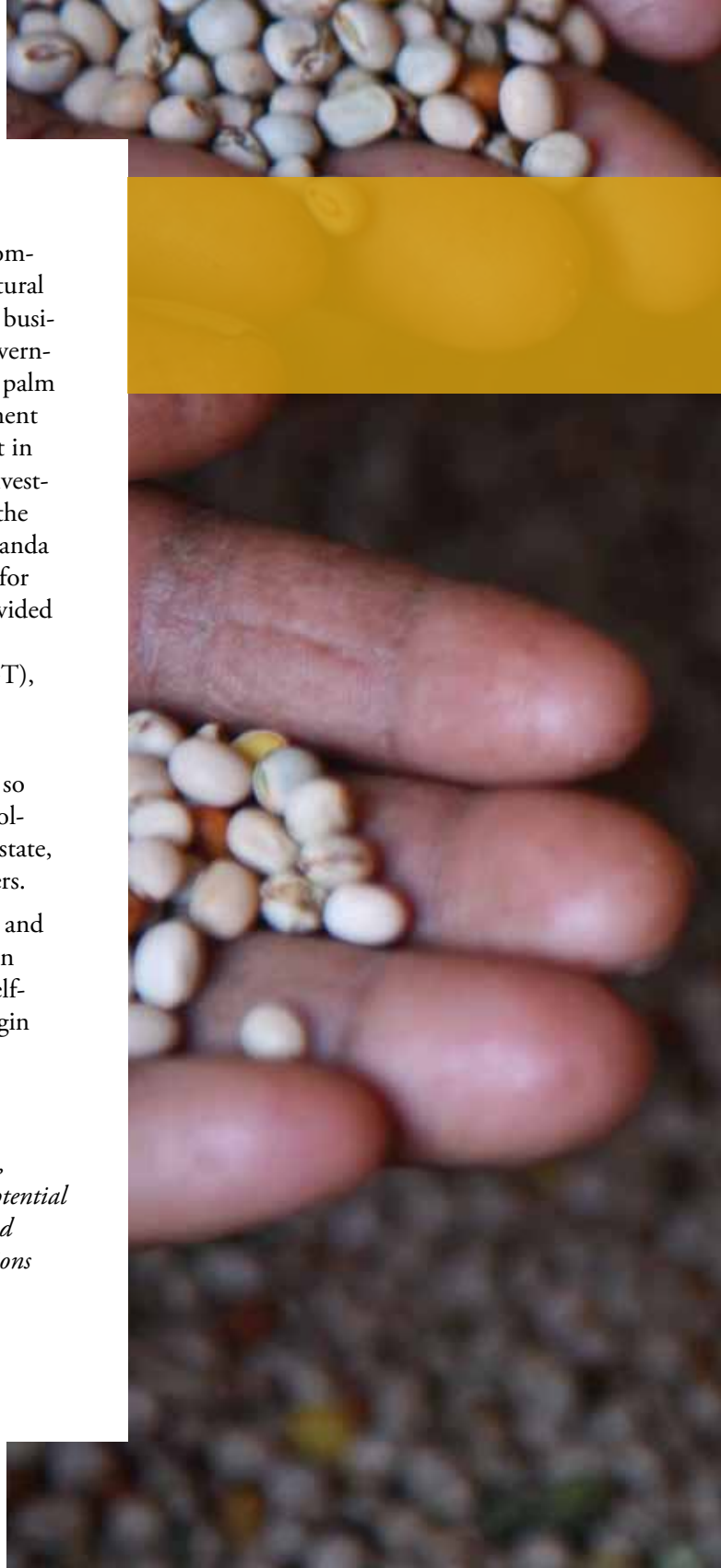
UGANDAN OIL PALM

Public-private partnerships (PPPs) are becoming recognized as a way to improve agricultural extension. PPPs can bring the efficiency of business to public service delivery when the government plays an enabling role. Under the oil palm component of the Vegetable Oil Development Project in Uganda, the government has put in place a unique PPP by promoting direct investment to introduce oil palm cultivation by the large scale private operator Oil Palm of Uganda Limited (OPUL). The International Fund for Agricultural Development (IFAD) has provided funding to the government to establish the Kalangala Oil Palm Growers Trust (KOPGT), which provides funding to smallholders to develop their oil palm gardens.

OPUL provides the know-how and inputs so that smallholders are using the same technology on their plots as on the large nucleus estate, while KOPGT is the go-between for farmers.

While IFAD is financing the start-up costs and extension during an initial period, provision has been made for KOPGT to become a self-sustaining organization, financed by a margin of the earnings of its crop.

Excerpted from "Vegetable Oil Development Project-Uganda: Interim Evaluation," IFAD, December, 2009, cited in "Mobilizing the potential of rural and agricultural extension," Food and Agriculture Organization of the United Nations and The Global Forum for Rural Advisory Services, 2010.



By Riikka Rajalahti

Extending a HAND

The private sector's role in agricultural extension

Extension services are integral to agricultural productivity growth, development, and competitiveness. Developing high-quality, demand-driven, multi-sector services is a key to meeting food security, farmer livelihood, and export goals.

In response to the changing demand—particularly the increasing market focus—private sector extension services increasingly provide input, commodity, business development, and value chain-oriented services in partnership with public authorities. To best support this expanding and critical role of the private sector, public authorities can provide incentives to private service provision; ensure robust regulation and oversight; monitoring, technical support and evaluation of service providers; coordination of service providers; and financial support of underserved issues (such as natural resource management) and marginalized populations.

The following examples highlight the role of the private sector across select extension functions:

1 Improving technology transfer to increase export crop production and achieve food security

Traditional technology transfer is an important part of the extension that often involves the private sector. Aspects might include:

- Public and proprietary technologies in new crop and livestock technology.
- Private sector financing of extension services for specific commodities, inputs, and/or value chains.
- Private sector firms and/or farmer cooperatives' provision of technical advisory services for new production inputs (allowing public extension systems to shift attention to other important extension functions).

2 Intensifying and/or diversifying the farming systems of small-scale farmers to increase farm income

In response to economic growth and changing consumer demand, extension can introduce new high-value crop, livestock, and other enterprise options to groups of farm households. The private sector, along with the public sector, can facilitate this in various ways:

- Innovative farmers, who have already developed these new production systems or enterprises on their own, can be instrumental in building farmer capacity to absorb the new approaches.
- Private sector financing of extension services, inputs, and/or value chains.
- Private initiatives in information and communications technology can expand the circulation of market, price, and weather information and be an efficient conduit for specific kinds of extension advice.
- Support to farmer and producer associations in improving access to larger urban markets.

3 Training for extension services

The following three extension functions all require training that in many cases is provided efficiently and effectively by nongovernmental organizations and the private sector working together with the public sector:

- *Building social capital and reaching economies of scale within rural communities:* As small-scale farmers strive to increase farm income, they need to work together through producer and self-help groups within these rural communities. These farmer groups and their leadership will require training in many areas, including organization, technology, and financial management and technical skills. These skills are especially important as the groups begin creating larger producer or farmer associations with nearby farmer groups.
- *Educating farmers about sustainable natural resource management (NRM) practices:* Land and water degradation is an increasingly serious problem and sustainable NRM practices should be a high priority for any government. However, adoption of NRM practices is often slow, as it requires investment up-front in exchange for long-term benefits. Farmers often lack the necessary training, knowledge, and skills to apply or implement sustainable soil, water, pest, and other NRM practices. They need to be educated to integrate cost-effective, location-specific NRM practices into their farming systems.
- *Training rural women in nutrition, hygiene, healthcare, and family planning:* In addition to the vital role women play across all areas of agricultural production and rural livelihoods, women are integral to alleviating hunger and malnutrition, and preventing disease. Training in family nutrition and in proper hygiene can support women in these efforts.

WOMEN IN AGRICULTURE

Bill & Melinda Gates Foundation

Photo © Neil Palmer/CIAT

Cultivating a new breed

Brazil's model to enhance technology transfer

Through a 2007 project with the World Bank, the Brazilian Agricultural Research Corporation (EMBRAPA) was able to more closely link research with priorities identified by the users of agricultural technologies. EMBRAPA brought together academia, the private sector, and rural producers through joint ventures to improve agriculture in Brazil. Its success can be instructive for countries implementing similar programs.

Agriculture is an important part of Brazil's economy, but the country faces increasing regional and international competition. New agricultural technologies and practices are necessary for remaining competitive, as well as to meet the food and income needs of the poor and protect Brazil's environment. However, until recently the country spent very little on agricultural research, and the research that was done was linked weakly with client demand. It also failed to tap into the broader universe of actors in agriculture.

The public sector has traditionally been the main investor in agricultural research. The National System of Agricultural Research is led by EMBRAPA, the third largest research agency in the developing world and the most important in Latin America. In the past, most research was carried out directly by this agency. To better respond to farmers' priorities and harness the capacity of a broader range of actors, EMBRAPA sought to diversify the research base and enhance technology transfer.

To do this, EMBRAPA established a competitive grants system to fund research that expanded the role of the private sector, universities, and farmers' organizations. It has also increased international collaboration. Grants were made to 470 public-private initiatives. This vast joint venture reduced institutional isolation and dependence on public resources in research. As intended, EMBRAPA remained the leader of this process but is no longer its primary executor.

The initiatives included innovations in new cultivars, hybrids, vegetation genotypes, and clones, as well as more disease-resistant and productive herd animals. Future productivity increases can be expected from the cattle vaccines, animal and plant disease diagnostic kits, machinery and equipment prototypes, and farm management software created out of the grants. Other research products of socioeconomic, ecological, and technological importance include more efficient ecosystem evaluations, development of molecular markers for genetic improvements in plants, alternatives for sustainable exploitation of brushlands, and processes to improve the quality of milk, fruit, and vegetable products.

