



Enabling poor rural people
to overcome poverty

2012
Governing
Council

Sustainable smallholder agriculture: feeding the world, protecting the planet

Proceedings of the Governing Council Events

In conjunction with the Thirty-fifth Session
of IFAD's Governing Council, February 2012

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Sustainable smallholder agriculture: feeding the world, protecting the planet

Four fifths of the developing world's food is produced on about half a billion small farms.¹ Smallholder farmers live and earn their livelihoods in the world's most ecologically and climatically vulnerable landscapes – hillsides, drylands and floodplains – and rely on weather-dependent natural resources. They are at the forefront of the world's efforts to deal with climate change and environmental degradation. Through a mixture of ingenuity and toil, these women, men and young people manage to feed about one third of humanity despite the enormous difficulties they face. Yet they are themselves among the poorest and least food-secure people on earth.

As the world belatedly turns its attention to the pressing issues of environmental degradation, resource scarcity and climate change, the role of smallholder farmers in making food production sustainable is beginning to take its rightful place at centre stage in discussions about agriculture, rural development and food security, and about sustainable development more generally.

Farmers face two stark realities over the next four decades: they must contribute to fulfilling an estimated 60 per cent increase in demand for agricultural production by 2050² to feed a growing, more urbanized population, and they must do so facing growing water scarcity, climate change and the likelihood that arable land in developing countries will increase by no more than 12 per cent. That monumental challenge can be met only if sustainability – meeting present needs without compromising the ability of future generations to meet their needs – is the foundation of approaches to food security and poverty reduction in every country and every community. No other strategy has a hope of feeding current populations while protecting and restoring the natural resources that future generations will need to support their livelihoods.

This was the theme of the 2012 Governing Council meeting of the International Fund for Agricultural Development (IFAD), which took place 22-23 February in Rome. The IFAD Governors, many of whom are ministers of agriculture, participated in a day and a half of panel discussions focused on developing innovative ways to address the many overlapping issues regarding the promotion of sustainable smallholder agriculture: research and development, finance, governance, partnerships, technology and the active involvement of farmers and other rural residents themselves. The events included:

- Two high-level panel discussions featuring speakers representing the diverse fields that are crucial to solving this complex challenge: governments, agricultural research centres, farmers' organizations and the private sector. The first panel discussion, 'Feed the world, protect the planet', addressed the challenges facing smallholder farmers and some of the innovative responses to them. The second panel discussion, 'From words to actions: Creating a sustainable future for smallholder farmers', looked for concrete solutions to help smallholder farmers increase their productivity in a sustainable way.

1 FAO, Save and Grow, 2011, chapter 1, available at www.fao.org/ag/save-and-grow/en/1/index.html. Around 97 per cent of agricultural holdings in developing countries are below 10 hectares (FAO Agricultural World Census).

2 Graziano da Silva, J., Director-General of the Food and Agriculture Organization of the United Nations (FAO), keynote address at The Economist Conference: Feeding the World in 2050, Geneva, Switzerland, 8 February 2012.

- A conversation with entrepreneur and philanthropist Bill Gates on how to increase agricultural productivity, with an emphasis on the role of new developments in science and technology.
- A conversation with the chief executive officer of the Food, Agriculture and Natural Resources Policy Analysis Network, Lindiwe Majele Sibanda, on what promise the upcoming Rio + 20 United Nations Conference on Sustainable Development might hold for agriculture.
- Four side events focusing more narrowly on approaches in the regions where IFAD supports programmes on the ground. These discussions addressed:
 - The pros and cons of conservation agriculture, a specific approach to increasing productivity while preventing and redressing soil degradation, focused on sub-Saharan Africa
 - The potential of sustainable community management of natural resources, emphasizing the forestry sector in Latin America and the Caribbean
 - Crop varieties for the future that will be resilient to climate change, and the importance of increasing farmers' participation in developing them
 - The role of the diaspora in green agriculture investment, focused on how to support migrants' investment in sustainable rural and agricultural development initiatives.



Social media goes mainstream

Social media is no longer a side event for technology lovers – it has become a potent mainstream communication tool for international development. By allowing people to participate in events from far outside the room, it brings in the views of those who have been kept out of meetings due to location or poverty or disability – the very people these events are typically meant to help. Using the webcast to follow the Governing Council panel discussions, distant participants contributed to the conversation in real time. Their 'tweets' were shown on a screen in the meeting room so the audience could read them, and the moderators incorporated them into the conversation.

Social media influences not just the quantity of the audience but the quality of the conversation. "Tools like Twitter and Facebook are more than message boards – the comments enrich the conversation," said IFAD Web and Social Media Manager Roxanna Samii. "The answers to questions create more questions. And the questions coming from social media are more direct and more controversial. They ask things that people in the room would like to ask but feel they can't. Tweets and Facebook messages also bring in wisdom from the outside world."

During the Farmers' Forum that preceded the Governing Council meeting, for example, representatives of farmers and agrobiodiversity groups around the world were following the debate on Twitter and contributing ideas. Said Ms Samii, "During discussion of the outcome document, the youth group Global Youth Innovation Network tweeted, 'Hey, where are the young people?' We told them, 'Just wait, that part is coming.'"

The snowball effect also influenced IFAD coverage of the Governing Council meeting. Social media made its first appearance at the event two years ago, with just three or four participants. This year 31 staff members were involved in tweeting, writing blog posts and posting to IFAD's Facebook page.

For reference see:

www.ifad.org/events/gc/35/panel.htm

<http://ifad-un.blogspot.it/search/label/ifadgc>

The audience also heard from Mr Mario Monti, Prime Minister of Italy; Mr Paul Kagame, President of Rwanda; Mr Andrea Riccardi, Italian Minister for International Cooperation and Integration; and Mr Joseph Nyuma Boakai, Vice President of Liberia. (For a list of speakers and panellists, please see annex 3.)