Other nations can learn from EMBRAPA's experience and reinforce their agriculture systems. EMBRAPA president Pedro Arraes Pereira offers the following recommendations:

- Prioritize the permanent qualification of researchers and support personnel.
- Focus on research, prioritizing the weakest of the various links in the production chains.
- Participate in public policymaking in the area of agriculture.
- Form national and international research networks.
- Interact profoundly with the production sector in identifying research demands.

Courtesy of IFPRI

Productive alliances, PRODUCTIVE RESULTS

Pairing commercial buyers with rural producers

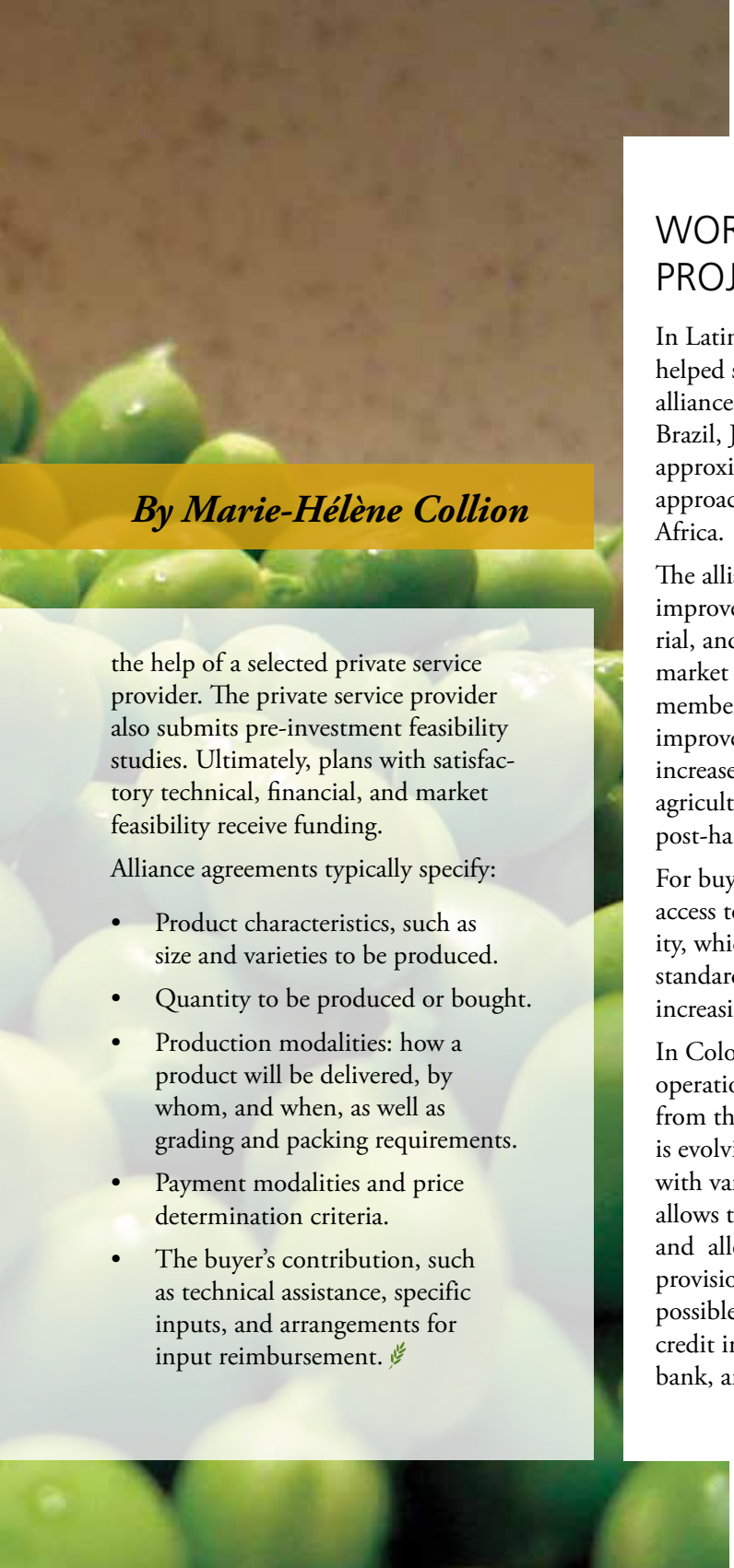
Rural productive alliances pair commercial buyers with small rural producer organizations. By increasing the rural producers' participation in modern supply chains, these alliances increase incomes and employment. They also create incentives for buyers and smallholders to establish mutually beneficial relationships by ensuring consistent quality and delivery of products.

It is not easy for smallholder farmers to enter into and benefit sustainably from modern agricultural value chains. The supermarket revolution has changed the parameters of market demand: exporters, agribusinesses, and supermarkets require large quantities of consistently high-quality goods that meet sanitary and phytosanitary standards and arrive on time. Small-scale producers are often consigned to selling in less demanding, less financially rewarding venues, such as open-air markets or through intermediaries. Smallholders' poor knowledge of distribution channels and prices also undermines their ability to negotiate with buyers.

Support for the creation of rural productive alliances—an economic agreement between formally organized producers (cooperatives or associations) and at least one buyer—can remedy these challenges. Producers achieve economies of scale, can ensure product quality and traceability, and improve their position in the value chain through their involvement in basic processing (selecting, grading, and packaging). A revolving fund enables the organization to develop financial management skills and obtain seed and long-term capital, both key components of long-term competitiveness.

HOW IT WORKS

Rural productive alliances are often developed with government and donor support. In these cases, the cycle begins with a call for proposals to producer organizations and their commercial partners. The producer organization prepares a draft business plan which, if selected, is developed into a full-fledged business plan with



By Marie-Hélène Collion

the help of a selected private service provider. The private service provider also submits pre-investment feasibility studies. Ultimately, plans with satisfactory technical, financial, and market feasibility receive funding.

Alliance agreements typically specify:

- Product characteristics, such as size and varieties to be produced.
- Quantity to be produced or bought.
- Production modalities: how a product will be delivered, by whom, and when, as well as grading and packing requirements.
- Payment modalities and price determination criteria.
- The buyer's contribution, such as technical assistance, specific inputs, and arrangements for input reimbursement.

WORLD BANK-SUPPORTED PROJECTS IN LATIN AMERICA

In Latin America, the World Bank Group has helped support over 2,200 rural productive alliances in Colombia, Bolivia, Panama, Peru, Brazil, Jamaica, and Guatemala, benefitting approximately 110,000 rural families. The approach has also been adopted in Asia and Africa.

The alliances have helped producer organizations improve their technical, organizational, managerial, and negotiating skills, and expand their market intelligence. In some cases, they also help members access private finance. These operational improvements have led to higher incomes and increased rural employment, especially for agricultural workers and women working in post-harvest activities.

For buyers, the benefits have included secure access to products of consistently high quality, which meet the sanitary and phytosanitary standards required by international markets and increasingly important for domestic markets.

In Colombia, where this approach has been in operation since 2005, there is growing interest from the agribusiness sector. A cluster model is evolving where a hub agribusiness partners with various producer organizations. This model allows the partnership to reach sustainable scale and allows for synergies to be developed for the provision of advisory services. It also facilitates the possible development of a triangular approach to credit involving the agribusiness, the commercial bank, and the producer organizations.

PREPARING for DISASTER

Weather Index Insurance shields farmers from loss

Weather Index Insurance policies provide payments linked to publicly observable weather conditions, protecting farmers against catastrophic weather risk. Payments may vary based on rainfall in a nearby rain gauge; commodity price; aggregate crop yields; and groundwater levels in a well. Policies may be tailored to specific agriculture-related threats, such as:

Photo © -Darin-

IN MEXICO:

Via the "Fondos de Aseguramiento" (Self Insurance Funds, or SIFs) program, farmers can obtain crop and livestock insurance which is reinsured by Agroasemex, the national Agricultural Reinsurance Company. Crop insurance is typically based on yield, while livestock insurance is based on a catastrophe's mortality or disease rates. Catastrophic insurance is provided by federal and state governments through CADENA, the Component of Natural Disaster Relief, which protects low-income producers affected by weather contingencies. A recent study confirmed Weather Index Insurance in Mexico increases yields per hectare by 6 percent and increases income by 8 percent.

IN INDIA:

In Andhra Pradesh, groundwater supply insurance is offered to villagers in partnership with a local microfinance institution. Households can purchase as many or as few contracts as necessary to provide downside protection during seasons with limited rainfall.

Photo © IRRI

Photo © Internews Network

IN KENYA:

Livestock mortality due to drought imposes significant economic costs. This in turn impacts the welfare and well-being of farmers' households. An innovative index insurance scheme links payouts based on regional satellite data tracking seasonal forage availability.

IN MONGOLIA:

Catastrophic Weather Risk Insurance is being piloted to protect the livelihoods of Mongolia's herders, who are at risk for extreme weather phenomena—such as the severe winter *dzud* of 2010, which resulted in death for over 17 percent (8 million heads) of the country's livestock.

Photo © United Nations Development Programme

The geopolitics *of* food scarcity

A discussion with Lester Brown

Interview by Alison Buckholtz & Jeanine Delay

Lester Brown, president of the Earth Policy Institute, is most recently the author of World on the Edge: How to Prevent Environmental and Economic Collapse. *Throughout his career he has been honored with numerous prizes, including a MacArthur Fellowship, the United Nations Environment Prize, Japan's Blue Planet Prize, and 25 honorary degrees. His new book,* Full Planet, Empty Plates: The New Geopolitics of Food Scarcity *(W.W. Norton), will be published in September 2012.*

Why has food security become one of the most pressing issues of our time?