In addition to the 660 people in the room during the sessions, the webcast of the events had 91,000 views, the 5,000-plus 'tweets' produced by the Governing Council Twitter campaign reached over 17 million people and more than 6,000 people read blog posts about the events. Panel moderators enlivened the events with questions and comments from the Twitter audience (see box 1 for details).

The pages that follow draw on the rich discussions that took place at the Governing Council meeting. The creative and thoughtful ideas that emerged offer food for thought on how to ensure that the Rio + 20 conference takes up the issue of strengthening the crucial role of smallholder farmers in feeding the world while protecting the planet.

The challenges of smallholder farmers in the 21st century

The smallholder farmer at the opening of the 21st century should be at the forefront of the world's efforts to increase agricultural productivity and deal with environmental degradation, poverty and child labour. The women and men who own or work on about 500 million smallholder farms make critical contributions to feeding a growing population in their communities and countries. But they do so with scarce resources, sometimes in precarious environments, and their livelihoods are threatened by climate change impacts for which they bear minimal, if any, responsibility. Providing them with the support they need to thrive in this challenging environment is essential if they are to increase their production capacity, strengthen their resilience and protect the world's increasingly fragile natural resources. It will also create dignified and decent-paying employment for farmers and other residents of rural areas.

The developing world's small-scale farmers have long fed their families and cared for the natural resources on which their lives and livelihoods depend. Their knowledge is integral to increasing productivity while protecting the planet. But their ability to produce more and to become competitive market suppliers is limited by their long-standing lack of access to the resources needed to enhance productivity: credit and other financial products, new and more productive seeds and technologies, education and training, secure land tenure, access to markets and more powerful partnerships with private and public entities.

Key to expanding productivity is transformation of smallholder farming into sustainable small-business farming. "Simply put, agriculture is a growth industry," IFAD President Kanayo F. Nwanze told the Governors in his opening remarks. "Our job is to make it possible for smaller farmers, and everyone living in rural areas, to be part of this growth industry by realizing their potential. When these farmers are recognized as small entrepreneurs, when they have access to better resources and incentives, and when they have access to markets and an enabling environment, they can transform their communities, their own lives and indeed the world."

This transformation to a more business-oriented smallholder agriculture needs to be complemented by a climate-smart farming approach. The result would be a thriving rural economy offering a livelihood for those who choose to stay in rural areas. It would make use of new technologies and offer rewarding new opportunities, especially for the emerging generation of young adults, of whom 75 million were struggling to find jobs at the end of 2010.³ With almost one third of humanity living and working on the world's small farms, a turnaround in this sector would change the world. As Italian Prime Minister Mario Monti reminded the participants in his keynote address, "Agricultural development is two to four times more effective at reducing hunger and poverty than any other sector."

It could be even more effective with removal of gender inequalities. Globally around 43 per cent of agricultural workers are women, yet in the developing countries they have very limited access to land. In North Africa and West Asia women represent fewer than 5 per cent of

³ ILO, Global Employment Trends for Youth: 2011 update.

all agricultural land holders,⁴ while in Latin America they represent only 15 per cent.⁵ Across the world women have less access than men to productive resources and opportunities – land, livestock, labour, education, technology and extension and financial services.⁶ Collectively the price paid for this gender gap is hunger: If women had the same access to productive resources as men, they could increase yields on their farms by 20 to 30 per cent. This could raise total agricultural output in developing countries by 2.5 to 4 per cent, which in turn could reduce the number of hungry people in the world by 12 to 17 per cent.⁷ On an individual level, the price to each woman deprived of these resources is the lost opportunity to earn enough income to have choices for herself and her children.

“This is an incredibly telling example of how equity, justice, equal access, equal opportunity does have – or we should say, could have – huge efficiency implications,” said Prime Minister Monti. “A policy for women is really a policy for growth.”

Women are at the greatest disadvantage, but all smallholder farmers are facing challenges – some new, some long-standing – that prevent them from ramping up their output in a climate-smart way:

- **Declining productivity.** The productivity gains of the 1960s and 1970s, spurred by the green revolution, have declined, and concern is growing about its downsides: excessive and inappropriate use of fertilizers and pesticides; pollution of waterways and aquifers; salinization and declining groundwater; and human pesticide poisoning and rising rates of cancer.⁸ Africa, largely bypassed by the green revolution, faces different problems. Its productivity is hampered by the lack of irrigation (it covers only 4 per cent of cropland in Africa⁹), fertilizers and improved seed varieties. Stressed by drought and growing population pressure, almost three quarters of Africa’s agricultural drylands are degraded to some degree.¹⁰ After years of growth, investments in the agriculture sector by both national governments and the international community began to decline in the 1980s, followed by predictable declines in productivity. Mr Akinwunmi Ayo Adesina, Minister of Agriculture for Nigeria, reminded the Governing Council audience that Nigeria was a major world player in agriculture in the 1960s and 1970s but is now one of the largest importers of rice in the world.

Another component of declining productivity is the shrinkage of farm size over the past 50 years.¹¹ In a number of countries of East Africa, the average farm today amounts to less than 0.3 hectares per capita.¹²

- **Insecure land tenure.** Smallholder farmers face weak institutional environments and, in some cases, unjust laws and practices regarding land ownership and tenure. This makes it difficult for them to approach farming with a long-term perspective, discouraging farmers from prioritizing sustainable approaches to farming. It is a particular impediment for women, indigenous people and young people, who are hampered by discriminatory laws and inheritance rules as well as cultural norms and practices. In India, Nepal and Thailand, for example, fewer than 10 per cent of women farmers own land in their own right.

4 The holding may be owned, rented or allocated from common property resources and may be operated on a sharecropped basis. FAO, *The State of Food and Agriculture 2010-2011*, p. 23.

5 Ibid.

6 Ibid., p. 6.

7 Ibid., p. 5.

8 IFAD, *Environment and Natural Resource Management Policy*, 2011, p. 17.

9 IFAD, *Rural Poverty Report*, 2011, p. 150.

10 IFAD, *Environment and Natural Resource Management Policy*, 2011, p. 18.

11 IFAD, *Rural Poverty Report*, 2011, pg. 89.

12 IFAD, *Policy on improving access to land and tenure security*, p. 7.

In Kenya, where women provide 70 per cent of agricultural labour, only 1 per cent of them own land.¹³ Lack of secure tenure also hinders growth: A 2005 World Bank study of 73 countries found that those with more equitable initial land distribution achieved growth rates two to three times higher than those without.¹⁴

- **Insufficient infrastructure.** Most smallholder farmers produce little more than they need to feed their families, but those who manage to grow a surplus face more obstacles in selling it. To make real money, farmers need to access value chains and urban markets. They also need the capacity to time their market entry to coincide with demand so they can gain higher prices. But there is little secure storage for surplus output, and the lack of roads and transport for getting product to distant markets prevents farmers from taking advantage of demand and participating in value chains that could raise their incomes. Lack of storage and transport infrastructure also contributes to spoilage – and thus to the loss of one third of all food produced (about 1.3 billion tons) every year, during or after harvest or through commercial chains. Andre Leu, President of the International Federation of Organic Agriculture Movements, used a hypothetical example to point out to the audience what this means for farmers. “If you grow food in Uganda, your product might be in the back of a truck for a week, two weeks, in the monsoon season three months, before you can get to a port in Kenya,” he said.

- **Inadequate education and training.** Basic education in rural areas needs urgent attention. It is often biased against agriculture, failing to support would-be farmers’ aspirations. Nor do schools typically teach young people about agriculture in the context of sustainable development or about its links to a community’s development aspirations.

People in agricultural communities pass down knowledge and farming methods from generation to generation. Traditional and indigenous knowledge has played a crucial role in helping poor rural people manage natural assets and adapt to climate change, but it is no longer sufficient. Farmers need up-to-date vocational training to respond to the realities of the 21st century and to learn new farming methods. These need to blend traditional knowledge and practices with modern scientific approaches and link local knowledge with institutions that will help farmers ramp up productivity while protecting their natural assets.

Along with young people and indigenous groups, women have been especially deprived of access to information and training. Only 5 per cent of agricultural extension services are provided for women farmers.¹⁵ Women’s access to vocational training needs to be vastly expanded if women are to take their rightful place as full-scale participants in the small-farm sector.

- **Lack of access to new seeds and technologies.** Despite the broad progress researchers have made in creating climate-tolerant crop and seed varieties, adoption of these technologies remains low. Over the past 35 years the International Center for Agricultural Research in the Dry Areas (ICARDA) has released 880 new varieties, 95 per cent of them in developing countries. But during one of the Governing Council side events, ICARDA Director General Mahmoud El Solh pointed out that adoption rates are mixed: 65 to 85 per cent of some varieties have been picked up while others are virtually ignored. Of the 100 varieties released by the International Rice Research Institute (IRRI) in the Philippines, farmers have adopted only around 20, said IRRI Social Scientist Digna Manzanilla at the same event. Making sure smallholder agriculture can benefit from these

13 IFAD, Policy on improving access to land and tenure security, p. 5.

14 Deininger, K., 2003, Land Policies for Growth and Poverty Reduction. World Bank Policy Research Report, World Bank.

15 FAO, Agricultural Support System, available at: www.fao.org/docrep/005/y3969e/y3969e05.htm.

more productive varieties requires, among other things, greater collaboration between researchers and farmers. It also calls for robust incentives for farmers to adopt improved seeds, breeds and technologies, for instance through enhanced market integration and access to financial services and risk mitigation tools. It is important to note that planting new crop varieties in place of traditional ones can result in a loss of crop biodiversity where there is no system to conserve germplasm. Preservation of biodiversity is important for food security as well as for climate change adaptation.

- **Inadequate financial services.** Smallholders and other rural residents have diverse needs for financial services. In addition to funds for investment in farming, they need services to help them deal with irregular and unpredictable income, cope with shocks and manage risks. As the rural finance sector has matured, financial services have expanded to encompass savings, remittances, leasing, insurance and others. Yet an estimated 2.2 billion adults in developing countries, including most of the rural poor, do not have access to formal financial services.¹⁶ It is estimated that only 10 per cent of all credit is extended to women. These gaps remain a major impediment to the socio-economic choices of smallholder farmers and other rural poor people.

¹⁶ IFAD, Rural Poverty Report, 2011, p. 103.

Smallholder agriculture and climate change

Agriculture is where climate change, food security and poverty intersect. Climate change is not an isolated specific risk but a 'threat multiplier', increasing a range of livelihood threats and vulnerabilities. Farming has always been risky, and climate change is magnifying those risks. Generally, smallholders living on the precarious margins of the earth's productive lands are the first to feel its effects. The ecosystems and biodiversity on which they rely are increasingly degraded; their access to suitable agricultural land is declining; their forest resources are increasingly restricted and degraded; they produce on typically marginal rainfed land, and with declining rainfall; they face rising prices for energy and agricultural inputs; and they live with declining fish and marine resources, threatening their access to essential sources of income and nutrition. About 5.2 million hectares of forest are lost every year,¹⁷ and 70 per cent of fisheries are threatened by overfishing and environmental degradation.¹⁸

The effects of climate change are expected to be worst in developing regions – much of Africa, the Arabian Peninsula, Southeast Asia, Central America and central South America.¹⁹ The Intergovernmental Panel on Climate Change projects that agricultural production will be severely compromised in many African countries and regions. It predicts that by 2020 yields from rainfed agriculture could be reduced by up to 50 per cent in some African countries, and coastal areas of Asia will be at high risk of flooding.²⁰ Already the Alliance for a Green Revolution in Africa estimates that environmental degradation in Africa is causing losses of 4 to 12 per cent of GDP.²¹