We have a potentially dangerous tightening of the world food situation. I think people don't yet realize how dicey things could get. After grain prices went up in 2007-2008, exporting countries began to restrict exports to keep their food prices down. Russia and Argentina restricted wheat exports; Vietnam banned rice exports. Suddenly, importing countries realized they no longer could count on the world market to supply grain when they needed it. In the past this was always the case, but after a half century of surpluses we have now moved into this period where things are tight. It's every country for itself, and in this era of tightening world food supplies, the ability to grow food is fast becoming a new form of geopolitical leverage. Food is the new oil.

In this era of tightening world food supplies, the ability to grow food is fast becoming a new form of geopolitical leverage. Food is the new oil.

What has caused the sudden tightening of supplies?

On the supply side, the rise in yields is slowing dramatically and in some countries this has already plateaued, including in the more agriculturally advanced countries such as Japan, Korea, Germany, and France. Farmers are using all the available technologies; scientists have nothing new to give them. So importing countries have started buying land in other countries—land on which to produce food for their own citizens. These "land grabs" are entirely new—and it's more than governments trying to buy or lease land, it's an investment issue. Land is the new gold. Prices are going to go up. There are agribusiness firms and investment banks, along with pension funds and university endowments, putting part of their investments now in land. It's hard to see where it is going to end.

Then there's the issue of water, which is underground and out of sight. The land grabs are also water grabs where we will see competition developing. Egypt, with 80 million people, imports its wheat or the water to produce it via the Nile. However, some of the principal land grabs are in Sudan and Ethiopia, which occupy 75 percent of the Nile watershed. So, a lot of the Nile water that goes to Egypt won't be getting there in the future. That's going to

put a real squeeze in an area where population is growing very fast.

Furthermore, we have 3 billion people in the world trying to move up the food chain consuming more meat, dairy, and farmed fish, and all this takes soybeans. As a result, demand for land to grow them is exploding and now there's more land in soybeans than in any other crop in all the Americas, from Canada to Argentina, and it will keep growing. This not only has long-term consequences for food but also for climate change and biological diversity.

What can be done?

First, we need to address the population issue. The extent to which the populations are exploiting their water supplies is scary. Half of us today live in countries that are over-pumping aquifers for irrigation. This is a water-based food bubble, which leads to a false sense of assurance. We have these now in China, in India, Pakistan, Mexico, and the U.S. It's most severe in China and India; World Bank data indicate that 15 percent of the population of India is being fed by over-pumping. That's 175 million people. My calculation for China is that 130 million people in China are being fed by over-pumping.

We also need to launch a worldwide campaign to improve water productivity much as we did for grain productivity 60 years ago. The key to that is raising the price of water to its market value. In many places in the world, water is still priced as it was 50 years ago, as if it was a cheap and abundant resource—which it no longer is.

What advice would you give to government officials who want to make a difference?

Food security is no longer a ministry of agriculture issue—it's a social issue. When I joined the U.S. Department of Agriculture in 1959, the responsibility for food security was entirely in the hands of the Department of Agriculture. Especially in the U.S., we just had to decide how much idle cropland to hold out each year, depending on the world market situation. But now, when I go to places like China, I tell the officials there that they need a direct phone line between the ministry of agriculture and the ministry of energy because decisions being made about energy may have a greater effect on food security than anything that can be done at the ministry of agriculture. And the same applies to transport. Each day there are more and more cars on the roads; at what point do countries start to pave over their farm land to build more highways? From now on, food security is going to depend on the ministries of health and family planning, agriculture, transportation, and forestry, all working together.

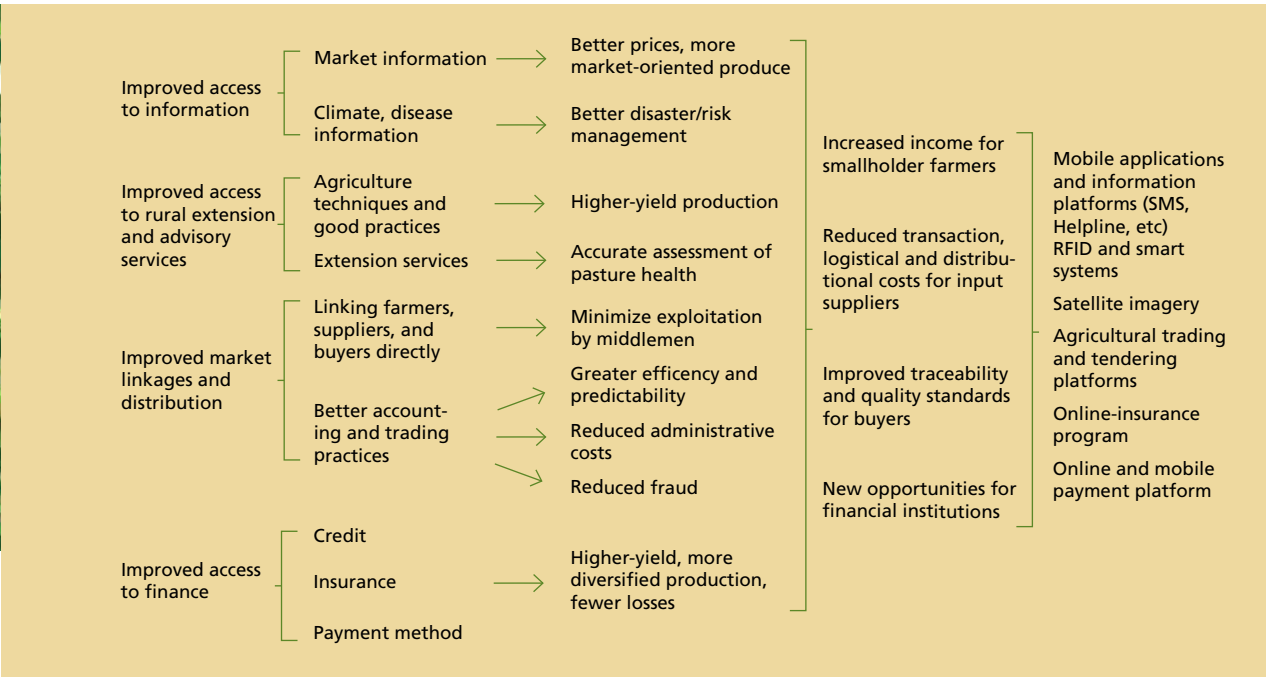
Photo © NASA

ICT for Agriculture and Rural Development

By Mariana Dahan

Turning difficult-to-access irrigation pumps on and off with a mobile phone sounds like science fiction for some farmers—too futuristic to be true. Ditto for the fantasy of eliminating the middleman from complex, graft-ridden distribution chains, which would ultimately enable farmers to get better prices for their products. But with new information and communication technologies (ICT) for agriculture and rural development, the future has arrived. Mobile devices have already increased efficiency in smallholder agriculture. Now, even more sophisticated ICT applications are emerging, including remote and satellite technologies for food traceability, sensory detection, real-time reporting, and status updates from the field.

ICT unlocks critical opportunities for the agriculture sector, which accounts for about 40 percent of the world's workforce, along with a large proportion of developing country exports. Improving yields, productivity, and



Mobile devices have increased access to information and raised efficiency in smallholder agriculture. Today, emerging remote and satellite technologies are also used for food traceability, sensory detection, real-time reporting, and status updates from the field, as illustrated above.

incomes in rural areas is important to solving the food security puzzle. Solutions like Nano Ganesh—the mobile irrigation switch—and eChoupal—kiosks connecting farmers directly with buyers—are transformational tools that deliver better services to farmers and herders in developing countries. Readers can find more information in the World Bank Group's *ICT in Agriculture* eSourcebook.

The private sector has a significant role to play matching private technology and public funding to create and design innovative solutions. The Sri Lankan mobile phone application eDairy is a good example of this collaboration. eDairy, aimed at expanding cows' milk production through increased pregnancy rates, builds on research that shows that an increase in pregnancy rates can be achieved by having timely access to veterinary services. With eDairy, farmers access databases and request veterinary services directly. The government-owned ICT Agency of Sri Lanka provided 50 percent of the start-up fund-

ing, and a grassroots community development organization is providing the technology and operational management.

Unlike technology tools in other sectors, ICT applications for agriculture and rural development have not followed a typical top-down, roll-out approach. The most successful have been designed locally to answer specific challenges in target markets. In many cases, content is created by factoring in the local language, crop, and farming method. With such useful ICT resources, the future has arrived.

ICT is an important link in the value chain. Established and emerging technologies can be leveraged to deliver value at each stage of the agriculture sector lifecycle, as illustrated below:

ONLINE AND ON TIME

eChoupal supplies farmers up-to-date market information and online sales channels

Indian farmers face unique challenges, like fragmented farms, weak infrastructure, and especially the involvement of numerous intermediaries—middlemen who use unscientific means to judge the quality of the product and set prices. In the process, middlemen often make out with most of the farmers' profit. Since price differences between good quality and inferior quality are small, there is little or no incentive for the farmers to invest in producing high-quality products. eChoupal, an initiative of ITC Limited (a large Indian multibusiness conglomerate), addresses this problem by linking rural farmers directly to opportunities to procure produce like soybeans, wheat, coffee, and prawns. Now, farmers are discovering the true market value of their agriculture and aquaculture.