For farmers, one of the most difficult impacts of climate change is the loss of predictability. Planting schedules handed down by generations are no longer valid, and farmers can no longer rely on historical averages of rainfall and temperature due to wider ranges of extremes and the scale of volatility. In addition to traditional risks, smallholders now face new threats, such as sea-level rise and the effect of melting glaciers on water supply. Water withdrawals are expected to increase by 50 per cent by 2025 in developing countries.²² As Liberian Vice President Joseph Nyuma Boakai reminded the audience in his keynote address, by 2020 climate change will expose 75 to 250 million more people to water stress in Africa alone.²³

Climate change is already causing tangible economic losses for many countries. In the Philippines, for instance, weather events over the past three years have cost the economy an annual average of 0.3 per cent of GDP.²⁴ Estimates of the annual cost of climate change adaptation for developing world agriculture range from US\$7 billion to US\$12 billion per year.²⁵ Climate change will also make food more expensive. According to the Intergovernmental

17 FAO, Global Forest Resources Assessment 2010, Forestry Paper 163.

18 See: www.iucn.org/about/work/programmes/pa/pa_what/?4646/Marine-Protected-Areas--Whyhave-them.

19 See: <http://onlinelibrary.wiley.com/doi/10.1111/j.1466-8238.2010.00632.x/abstract>.

20 See: www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf, p. 13.

21 Langyintuo, A., 2011, African agriculture and productivity, AGRA paper presented at the Sharing Knowledge across the Mediterranean (6) Conference, Malta, 5–8 May 2011.

22 IFAD, Environment and Natural Resource Management Policy, 2011, p. 14.

23 See: www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf, p. 13.

24 United Nations, ESCAP Press Release, available at: www.unescap.org/unis/press/2011/dec/g64.asp?print=true

25 IFAD, Climate change: building smallholder resilience, p. 2.

Panel on Climate Change, a global mean temperature increase of 3 to 5 degrees could lead to an average increase in food prices of 30 per cent.²⁶

To counter climate change impacts many governments are trying to introduce climate-resilient programmes. Mechanisms have already been developed to reward carbon sequestration, such as payment for environmental services, as well as carbon-financing schemes. But they are complex, and smallholders face significant risks and barriers that limit their access to this financing, including their insecure land tenure and the high cost of implementing projects associated in particular with monitoring, reporting and verification. Climate-resilient initiatives typically have higher up-front costs, including for infrastructure, skills development for farmers and strengthening of institutions.

Too often it is assumed that a trade-off is inevitable between maximizing agricultural production and productivity and caring for the environment. This is a false choice. We can and we must achieve both – or we will fail in both. Viewing the agriculture sector as renewable rather than extractive is the only way forward. This approach embraces the idea that agriculture is an activity that relies on interaction with wider ecosystems, and that improving this interaction can simultaneously raise productivity, strengthen sustainability and improve the livelihoods of smallholders and their communities. In the long term, there is no trade-off between productivity and production growth, on the one hand, and greater sustainability on the other. The opposite is true: without sustainability, both productivity and production growth will suffer. But business as usual cannot continue.

And business as usual is indeed changing. Throughout the world, farmers are demonstrating the benefits of managing natural assets sustainably and in harmony with local ecosystems. Ms Estrella Penunia Banzuela, Secretary General of the Asian Farmers' Association for Sustainable Rural Development, which represents 11 million farmers, reported at the meeting on research about a rice intensification initiative undertaken by over 100 farmers in Cambodia. It found that yields went up over 60 per cent and use of inorganic fertilizers fell by over 70 per cent. Mr Leu of the International Federation of Organic Agriculture Movements told the audience about a review of organic agriculture systems in Africa, conducted by the United Nations Environment Programme and United Nations Conference on Trade and Development, which found an average 116 per cent increase in yield. Ms Nivedita Banerji, Co-Founder and Secretary of Samaj Pragati Sahayog, one of India's largest non-governmental initiatives for water and food security, told of India's Mahatma Gandhi National Rural Employment Guarantee Act, which guarantees 100 days of work creating durable assets to help farmers improve productivity more sustainably, such as water harvesting structures.

On a broader scale, Brazil has implemented minimum-till agriculture on 60 per cent of the country's cultivable land. The government of the Philippines has stopped its fertilizer subsidy programme, replacing it with a balanced policy that promotes location-specific combinations of organic and inorganic fertilizers. Turkey has tripled agricultural productivity in the past eight years using sustainable methods (see box 2).

But too many of these successes are isolated, and too many of the changes are piecemeal. We no longer have the time or human or financial resources to deal with these issues as independent, sectoral problems, pointed out Ms Pamela Anderson, Director General of the International Potato Center. "What is needed going forward is a multi-functional, transformative agriculture with smallholders at its heart, not because they are victims but because they will be the drivers and creators of solutions," she said. "If we are not working with them at the local level, we are not going to achieve global challenges."

26 Intergovernmental Panel on Climate Change, Impacts, Adaptation and Vulnerability in Fourth Assessment Report: Climate Change 2007, eds. M. Parry et al. Contribution of Working Group II. (Cambridge, UK: Cambridge University Press, 2007), <http://www.ipccwg2.gov/publications/AR4/index.html>.

The elements of a productivity revolution

Paradigm shifts result from countless small innovations, large and small. Over the recent past such changes have demonstrated the possibilities for sustainable intensification of food production. Now they need to be expanded, adapted and disseminated widely, so that they become, instead of 'a project', simply the new and better way of doing things. Yet sharing this knowledge in a way that it can be taken up will require an enormous coordination effort at every level – among national governments, the agricultural research system, farmers' organizations, the private sector, United Nations organizations, non-governmental organizations (NGOs) and donors.