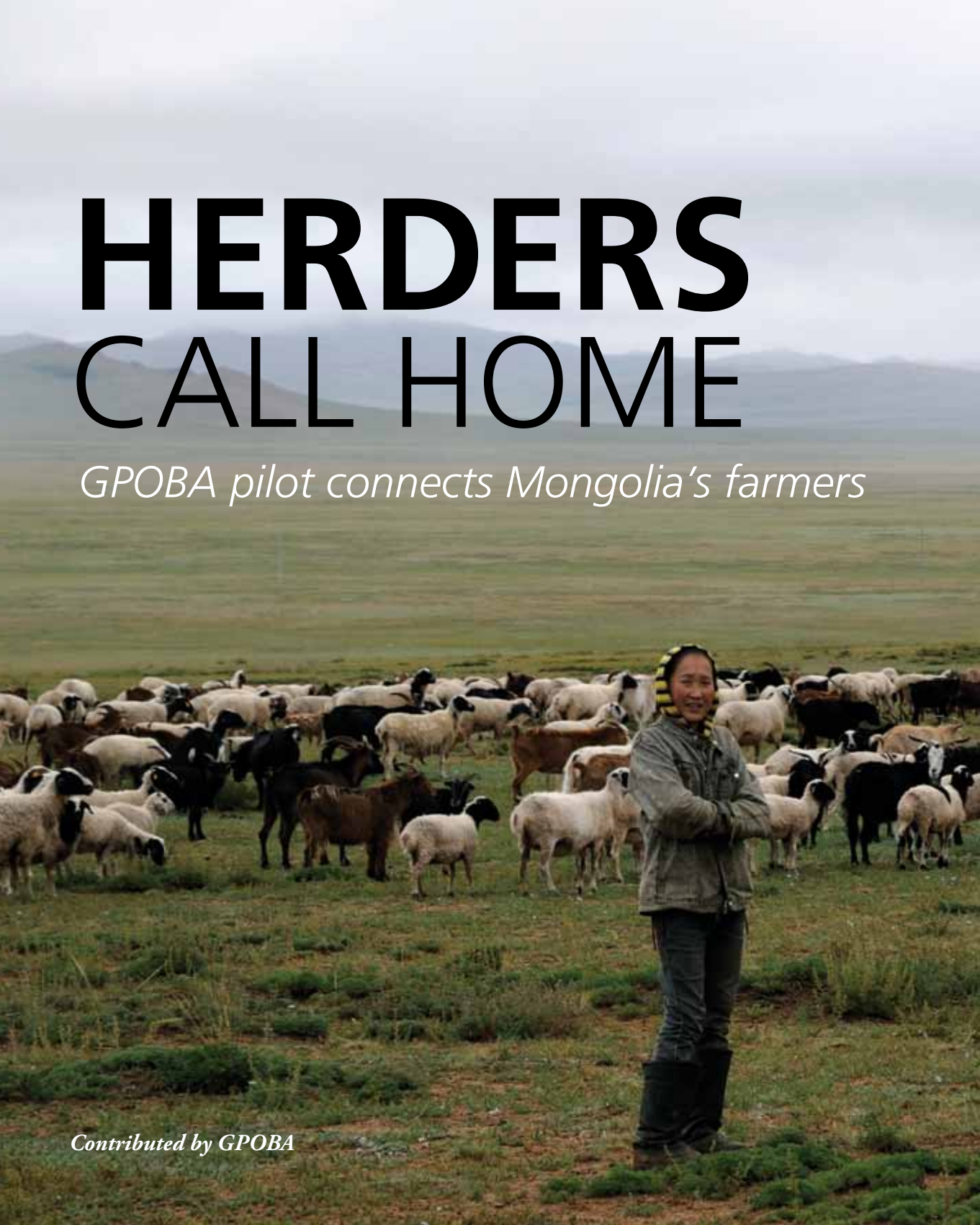
ITC Limited has established over 10,000 eChoupal kiosks, each with a computer and Internet access, across several agricultural regions of the country, allowing farmers to negotiate the sale of their produce online. In the same transaction, eChoupal centers also allow farmers to access online *mandi* (government agricultural marketing centers) and ITC Limited prices, as well as information and recommendations on good farming practices. Farmers use the system when they need to place orders for agricultural inputs like seeds and fertilizers, helping them improve the quality of their produce and ultimately procure better prices.

Each ITC Limited kiosk is run by a *sanchalak*—a trained farmer whose Internet or VSAT connection serves an average of 600 medium- to large-scale farmers in the surrounding villages. The *sanchalak* bears some operating cost, but in return earns a service fee for each e-transaction done through his/her eChoupal. ITC plans to scale up to about 20,000 eChoupals, covering 100,000 villages in 15 states and servicing 15 million farmers.

Excerpted from Strengthening Agricultural Extension and Advisory Systems: Procedures for Assessing, Transforming, and Evaluating Extension Systems, *edited by Burton E. Swanson and Riikka Rajalahti. Washington, D.C.: The World Bank, 2010.*

HERDERS CALL HOME

GPOBA pilot connects Mongolia's farmers



Contributed by GPOBA

A Global Partnership on Output-Based Aid (GPOBA)-funded pilot project in Mongolia provided access to modern information and communication technology (ICT) services to over 22,300 herders living in remote, sparsely populated, rural areas of Mongolia. The services have reduced communication costs for these herders, strengthened family ties, improved security and coordination associated with migration and response to harsh weather, increased economic activity, and contributed to more efficient governance and provision of social services.

Mongolia, almost half the size of India, is the world's least densely populated country: 2.8 million people live across 1.5 million square kilometers. Because of the country's vast and challenging geography, the cost of providing rural communications infrastructure is high. Before the World Bank and GPOBA helped to develop and fund Mongolia's rural communication access program, most of the country's ICT infrastructure in rural areas was government owned and controlled, and there was only limited access to poor quality services in rural areas. Private mobile operators were not mandated to provide services to rural areas, which appeared to be commercially unviable. The lack of ICT services affected the rural population in multiple ways, limiting social communication and access to information and education media, and delaying response times in emergencies.

To give Mongolians access to modern ICT services, the World Bank supported the development of the government's Universal Access policy. This included establishing a fund to provide subsidies for the expansion of ICT services into rural areas. The subsequent Mongolia Universal Access Pilot Project, signed in 2006 and completed in 2010, was one of GPOBA's first grant agreements.

In line with the output-based aid (OBA) approach, GPOBA subsidies were paid to service providers only after the services (or "outputs") were delivered and verified by an independent expert. The GPOBA-funded pilot was followed by a full scale roll-out financed by the World Banks' International Development Association (IDA) and the Universal Service Obligation Fund of Mongolia.

The World Bank and GPOBA helped Mongolia's Communications Regulatory Commission to manage and finance several "least-cost" subsidy competitions. The recipients of subsidies were private operators responsible for installing and

Photo © Johannes Lundberg

operating the rural voice and Internet services. This approach harnessed the power of the private sector by providing incentives to deliver services in rural areas.

With the infrastructure and services now in place across the country, many more of Mongolia's rural residents are able to communicate easily, and benefit from educational and commercial access to the Internet. It also opens a range of opportunities for the government, private sector, civil society organizations, and development partners to enhance service delivery by using new technologies.

RESULTS

Through its work with the government and the Communications Regulatory Commission, IDA and GPOBA projects financed:

- Mobile base stations to provide mobile phone services to the population of 90 *soum* (district) centers and the surrounding herder areas.
- A network of about 180 satellite public telephones to serve herders in remote areas beyond the reach of the mobile networks.
- Internet services for schools, commercial customers, and Internet cafés in 34 prime *soum* centers.

The project's successful implementation yielded the following benefits:

- All 335 *soums* in Mongolia have been provided with access to mobile voice service, in most cases also enabling a medium-speed Internet service. Although only about 90 *soums* benefited directly from World Bank and GPOBA financed subsidies, a large number of *soums* benefited indirectly as the Universal Access program demonstrated that demand for services in rural areas is significantly higher than originally expected.
- The herder public access network, combined with the mobile services, reduced the average travel distance required to make a call for herders in the target areas to 15 km from 39 km.
- 34 prime *soum* centers have broadband Internet access for public and private users at the same tariffs as in the capital, Ulaanbaatar. Schools are connected at discounted rates, and in all of these 34 communities, people are benefitting from access to public Internet cafés.

NANO GANESH

Nano Ganesh allows smallholder farmers across two Indian states to remotely turn their irrigation pumps on and off using their mobile phones. This GSM mobile-based remote control system, exclusively for use with water pump sets in agricultural areas, makes it possible for farmers to control the pumps from any distance; check an availability of power supply at the pump end; recognize whether the water pump is on or off; and, in some models, get alerts through calls if there is a theft attempt of the cable or pump.

The need for Nano Ganesh arose from the routine problems faced by farmers in operating irrigation pumps. In India and other parts of the developing world, a farmer may have to travel miles to turn on a water pump, and stay on the farm until irrigation is complete before returning—at any hour of the day, often late at night or early in the morning. There are fluctuations in power supply, difficult terrains, weather hazards, and other challenges.

Nano Ganesh requires a mobile connection and phone, along with a mobile modem that attaches to the starter on the irrigation pump. Using the phone, an assigned code number switches the pump's starter off and on, and a particular tone signals the off/on status of the pump and the electrical supply at the pump location. Currently, there are over 10,000 installations across the operational states in India. The application was developed by Ossian Agro Automation.