As Mr Gates noted, one reason for the success of the Millennium Development Goals is that they encourage countries to compare themselves with other countries that are using best practices. He called for taking that kind of comparison further through development of global productivity targets for small farmers and a system of scorecards to measure how national systems, food agencies and donors are contributing to poverty reduction. A system that looks at national and international activities would encourage ambitious productivity targets, helping each part of the system to focus on its key contributions, diagnose the problems and spread the best interventions. "As it stands, we really do not have a broad awareness of what is working and what is not," he said. "We do not have an awareness of what the highest priorities should be."

How to develop and implement such an index remains to be determined and, if the goal is to boost smallholder agriculture in a context of greater sustainability, the index should look not only at productivity. Indeed, World Food Programme Executive Director Josette Sheeran asked Mr Gates what such a report card would ultimately address. She pointed out that when a country increases productivity sometimes the food is exported, and the country's hunger and malnutrition statistics don't improve. "So what would you see as the 'A student'?" she asked. "Would it be the country that drives down malnutrition? The country that increases exports? The country that drives up the production numbers? Or is it about income for the small farmers and then the rest can take care of itself?"

The starting point: local solutions

"When we talk about a vision of a food-secure Africa, that vision has to start at household level." That statement by Dr Sibanda, applied not just to Africa but to all developing countries, captures the essence of the consensus that surrounded the high-level events held during the Governing Council meeting. Producing food has always been an intensely local activity, of course. But the variability and unpredictability of climate change effects are overturning broadly adopted approaches to cultivation. As rainfall becomes more erratic, for example, varieties once productive in a certain micro-climate may no longer be. At the same time, the planning horizon is expanding, as pointed out by Mr Carlos Seré, IFAD's Chief Development Strategist. "The issues we are now facing cross borders, environments and sectors. The real challenge is that the solutions that we need to take now require enormous coordination and new partnerships."

Even in the absence of a warming planet, producing enough food for the additional 2 billion people expected in just 40 years would require a productivity revolution.

Empowering smallholders to learn about locally adapted sustainable agricultural intensification techniques is precisely the productivity revolution that is needed.

From place to place there are enormous differences in natural resource endowments, population densities, social and political relations, and market opportunities – and the results of generation upon generation of experimentation, innovation, learning and refinement. Different places offer different opportunities for sustainable intensification, have different requirements and face different constraints. Therefore, sustainable intensification approaches need to recognize the complexity of people's interaction with landscapes and to be tailored to local circumstances.

Creating a level playing field

The evolution of today's smallholder farming into productive, climate-smart small-business farming will require actions on many levels, but it must begin with a supportive enabling environment. Distorting trade policies and subsidies together with ineffective land management policies create disincentives for farmers. Government policies in both industrialized and developing countries often leave smallholders at a disadvantage. Big producers can benefit from economies of scale that, taken individually, smallholders cannot. A large-scale poultry company can hire a veterinarian, said Mr Seré by way of example, while a smallholder with 20 chickens cannot. Appropriate services for smallholders need to be developed.

Mr Akinwunmi Adesina, of Nigeria, noted that the decline in agricultural investment over the past two decades resulted, to a large extent, from the adoption of recommendations of global financial institutions. The result has been falling expenditure by national governments on research, extension and critical rural infrastructure, including irrigation. But government is not the problem, he said; it is the major part of the solution. "It is government that has to decide the country is going to be hunger free, not the private sector," he pointed out. "What I believe we need is a transformation process enabled by the government but led by the private sector."

Where the government establishes a supportive enabling environment, smallholders will adapt green approaches to local contexts and scale up their successes. Policymakers have access to a range of tools to unleash the potential of smallholder producers to build sustainable livelihoods while helping the world to protect natural resources and mitigate climate change.

The government of Turkey, for example, has embraced its responsibility for leading farmers down a new path. The country's Minister for Food, Agriculture and Livestock, Mehmet Mehdi Eker, described the sustainable agriculture policies adopted by his government (see box 2). They include grants for implementing drip irrigation, widespread use of integrated pest management and a vastly expanded cadre of extension agents who live alongside the farmers they help.

However, few of the world's smallholder farmers are receiving the concrete support they need. George Fernandez, President of the International Movement of Catholic Agricultural and Rural Youth, spoke movingly about the situation of farmers in his home village in Kerala, India, where the whole community has traditionally been very involved with agriculture. "They were happy with what they earned, because while they cultivate crops they cultivate values," he said.

But things began to deteriorate in recent years. He ticked off some of the problems faced by neighbouring farmers – policy changes, price volatility and land grabbing – that had resulted in bankruptcy, ultimately leading to the suicides of thousands of farmers between 2005 and 2008. Then he said to the audience of IFAD Governors, "Here, everybody is saying that farmers are the ones who feed the world, here everyone speaks with the same voice. But I think the problem is that our policymakers speak with different voices in different conferences. So how will it be in Rio? Will there be any discussion with the farming community?"

Building resilience

Most smallholder producers lack safety nets to catch them in the event of calamitous weather, crop failures, economic shocks or illness or death of family members. This severely hampers their ability to stay out of poverty. It also affects their willingness to take on risks in the form of new livelihood strategies and farming approaches. If smallholders are to be protagonists in intensifying sustainable agriculture, they will need support in dealing with the risks they face.

One of the main obstacles to resilience is uncertainty. The inherent unpredictability of farming combined with the poverty of most smallholders can become a calamitous mix. Farmers need tools that help to lower the level of risk they face, to better manage the risks that cannot be reduced and to protect their assets and livelihoods in the event of shocks.

One such tool is weather information. Weather shocks and erratic weather can harm farmers' assets, said Ms Sibanda, and timely information, which can enable farmers to better prepare for weather changes, is clearly a public good that government should provide. Mr Adesina, mentioning that Nigeria has about as many weather stations as a typical university farm in the United States, called for heavy investment in weather information. It is all the more crucial for farmers as climate change increases weather unpredictability.

Similarly, he pointed out, climate change is raising the need for weather index-based insurance, which is also lacking in Africa. The issue is not whether this insurance works – it has been proven successful, though at times costly for poor farmers in particular – but whether it can be financed at scale, and who is going to pay for it. Both the government and the private sector have a role to play in helping farmers deal with risk, said Mr Bruce



Turkey: A tripling of agricultural GDP – using sustainable methods*

Here are some of the techniques that have contributed to Turkey's achievement of a tripling of agricultural GDP in the past decade:

- Extension workers are being deployed to live in villages alongside the farmers who need their services. So far, with 7,500 technicians hired, 80 per cent of the country's 35,000 villages are covered. With plans to hire an additional 2,500 in 2012, Turkey will soon be providing access to extension services for all smallholder farmers.
- Integrated pest management is being implemented using the extension system to educate farmers about its benefits and implementation. As a result, pesticide use has declined 30 per cent over the past eight years.
- Open-channel irrigation is being converted to drip or sprinkler irrigation systems through interest-free loans and 50 per cent grants to farmers.
- Subsidies for fertilizer are conditioned on soil analysis. Once the soil is analysed and the farmer knows what nutrients it needs, the Government pays for the soil analysis and for a certain amount of fertilizer.
- Farmers are being encouraged to use certified seeds, seedlings and saplings, which are more productive.
- Research stations have been opened to the private sector and farmers' groups, giving them free access to these institutes' laboratories and other facilities.

* Based on the contributions of Mr Mehmet Mehdi Eker, the Turkish Minister for Food, Agriculture and Livestock at the high-level panel 'From words to actions: Creating a sustainable future for smallholder farmers'.

McNamer, President and CEO of TechnoServe, a non-profit economic development organization that helps men and women build businesses in developing countries. He encouraged new thinking about government incentives that will encourage multinationals, national companies and entrepreneurs to engage in risk mitigation investments, such as insurance products. A smallholder farmer's risk tolerance is very different from that of an entrepreneur in the industrialized world, he noted. But if risk mitigation strategies can be seen as an investment subsidized by a government or a donor, it would be possible to change the farmer's view of risk.

Accessing financing

Although sustainable agricultural intensification covers a variety of approaches with very different costs, the upfront resources needed by smallholders to shift to these approaches are sometimes significant. Adapting to new production systems and technologies while dealing with the effects of changing climatic patterns also requires significant financial investment. Smallholders need both financing to help them adapt to new production systems and innovative financial services to support them in prioritizing sustainable natural resource management. Sources of funding will include not just expanded credit but new products and mechanisms for savings, such as expansion of savings groups, along with more insurance products and greater use of remittances to fund profitable agriculture initiatives (see box 3).

However, obtaining financing is still an enormous obstacle for smallholders. This issue came up repeatedly during the panel discussions and the Farmers' Forum, a biannual meeting of representatives of the world's smallholder farmers, which preceded the Governing Council meeting. Developing-country economies are growing, Mr Adesina pointed out, and they must get smarter about generating innovative financing methods to finance green growth in their own countries.

Mr Seré noted that IFAD is funding initiatives that support such innovation. As an example he described a project co-financed by IFAD in the Peruvian Andes in which the activities to be funded are not spelled out in advance. Instead, communities receive a pot of money and then determine as a group what critical public investments should be made. Such an approach allocates resources more effectively while building the community's skills and heightening their ownership of the activities supported.

IFAD has also recently initiated the Adaptation for Smallholder Agriculture Programme, which will help channel finance into climate-smart, sustainable investments in poor smallholder communities. It aims to help 8 million smallholders become more resilient to climate change by 2020. The initiative will focus on appropriate agricultural practices, efficient water use, expanded capacities for adaptation and risk reduction among communities, more resilient infrastructure and knowledge sharing on climate-smart practices.²⁷

A mechanism growing in use is payment for environmental services, which is another way of giving smallholders access to the resources they need while ensuring they receive fair rewards for the important work they do. The operators of Brazil's Itaipu dam, which provides 25 per cent of the country's energy, pay municipalities along the reservoir lake to provide the environmental service of implementing no-till agriculture, which reduces siltation at the dam. In Kenya the Green Water Credit initiative will provide regular payments to upstream water users in recognition of their important role in managing land and water resources. This enables farmers to invest time and resources in sustainable water management, while diversifying their income and helping them to stay out of poverty.

27 IFAD, Adaptation for Smallholder Agriculture Programme leaflet, available at: www.ifad.org/climate/asap/asap.pdf.



Investing in green agriculture: the role of diaspora

With around 10 per cent of its population living and working overseas, the Philippines is a major recipient of remittances – over \$US20 billion in 2011 alone – but little of it is invested in agriculture. Simultaneously the sector is hard hit by migration because families of migrants typically stop tilling their lands once they start receiving remittances. Around 50,000 Filipino women from just 6 provinces are working in Italy, most in the service sector. They face difficulties in saving for long-term goals and planning for their and their children's future.

However, for some of these Filipino women workers the situation has changed thanks to the Atikha Overseas Workers and Communities Initiative, discussed at the Governing Council side event **Investing in green agriculture: the role of the diaspora**. Working in partnership with NGOs in Italy, Atikha began teaching Filipino migrant women about financial management and saving. These courses encouraged some members to invest their savings in small businesses. Then the group partnered with the Soro-soro Ibaba Development Cooperative (SIDC), which can provide cheaper money transfer options. By lowering the cost of sending remittances from 8 euros to 1 euro, it encourages more savings – and more investment.

The next element of the initiative was investment in the agriculture sector. As the country's largest agricultural cooperative, SIDC offers numerous rural business investment choices, from hog-raising to a feed mill to a water refilling station. Atikha chose SIDC's robust egg-laying business as its first offering to the migrant investors. Each shareholder invests €1,800 per year for a guaranteed return of 6 per cent, plus additional dividends depending on farm performance.