Photo © IRRI Images

Storage solutions

A ready role for PPPs

By David McKee

Some governments have responded to the unprecedented food price spikes of recent years by increasing the stocks of grain that they hold as strategic reserves. For such policy initiatives to best enhance food security, the expanded cereals stocks should be contained in modern bulk storage and handling systems that will minimize losses in storage, lower operating costs, and allow for efficient management of the grain in storage. Traditional storage of bagged grain in warehouses falls far short of fulfilling any of these criteria. Nevertheless, it is still widely practiced by state grain agencies—especially in South Asia, and to a lesser extent in Southeast Asia and Sub-Saharan Africa.

But private sector grain companies in all of these regions have experience building and operating large-scale, state-of-the-art storage facilities for port installations, inland grain production locations, and at processing plants like wheat and rice mills. Governments should use this expertise, engaging the private sector to build and operate modern grain storages to hold larger reserve stocks, or simply maintain the existing ones more carefully. Public-private partnerships (PPPs) are an excellent vehicle for this.

If properly structured, a PPP for government grain storage can ensure that:

- Precious public funds or borrowing capacity are not tied up in capital construction costs.
- Storage facilities are built at a competitive price using the most suitable technology.
- Government agencies spend limited time on management of stored grain in a large facility.
- Hiring of new public employees, including labor for the expanded grain reserve, is minimized.

- Know-how in grain management and storage technology is transferred from the private sector to government.
- Contracts are structured such that private sector grain is stored in the same facility, enhancing utilization.
- Governments are not stuck with an unattractive asset when policy or market conditions change and grain stocks must be reduced.

LONG-TERM BENEFITS

There are a number of solutions for automated bulk storage and handling of grains. Some involve flat storages, but in most cases vertical silos—steel or concrete—provide the greatest long-term benefits. Infestations from insects, rodents, and birds are prevented, as silos keep them out while allowing for more efficient and less frequent fumigation than required in a warehouse. In addition, effective temperature monitoring is not possible with bagged grains, but is in silos, via cables with sensors suspended from the roof hot spots. With this technique, any point in the grain mass can be readily detected and addressed through efficient aeration, fumigation and/or recirculation of stored grain. Furthermore, filling grain into and discharging from silos are high speed operations. Other benefits include:

- Avoidance of rising costs and potential labor strife associated with large numbers of people loading and unloading bags from trucks and stacking and unstacking them in warehouses.
- Reduction in financial costs and environmental problems associated with the polyethylene fiber bags and wooden pallets used in flat warehouses.
- Reduction of land area devoted to grain storage, as 20 tons per square meter of surface can be put in a silo, compared to about 2.5 tons per square meter in bags in a warehouse.
- Inventory levels in silos can be monitored via computerized systems tracking incoming and outgoing inventory via weighbridges.
- Reduction of pilferage due to sealed and locked silos with automatic controls, while bags of grain entering and leaving warehouses are easily miscounted.

Entrenched, inflexible bureaucracies often have a vested interest in keeping any system as it is, including when it comes to bagged storage of government grain. However, strong, visionary leaders can improve food security for their populations—not just by enacting policies to store more grain, but by storing it more efficiently in modern bulk silo systems created through well-structured PPPs.

For further information: davidmckee59@msn.com.

Photo © Gates Foundation

A problem of plenty

GRAIN STORAGE LESSONS FROM INDIA'S BREADBASKET

Wheat is a staple of basic nutrition in India—from open-flame soft chapati to tandoor-fired crispy roti—and hence is a matter of national importance. The Food Corporation of India (FCI), an undertaking of the government of India, is responsible for distributing wheat from producing states to the rest of the country at subsidized prices to ensure the 330 million poorest individuals access to basic sustenance. Now, as a result of food-security policy reform, rising commodity prices, and bumper harvests in recent years, India is faced with a problem of plenty: how to store the surplus grain. IFC worked with multiple stakeholders to create a storage solution.

By Neeraj Gupta & Jay Lurie

By the end of 2010, India had stockpiled more than 16 million tons of wheat—130 percent higher than its minimum buffer norm of 7 million tons. Between rice and wheat, the stockpile totaled nearly 61 million tons. With only 42 million metric tons of available storage in covered godowns (warehouses), the remainder is stored in makeshift covered area plinth (CAP), or platform, facilities.

Because rice has priority in covered godowns, wheat is largely stored in CAPs, which are susceptible to losses and rotting. With 25.4 million tons of wheat procured in India in FY10 at the then-minimum sale price of 10,800 Indian rupees (Rs) per ton, even a 2 percent loss costs the government nearly $110 million per year.

In Punjab, the breadbasket of India, agriculture contributes almost 40 percent to the state gross domestic product, compared with the national average of 26 percent. Roughly half of the 16 million ton stockpile is stored in Punjab, with 6.5 million tons stacked in CAPs. The government of Punjab and its Ministry of Food and Civil Supplies recognized the urgent need for improved storage of the 6.5 million tons.

Because of Punjab's production capacity relative to the rest of India, FCI is required to procure and distribute wheat to less productive states through the Public Distribution System. FCI offtakes wheat from the government of Punjab's grain procurement agencies and reimburses the agencies for storage costs. Thus, any initiative by the government of Punjab needs the blessing of FCI.

In 2009, the government of Punjab asked the World Bank Group to help resolve the storage gap. IFC was hired as lead transaction advisor to the Punjab State Grains Procurement Corporation (PUNGRAIN) Ltd.

FCI had previously contracted a grain storage silo public-private partnership (PPP) in Punjab through a business model that incorporated transport and logistics in addition to storage. However, the new, simpler silo business plan was a step in the right direction as the higher rental rate PUNGRAIN would pay, vis-a-vis conventional storage, would be offest by the opportunity cost of lost grain from the conventional storage system. Throughout the course of the concession, IFC learned lessons that can benefit other agricultural storage PPPs. These include:

When the subject does not admit that he has a weight problem, refocus the argument.

In December 2011, India's food minister declared that, on FCI's account, "no stock of wheat and rice got damaged due to insufficient storage space." While IFC was anecdotally apprised of losses of grain of up to 20 percent due to poor storage, the team also encountered other statistics, in line with the food minister's statement, that attempted to demonstrate zero losses—and even gains in volume due to moisture. Thus, in proving that the silos PPP represented value for money, IFC could not make an assumption about the actual loss. Instead, IFC illustrated the break-even point of losses where silos would make economic sense. This separated the argument from a debate on "what is the right loss figure?" to "the government of Punjab and FCI should think about reforms if they believe

losses could be over 3 percent per year, either now or in the future."

By multiplying the minimum sale price (MSP) for wheat (FY10 MSP Rs10,800 per ton) by 50,000-ton capacity and the estimated loss from not storing in silos, one can arrive at the estimated fiscal loss. For example, a 1 percent estimated loss would result in an Rs54 lakh ($108,000) opportunity cost gain for silos.

The rate at which FCI was reimbursing PUNGRAIN (Rs890 per metric ton per year) implies an additional cost of the silos PPP of Rs285 per metric ton per year, or Rs142.5 lakh ($285,000) for 50,000 metric tons of storage in Year One. Solving for the breakeven loss (L):

PPP Storage Charge (Rs) – FCI Reimbursement Rate (Rs) = MSP (Rs) x L%

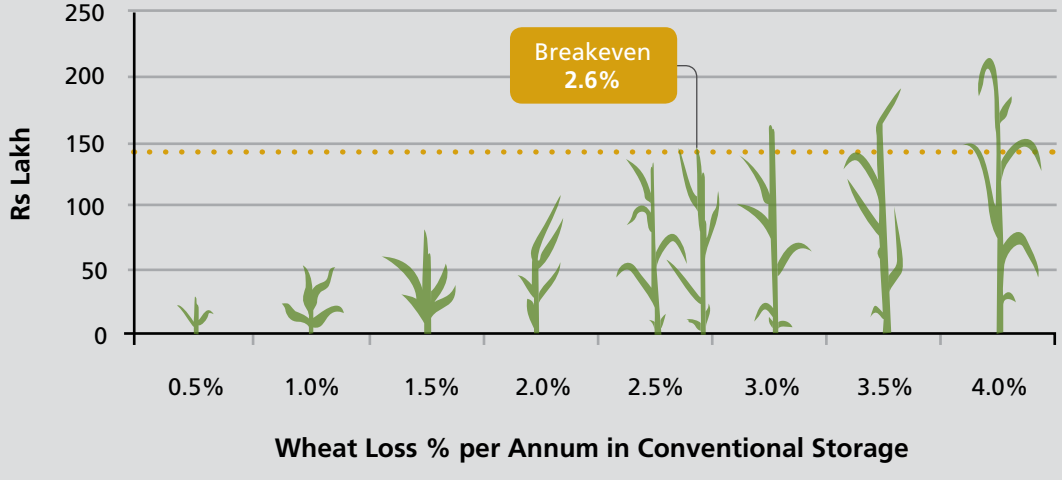
Rs1,175 / ton – Rs890 / ton = Rs10,800 / ton x L%

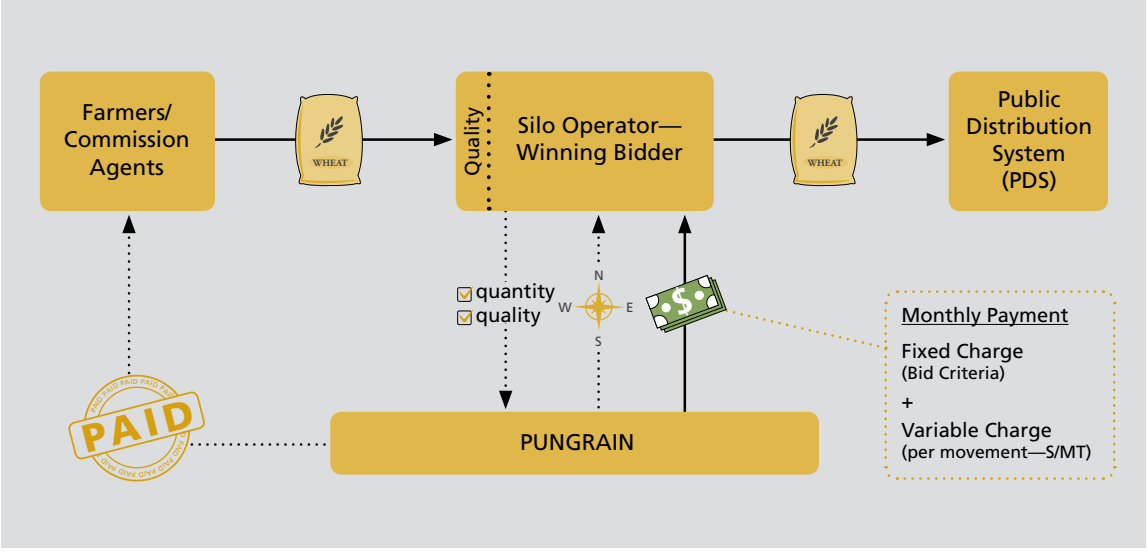
L = 285 / 10,800 = 2.6%

LESSON: With 2.6 percent wheat loss or more, the silos are more economical.

If the roti is not perfectly round, it is still worth eating.

IFC reviewed the entire value chain of the grain procurement and distribution system. In feasibility analysis, IFC debated the merits of a bulk-





handling system compared with a bagged-grain system and presented the findings for a more efficient system to the governments of Punjab and India. IFC acknowledged the political bottlenecks in effecting any change to the system (namely concerning the bagged dispatch and distribution through commission agents), but held to the holistic view of a better system.

The client's singularity of purpose helped focus and rethink phasing of reforms. The final project structure centers on introducing an efficient storage system while allowing for future reforms in transportation and handling.

LESSON: Although it is ideal to strive for holistic system reforms, project-level interventions that achieve some but not all goals can serve as an engine for broader changes.

HIGH STAKES FOR FOOD SECURITY

Private sector solutions for grain storage carry high-stakes implications for food security. Since the start of the project in early 2009, there has been a significant increase in attention by the Indian government to the policies that make storage possible. Agricultural storage is now an eligible sector for Viability Gap Funding, an amendment for which IFC had lobbied to ensure economic feasibility of projects and alleviate the fiscal burden at the state level.

Although the Punjab Silos PPP project represents only a piece of the food distribution value chain, it demonstrates a transformation in policy thinking on how to more efficiently feed a nation. The government of India has now set out to develop a 2 million metric ton pilot of similarly modeled grain silo PPPs throughout India in consumption centers, addressing a gap in the ability of receiving states to store grain beyond the harvest season.

SHARING THE WEALTH

Punjab's storage experience has already begun to benefit other geographies. In neighboring Pakistan, where the topography and grain procurement system are broadly similar to India's, IFC is supporting the governments of Sindh and Punjab (Pakistan) on silos projects representing 600,000 metric tons of wheat storage. By structuring elements like ancillary land development availability and wheat grading, IFC has further improved upon the PPP business model.

Officials from Sub-Saharan Africa and East Asia, where grain losses and rotting are also prevalent, have expressed interest in similar projects. As successes mount, governments and procurement agencies will continue to realize that they can defer large up-front payments on storage facilities and outsource the technical operations to private sector experts.

This article was originally submitted as a SmartLesson, a World Bank Group program which enables development practitioners to share lessons. For more information, e-mail smartlessons@ifc.org.

BEYOND STORAGE

Advice from the Punjab silos' private operator

Know your business

In our endeavor to introduce new and highly mechanized systems, LT Foods Limited was first to introduce silos for rice and paddy storage in India by installing them for our own rice mills. It was a success. In the course of business, we had also seen silos abroad being used for storage of food grains, and adapting our rice model to this purpose enabled us to ramp up quickly to respond to the government's bid.

Finalize the agreement before investing

PUNGRAIN, Punjab's government authority, awarded us the tender and we were declared the selected bidders. On the basis of the government's letter of award, we started working on the project. However, the government then reduced the fixed charges from the awarded amount. We learned from this that it is essential that in public-private partnerships, all documentation, including legal agreements, are finalized and signed by all parties involved before actual on-site work commences and investment by the private party takes place. This will ensure smooth and timely execution of the project and trouble-free operations thereafter.

Factor in all the benefits

Food storage in India isn't just about food storage. It doesn't belong in the storage category at all. It's a food safety issue and a food security issue, and government should give it a higher priority. These types of projects cost more, but they also achieve long-term benefits. For example, silos reduce land use, compared to regular warehouses, so they free up the land, and also reduce labor cost. It's a different kind of investment for the future.

—Vijay Arora, Chairman, LT Foods Limited

LT Foods Limited, a 40-year-old company, is one of the leading processors and distributors of rice and rice-based snacks. Its flagship brand, DAAWAT, is sold in more than 40 countries around the world.

Photo © Vurnman

The grain chain

MANAGING WHEAT IMPORTS IN ARAB COUNTRIES

By Julian Lampietti & Michelle Battat

Arab countries depend heavily on imported food, particularly wheat, leaving them exposed to international market volatility. In total, Arab countries import around 56 percent of the cereal calories they consume, the largest share of which comes from wheat. Some countries in the region import 100 percent of their wheat consumption needs. Population growth, rising incomes, and climate change will increase this dependency. "The Grain Chain," a recent World Bank/Food and Agriculture Organization of the United Nations (FAO) study, identifies three critical steps toward rectifying the problem.

Increase reserves and draw them down according to clear decision rules to ensure availability of supply and to mitigate price volatility

Historical data suggest a strong negative correlation between changes in global wheat stock-to-use ratios and changes in international wheat prices: when the level of available wheat stocks is high, the likelihood of a price spike is lower, and vice versa. Targeted safety nets like cash transfer programs may be much less expensive than storage but they do not necessarily offer that additional security associated with holding physical stocks in food deficit countries. Well-managed strategic reserves can help reduce price volatility by purchasing wheat when prices are low and releasing stocks when prices are high.

Storage capacity in the region averages the equivalent of six months of consumption, and ending stocks (beginning stocks plus production and imports, minus exports and consumption) average four and a half months. Increasing these reserves can provide critical lead time to secure alternative wheat supplies or supply routes during times of crisis, and also offer psychological benefits that may prevent hoarding and pilferage.

Improve logistics for significant cost savings

The study assessed the efficiency and reliability of the supply chain from the unloading port to bulk storage at the flour mill, and found that the average import supply chain transit time for wheat in Arab countries is 78 days, costing around $40 per metric ton. Improved port logistics can drastically reduce these transit times and costs. On average, 29 percent of total wheat

Photo © Gates Foundation

import supply chain costs are incurred at the port. Of these costs, 65 percent are driven by vessel turnaround time, which includes both waiting time in the harbor and the time it takes to unload the wheat once the vessel is at the berth. Long turnaround times impact significantly the cost of importing wheat. Wheat suppliers also consider port logistics when offering a bid price for wheat tenders. Therefore, efficiency improvements may reduce both logistics costs and the cost and freight price of wheat.

Strategic partnerships and hedging instruments can reduce the risk of supply disruptions and price volatility

Regardless of a country's preferred method of wheat procurement, various risk management techniques can improve food security. Countries can develop strategic partnerships with grain traders and key grain exporting countries, in the form of a long-term contract with a global grain trader, or a free trade agreement with a grain exporter.

There may also be advantages to working with neighboring countries to import wheat to the region. A hub-and-spoke model can allow large volumes of wheat to be shipped to a single deep-water port in the region and then distributed to multiple destinations with shallow-water ports.

Countries can also take advantage of a "parcel service" model, whereby smaller countries like Qatar and Bahrain benefit from importing wheat on shared vessels. Physical and financial hedging instruments can also reduce exposure to price volatility and shocks.

Although the Arab world faces a unique set of constraints and risks, this approach is applicable for any other net grain importing country seeking to manage its exposure to import risks, and it is important for grain exporters as well. Arab countries import the majority of their wheat from North America, Western Europe, the former Soviet Union, and Australia; these key grain exporters can better serve the needs of their customers by improving their understanding of the risks Arab wheat importers are facing.

This article was originally submitted as a SmartLesson, a World Bank Group program which enables development practitioners to share lessons. For more information, e-mail smartlessons@ifc.org.