Also discussed at the event was IFAD's recently launched Diaspora Investment in Agriculture initiative, which similarly aims to mobilize investment in sustainable agricultural projects in migrants' communities of origin. Undertaken in collaboration with the US Department of State, it will cofinance diaspora entrepreneurs and organizations for projects related to food security and agricultural value chains in 15 countries.

Panellists highlighted the fact that in 2011 alone, the world's 200 million-plus migrant workers sent home over US\$350 billion to family members in developing countries. In around 40 countries remittances make up 10 per cent or more of GDP. Other points raised by the panellists were:

- Diasporas play a vital role in the development of their countries of origin – through their remittances, investments, tourism, trade and philanthropy, along with the knowledge transfer and cross-border relationships they foster.
- The role of diaspora investment in catalysing private and public investment in the countries of origin is growing fast.
- Women's role in diaspora investment has been especially significant. In the Philippines, for example, women often play a leading role in family financial matters through goal setting, budgeting and saving.
- Diaspora cooperatives are an important instrument for pooling migrant savings and investment.
- Migrants' investment decisions are always based on family or community ties rather than profit seeking. This makes them reliable investors in their home countries, especially during crises, which discourage foreign investors.
- The international community needs to recognize and be sensitive to the human face of migration.

Engaging private investment

No one questions that the private sector has become the engine of growth in rural economies. This sector – comprising for-profit businesses and companies not owned by governments, as well as small-scale farmers and traders and their organizations – is responsible for 33 per cent of GDP in developing countries, according to a recent study.²⁸ Higher food prices since 2008 have also attracted more private investment in the agricultural sector. It could do more to drive green agricultural growth that enables smallholder farming to be more profitable. As Rwandan President Paul Kagame reminded the audience during his keynote speech, “Ultimately, long-term solutions to invest in agriculture will come from a greater involvement of the private sector.”

Mr McNamer of TechnoServe highlighted the possibilities for engaging private investment and pointed out the need to think broadly about business opportunities in the agricultural sector. Providing transport, logistics, credit, warehousing services, ploughing services and markets are among the opportunities, he said. Some entrepreneurs might get involved in leveraging advances in technology to bring down the cost of accessing pricing information or making payments. “How are we getting credit to input providers?” he asked. “How are we thinking about investments in incentives to make the market system work? How do we think further down value chains and real business opportunities, about value addition in a context in which people can make money? We can actually advance the cause of sustainable agriculture hand-in-hand with the opportunities for smallholder farmers as business people in commercially viable value chains.”

Food markets are evolving rapidly, providing enormous scope for helping smallholders link up with food value chains that operate sustainably. The interactions between private actors (smallholder producers, intermediaries, entrepreneurs and business of all sizes, both national and international) determine production, marketing, economic and environmental outcomes. These actors need to be engaged in a way that encourages investment in smallholder agriculture while protecting the welfare of rural women and men and the environment – not just in marketing, Mr McNamer said, but also in technology, production and research.

IFAD is increasingly involved in facilitating projects that help farmers make money through better linkages to other actors within value chains – a recent assessment found that such initiatives are now over 45 per cent of the organization’s work.²⁹ IFAD President Nwanze spoke at the meeting about one such project in Guatemala, where he met Mr Pedro Tun, a smallholder farmer and president of a producers’ association. With the backing of an IFAD-supported project, the association bought irrigation equipment, built a storage facility and worked with private-sector partners to bring their produce to new markets. Today, they sell high-value crops like onions and radicchio to some of the biggest retailers in the world, including Wal-Mart in the United States.

The power of organizations

A major obstacle to expanding the role of farmers as drivers and creators of solutions to the challenge of sustainable productivity growth has been their relative ‘invisibility’ with respect to policy processes, but also in the context of mainstream R&D programmes, innovation systems, and so forth. Building partnerships among farmers and between them and other actors can greatly help redress this ‘invisibility’, which is rooted in geographic isolation, poverty and gender discrimination, among other factors. Organizing into groups, and building their capacity

28 McKinsey & Co. and International Finance Corp., October 2010, cited in IFAD Private Sector Strategy, p. 7.

29 IFAD, Private Sector Strategy, p. 11.



Potato chips and partnerships

Potato chips made of native potatoes are now common in Peruvian markets, but their benefits extend far beyond creation of a market for a previously unappreciated crop. Their existence is a result of collaboration among non-traditional partners – the International Potato Center (CIP), through its Papa Andina partnership programme, Andean farmers, domestic and multinational retailers and NGOs. The result has been higher incomes and new business skills for smallholder farmers as well as establishment of new markets and support for biodiversity.

CIP decided to focus on commercial innovation in an effort to unleash the potential of native potatoes to help reduce poverty. Beginning in 2003, it worked with small-scale producers, NGOs and the gastronomic and business sectors to develop new products for native potatoes, which are more attractive and nutritious than improved varieties, while also supporting Andean cultural identity. In addition these varieties grow at high altitudes, benefiting small-scale farmers living in remote areas of the Andes, who are among the poorest people in Peru.

The initiative made use of the participatory market chain approach, a methodology that encourages innovation and links poor farmers to new markets. Eventually the effort involved researchers, farmers, private companies and representatives from the gastronomic sector.

CIP scientists came up with the idea of creating potato chips from colourful native potatoes, and with their assistance a small-scale Peruvian processor launched Jalca Chips in 2005. Sales took off in airport duty-free shops. CIP worked with small farmers, NGOs, small processing companies and large multinationals to develop further products while boosting the bargaining power and participation of local farmers. In 2008, PepsiCo Americas Foods entered the market, through a partnership arrangement with CIP, several NGOs and the small-scale producers. PepsiCo offered native potato farmers a contract that guaranteed a market for their production at a price that would give them a profit.

NGOs got involved in organizing the farmers, helping to manage contracts, building capacity and ensuring quality control. CIP worked with them and the National Agricultural Research Institute to create a quality seed programme for native potato varieties that would satisfy PepsiCo's quality requirements and improve productivity. CIP and the NGOs helped to improve marketing systems and strengthened capacities for quality and productivity among farmer organizations. CIP facilitated an innovation process involving diverse partners and contributed to the launch and development of the product.