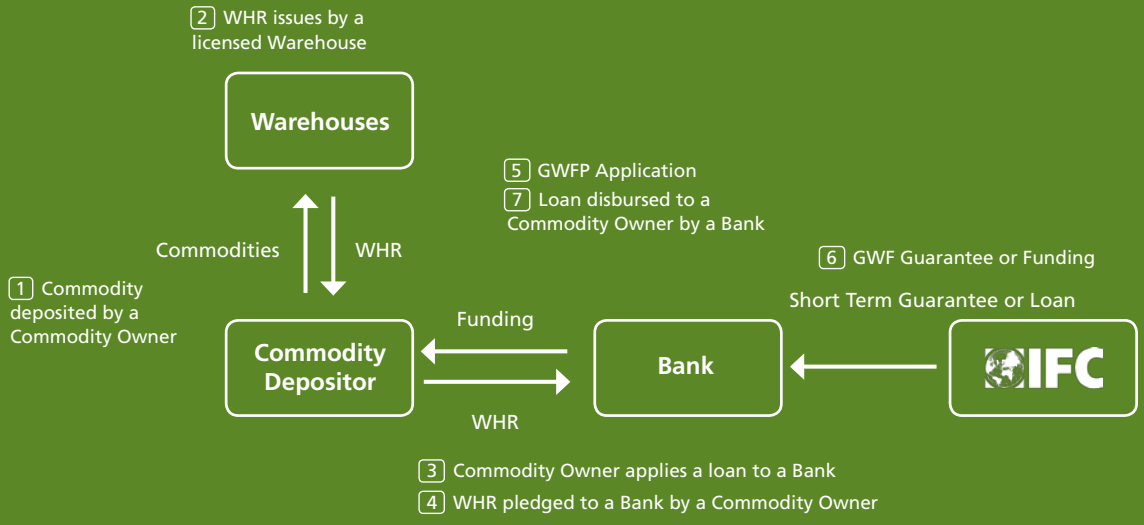
Illustration © Mat Barrand/istockphoto

RECEIPTS THAT PAY

Warehouse receipts as collateral

By Makiko Toyoda

Access to finance is critical for farmers, agricultural traders, and exporters in emerging markets. Agricultural commodities are stored in warehouses before they are shipped, and often, the farmer, trader, or exporter storing the production is forced to sell early at suboptimal prices to meet urgent financial needs. If they don't sell, they consider other short-term solutions to meet their financing needs, such as expensive overdraft credit lines.



Warehouse financing is a lending technique that provides access to finance secured by the commodities deposited in the warehouses, through use of the warehouse receipt (WHR). It allows farmers flexibility in the timing of their sales by enabling easy refinancing for the goods in storage. Warehouse financing is particularly beneficial for small farmers and SMEs who are often unable to secure their borrowing requirements because of insufficient conventional loan collateral.

IFC has successfully applied this technique through its Global Warehouse Finance Program. The program facilitates pre-export warehouse financing through local banks by providing liquidity for on-lending or risk mitigation solutions. To strengthen warehouse financing, IFC offers advice to local banks, sensitizing them to the use of WHR as collateral for short-term loans and teaching them to value the commodities and structure appropriate financing. IFC also advises the host country governments in reviewing the existing legal environment for WHR financing, and provides recommendations including licensing systems, inspection systems, market information systems, and auction market systems.

Incubating OPPORTUNITIES

AgDevCo founder Keith Palmer on creating infrastructure for profitable agriculture

Interview by Alison Buckholtz

Keith Palmer is the Executive Chairman and principal sponsor of AgDevCo, an agricultural development company that identifies, develops and arranges financing for sustainable agricultural and agri-processing business opportunities in Africa. AgDevCo also arranges finance to develop agriculture-supporting infrastructure such as irrigation, feeder roads, and bulk storage.

There is enormous unexploited agricultural potential in Africa, but the paradox is that Sub-Saharan Africa is a net importer of food. Why?

Huge areas of land in Sub-Saharan Africa have great potential in the sense that the soil and climate conditions are fine, and much of this land is not farmed today. But there are three key constraints preventing exploitation of this potential: infrastructure, credit, and management expertise. Each of them compounds the problem caused by the others.

First, many areas do not have the infrastructure needed to support profitable agriculture. No electricity is supplied to the farm gates to drive the machinery, and although water supplies in local rivers and aquifers are plentiful, there is no piped water to the site so you can't irrigate. In these hot climates, with unreliable rainfall, irrigation is often essential. In many cases there are no all-weather feeder roads to get the agricul-

tural produce to market or to storage facilities to minimize post-harvest losses. Once the infrastructure is in place, farmers can make money. But if they have to incur the cost of installing infrastructure, it destroys the profit potential.

Second, you can't farm without access to credit to fund working capital and fixed assets. It is very difficult to secure funding for early-stage agricultural ventures because the potential is not yet proven. But you need the funding to be able to demonstrate that you can generate high yields and productivity. It's a vicious circle.

Third, in many African countries, there is very little local knowledge of how to farm in African conditions. Accessing experienced, capable managers that funders can trust is difficult and very expensive. We partner with local small and medium-size farmers to develop their skills, but these skills are developed over time, learning from experience, so pay-off is slow.

Those are serious barriers. How does AgDevCo lessen the impact of these impediments?

We access concessional capital from government donors and private foundations that see the importance of developing agriculture in Africa. We invest to reduce the costs and risks facing small and medium-size African farmers; we arrange credit facilities that can be accessed by them; we arrange funding for the necessary infrastructure. Our aim is to incubate opportunities to the point where third-party capital can be attracted to invest in them on a larger scale.

All our ventures must have clear potential to be socially, environmentally, and financially sustainable. When the businesses reach maturity we sell our stake and reinvest the proceeds doing "more of the same."

How does that encourage private investors?

Once private investors see that the infrastructure will be there, that credit is available and some of the risks have reduced, they are much more willing to invest in the growth of these businesses. However, it's a gradual process; once early investors have proven that is possible to get the high yields and to make money, other investors will follow and invest without the type of support provided by AgDevCo.

You call this a "slow and difficult" business. What keeps you motivated?

What motivates the people in AgDevCo is a strong belief that our approach, catalyzing sustainable agribusiness investment by the private sector but generating large benefits for smallholder farmers, is the right way forward. We've been in the game long enough now to begin to see success – that is, sustainable, profitable ventures that would not exist without our involvement. There is nothing that motivates a team as well as being part of a novel new approach and seeing that it actually works.

Are the local people behind these efforts as well?

Absolutely. In all countries where we are actively involved—Zambia, Mozambique, Tanzania, and Ghana—the host governments and the local people in the vicinity of the ventures are our strongest supporters. I think the reason is that we work closely with people on the ground, and rather than write reports recommending what should be done, we get on and do it. The irrigated agriculture project in Zambia has involved lengthy engagement with the local smallholder farmer community and with local councils and MPs, as well as the national government. In the other countries where we're active, we've got local partners who are excited about our reputation and get things done on the ground to move quickly. But I don't want to exaggerate, we've only been going four years and this is a long game.

It's a long game, but the food security crisis could last decades. What must be done?

On the consumer side of the food security issue, here's the problem: a large amount of basic food consumed in urban areas among the rapidly growing urban population is imported, and the flow is controlled by a small number of distributors who have quite high margins. If we can increase the production of food within Africa, we're reducing the transportation costs, and by increasing the supply we can bring down prices to urban consumers.

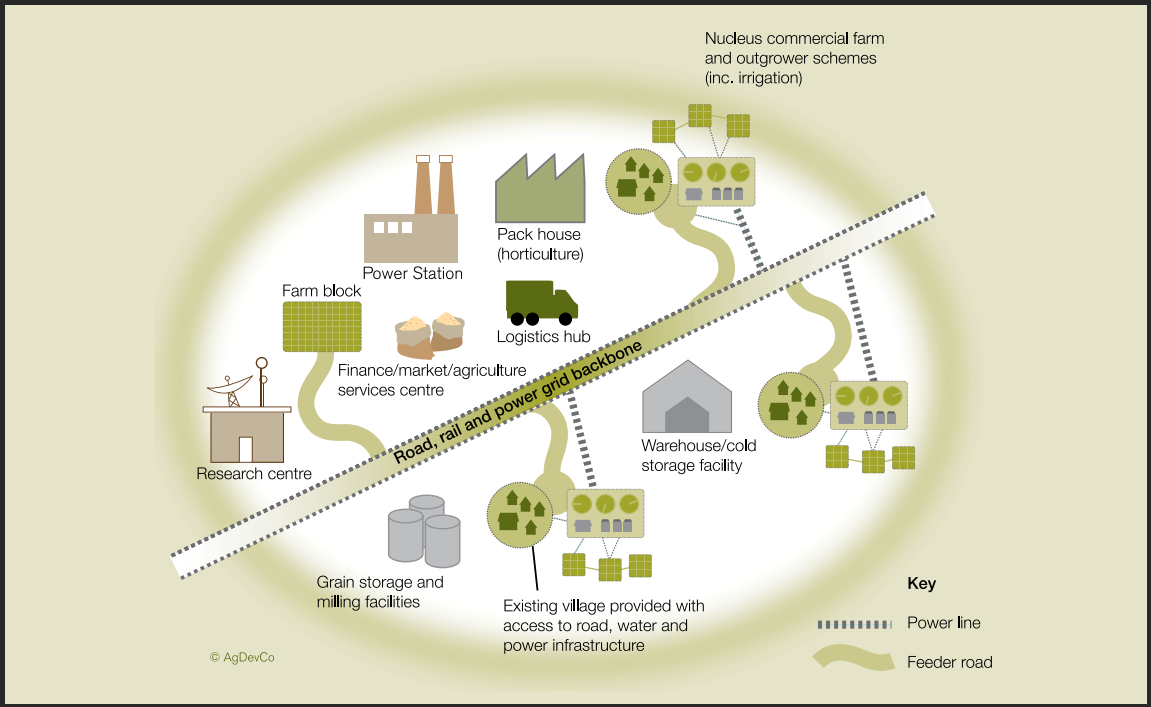
On the producer side, the vast majority of people who live in Africa are small farmers. They have a poor diet, mostly maize, and lack the money to buy protein. By increasing their productivity, small farmers can increase their incomes, improve nutritional intake, and therefore improve their health. For example, irrigation allows them to double crop and sometimes triple crop. They can diversify their crop mix, and therefore increase their protein intake. Irrigation also increases resilience to climate volatility. By focusing on removing the constraints to higher productivity, production, and sales from Africa to domestic, regional, and international markets, we're addressing the food security issue on both the supply side and the demand side.

Is AgDevCo's approach a replicable model?

There are a number of other sectors, including forestry and healthcare, where the technical toolkit we're using in the InfraCo and AgDevCo businesses could be adapted with equally positive results. There is no question in my mind that there's huge replicability across geographies as well as across sectors.

Where would you like to see AgDevCo in 10 years?

In 10 years I hope we would have demonstrated a model that works better than the other [grant-funded] model, which hasn't worked very well at all. I don't mind if others steal our ideas and copy us. That's the point.



AGRICULTURAL CLUSTER PPP FLOURISHES

Agricultural clusters require simultaneous and properly coordinated investment by the public and private sectors. The Southern Agricultural Growth Corridor of Tanzania (SAGCOT) is another public-private partnership which aims to boost agricultural productivity in Tanzania and the wider region. SAGCOT will promote clusters of profitable agricultural farming and services businesses, with major benefits for smallholder farmers and local communities.

SAGCOT's main objective is to make smallholder farming a profitable activity by incentivizing stronger links between smallholders and agribusinesses via:

- "Hub and outgrower" models
- Linking farmers' associations to markets
- Irrigated farm blocks with professional management

SAGCOT is being implemented by a group of private sector agribusiness companies, both local and international, in partnership with the Government of the Republic of Tanzania and donor organizations. The concept and investment strategy were developed by a working group within the Agricultural Council of Tanzania (ACT), with assistance from AgDevCo and Prorustica.

Photo © D. Mowbray/CIMMYT

Catalytic capital

Powering Africa's agricultural potential

Agricultural clusters like the Beira Corridor, matched with catalytic capital, have the potential to transform Africa's agricultural potential into a reality.

By Chris Isaac

Zacharia Elises' maize stands tall on his 1.5 hectare plot in Catandica, central Mozambique. He expects to harvest over five metric tons this season, which is more than three times the average yield in the area. He is linked to the innovative extension and marketing company, Empresa de Comercialização Agricola (ECA) which provided him with seeds, fertilizer, and planting advice. One-third of ECA is owned by local farmers, so Elises will share in any profits generated from processing maize and other products for sale to the World Food Programme and a local brewery.

ECA sits at the middle of an economic cluster of related agricultural businesses. The seeds were sourced from Phoenix Seeds, a company established in 2011, which aims to provide reliable and locally-adapted seeds at an affordable price.

ECA's milling operations produce maize meal for food consumption, starch for a local brewery, and nutritious bran that is highly sought after by local livestock farmers such as Guita Poultry and Tsetsera Pigs. These farm businesses, in turn, are expanding rapidly to take advantage of growing local demand for high-quality meat products.

All of these agricultural businesses have received investment from the Catalytic Fund, the financing arm of a pubic-private partnership launched in 2010 called the Beira Agricultural Growth Corridor (BAGC). Supporters of the BAGC include the Mozambican government, local and international agriculture businesses, the United Kingdom's Department for International Development (DFID), and the Norwegian and Dutch governments.

KICK-STARTING CLUSTERS

The Catalytic Fund, managed by AgDevCo, aims to kick-start clusters of profitable agricultural businesses in central Mozambique, in an area with reasonable infrastructure and rapidly developing new markets. Other investments made by the fund to date involve bananas, avocados, mangos, sesame, sunflower, and honey. AgDevCo is also developing irrigated farm blocks for use by local farmers, taking advantage of Central Mozambique's ample water resources.

Banks will rarely lend money to start-up or early-stage agriculture businesses. Agriculture accounts for 30 percent of Africa's economy, but less than 5 percent of bank lending goes into the sector. The Catalytic Fund steps into the gap, providing "social venture capital" on attractive terms to local entrepreneurs who have a solid business plan and the capacity to execute it effectively. The level of subsidy depends on the extent to which the business guarantees direct benefits for smallholder farmers and local communities. As well as capital, the $20 million fund provides hands-on management and business support. Where necessary, it can also help mobilize targeted grant funds for small farmer development programs.

By taking out many of the front-end costs and risks of getting a new agriculture business started, the Catalytic Fund aims to unlock large volumes of new private investment. Numerous private equity and debt funds are being raised for African agriculture but there remains a severe shortage of investment-ready opportunities. Catalytic capital helps create a pipeline of interlinked and highly scalable investments that are ready to take on commercial debt and equity. When the fund sells its stakes in a project, any profits are recycled into developing new local businesses.

REPLICATING RESULTS

The Catalytic Fund is proving to be catalytic in more than one sense. Frustrated by the slow pace of investment in agriculture, and influenced by what is happening in Mozambique, a number of African countries including Ethiopia, Ghana, Rwanda, and Tanzania are now setting up cluster initiatives and launching catalytic funds. The major donor agencies—the World Bank, USAID, DFID, and others—have backed calls by African governments to do more to develop the local private sector, which is the backbone of any agricultural economy. A promising new pan-African initiative, Grow Africa, endorsed by the African Union and the World Economic Forum, is supporting the agenda.

For a long time people have talked about Africa's agricultural potential; too often expectations of a take-off have failed to materialize. Perhaps this time the stars are aligned more favorably. The availability of catalytic capital, the focus on developing profitable clusters of farms in areas with reasonable infrastructure, the renewed investor interest in agriculture—all are necessary conditions for profitable and sustainable agriculture growth. Replicating these types of approaches across Africa will provide more opportunities to entrepreneurs like Elises, standing proud beside his maize, to become successful commercial farmers.

Marketing FARMERS

Interview by Jeanine Delay

Nina Planck launched the modern farmers' market movement in 1999 when she opened the first farmers' market in London, which led to the founding of London Farmers' Markets, a U.K. company that now runs 18 farmers' markets. After returning to the U.S., she was briefly director of Greenmarket, the largest group of farmers' markets in the United States, before opening Real Food Markets in New York City in 2006. Her website, www.realfood.info, builds on her expertise of marketplace distribution of farm-fresh food.

Photo © London Farmers' Markets

What inspired you to start the farmer's markets in London in 1999?

I was looking for fresh, local food and I could not find it. In London supermarkets you can get snow peas from Zimbabwe, peppers from Holland, and apples from New Zealand, but it is hard to find produce that is both fresh and local. No one there had yet revived the traditional producer-only market—that is, run solely by producers, with food from a specifically defined geographical area.

Why was local food missing from the marketplace?

Farmers in England faced the same challenges that all farmers face in the global market for agricultural products and food. They are not big enough to sell to the distributors and retailers. Their produce is not homogeneous or consistent enough—for example, their apples might not be large or blemish-free, or their cucumbers are curvy and not straight. Farmers' prices are also too high for distributors and retailers to get their cut. Margins are notoriously low in this industry.

How did you first launch the farmers' markets?

I looked for a site and began to call farmers. I started with farmers and food producers that I thought would be open to direct marketing—retailing directly to customers through farm stands or other means, and also growing things that consumers want rather than what distributors or big retailers ask for. It was not widely done in England at that time. That way, I found 16 producers for my first market, and it was an overnight success.

Are the issues faced by small farmers in the U.S. similar to those faced by small farmers elsewhere?

Yes. Many regional cooperatives and other forms of regional coordination are missing in the American food market. The model espoused by American agricultural universities has been for farmers to get big or die. I think this should be reversed. We should be encouraging multiple small farms to flourish.

Then the role of the manager is key to bridging the gap between farmers and customers?

Exactly. This is something that supermarkets were not doing for eaters and that distributors were not doing for farmers. There are too many farmers and they are too dispersed. Food producers need a very consistent supply chain and that requires either a large grower or many small growers which are quite tightly organized, both in terms of logistics and quality control.

What's your advice for a government entity that would like to establish farmers' markets?

The appropriate public contribution for farmers' markets is space, because farmers' markets don't have the money to compete with real commercial applications like parking lots. Then public entities should seek a professional management team for the market and provide appropriate signage and publicity, as well as set standards so that they know they will be getting a high-quality market.

I believe the management should be private, whether or not the market is for-profit, as mine are. Then government officials need to step back and let managers do their thing.

FAST FACTS

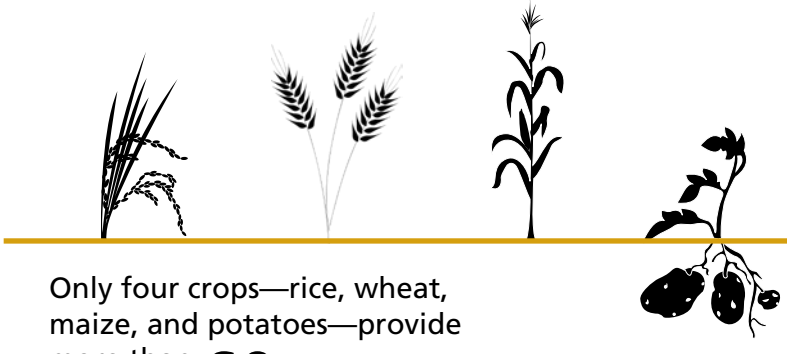
The world will need to raise its food production by **60** to **70%** to feed more than **9,000,000,000** people by 2050

The amount by which irrigation typically improves farm yields: **DOUBLE**

Average number of hectares of cultivated land needed to feed one person in 1961: **0.45** HECTARES

in 2006: **0.22** HECTARES

Post-harvest grain losses in Sub-Saharan Africa are estimated at **$4** BILLION a year. This could feed **48,000,000** people



Only four crops—rice, wheat, maize, and potatoes—provide more than **60%** of human food energy needs.

Courtesy Food and Agriculture Organization of the United Nations.

“A hunger crisis is not solely an act of God. It is a complex problem of infrastructure, governance, markets, education. These are things we can shape and strengthen.”

—Hillary Rodham Clinton,
U.S. Secretary of State

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