The various groups have also collaborated to get native potatoes onto the political agenda. One result is National Potato Day in Peru and Ecuador and establishment of quality norms for processing.

The direct beneficiaries of this initiative include more than 770 families who now have access to a stable market and a negotiated price that provides them with a profit margin of 20 to 40 per cent. In 2009 overall demand for native potatoes in Peru generated close to US\$1 million in revenues for farmers.

“Selling my native potatoes to the industry has changed my life,” said Mr Victoriano Meza, a farmer in the Central Andes community of Pomamanta. The additional income has allowed him to build a house for his family and equip it with satellite Internet, “so that my children can learn quickly and have a better future.”

to engage effectively in decision-making processes, can enable smallholders to claim a place at the policymaking table, strengthen their negotiating power within markets and support their investment and savings capacity.

In many countries, representative and capable farmers' organizations are beginning to fulfil their potential for magnifying the voices and power of individual farmers. Using social media, some of these organizations can also work virtually, reaching out to broader audiences. Mr Gates made the point that farmers' organizations are especially helpful in creating a loud enough voice about the things that agriculture ministries need to do better. He noted that coming together allows them to say to the government that, for example, the fertilizer policies are not right; the seed policies are not right; farmers are not getting enough education; there's a disease problem that government needs to help with. He called for more efforts to help such organizations to become more powerful voices.

Effective organizations can also enable farmers to better interact with other actors. The private sector in all its forms needs to participate in improving sustainable productivity – as already noted, the private sector is not just multinational corporations but, most importantly, domestic producers and market actors such as processors, traders, intermediaries and input providers. The results of collaboration among different actors within value chains, alongside researchers, donors and others, can be significant in boosting smallholder agriculture. For instance, in Peru, the International Potato Center brought together diverse and non-traditional partners – including the domestic and international food industry, farmers, agricultural researchers, NGOs and the transport and tourism sectors – to develop a lucrative new product, potato chips made from native varieties, that has changed the lives of numerous Andean farmers (see box 4).

Better links between agricultural researchers and farmers is another form of cooperation needing expansion. Participants at a side event on crops for the future discussed the disappointing take-up of new varieties by the farmers of the developing world. Solutions centred on the need for more collaborative research involving farmers. Mr Henry Saragih, head of the Indonesian Peasants Union, suggested reversing the traditional approach: Instead of having farmers participate in research, he said, researchers should participate in farmers' experiments.

Farmers' organizations are also a powerful tool for obtaining finance that would otherwise be unavailable to poor farmers. Ms Banerji, of India, described how her organization, which represents impoverished tribal communities, brings together thousands of small-scale female farmers who form strong economic partnerships. Aggregating their very small savings puts them in a position to negotiate with financial institutions. Through public-sector banks, these federations of women get loans enabling them to improve their rainfed agriculture and their livelihoods. Their economies of scale also make them a force in the market for both buying their inputs and selling their produce.

Public-private partnerships also have the potential to reduce the risks associated with investing in smallholder agriculture, as well as facilitate networks and identify untapped opportunities. IFAD's new Private Sector Strategy builds a framework upon which these partnerships can be fostered and the right investments made to generate and scale up new and sustainable livelihood opportunities.

Making smallholder agriculture climate smart

Over the centuries, smallholders have learned to adjust to environmental changes and climate variability. However, the current speed and intensity of climate change are outpacing farmers' capacity to adapt. Crop failures and livestock deaths are causing economic losses, raising food prices and undermining food security with ever-greater frequency, especially in parts of

sub-Saharan Africa. These farmers cannot be expected to take on the work of feeding growing populations while protecting universally valued assets without help from the diverse sectors that will benefit from their contributions.

Access to green technologies

Sustainable innovations are bringing multiple benefits in terms of yield, profit, climate resilience and poverty reduction. Innovations in energy-efficient technologies, already helping to ease some labour-intensive farming tasks, show great promise for future growth. Solar photovoltaic pumping systems, windmills, solar direct desalination and solar cookers, refrigerators and electricity are just a few of the green technologies that are already available. Drip irrigation is allowing farmers to increase yields even during droughts. Solar power can grind cereals and shell nuts on farms far from a nation's electric grid. Farmers in remote areas are getting information on market prices through cell phones, allowing them to better negotiate



The challenges of conservation agriculture

Emblematic of the need for local solutions is the debate on conservation agriculture. This crop production system is offered as a promising method to increase productivity while preventing soil degradation. At its core are the principles of minimum soil disturbance, permanent cover crop and crop rotation. It has particularly taken root in Zambia, where its use has dramatically increased maize yields.*

At the side event **Achieving food security in sub-Saharan Africa through conservation agriculture**, discussions highlighted both the benefits and the challenges faced by conservation agriculture in sub-Saharan Africa. Mr Dennis Garrity, the Chairman of Landcare International, World Agroforestry Centre (ICRAF), highlighted what it has to offer: the potential for reducing labour and use of animals and fuel; more stable yields, especially in drought years; greater profitability; and benefits for the soil, including less erosion and better soil structure and moisture.

Yet Mr Garrity cautioned that the approach needs to be promoted case by case based on clear understanding of the local situation. It requires specific socio-economic and agro-ecological conditions and consistent policies. He called for a double-storey 'evergreen' agriculture integrating trees with annual and perennial food crops while maintaining year-round green cover on the land, an approach that has taken hold in some parts of Africa.

Mr Ken Giller, Chair of Plant Production Systems, Wageningen University, said that he is concerned that the scientific evidence supporting conservation agriculture is unclear and inconsistent, and that the approach may not fit within the majority of smallholder farming systems in Africa. He also cautioned about the demand for weeding in the early years of using this method. Given that weeding is typically women's work, it adds to the workload of already overburdened female farmers.

He also noted that in Zambia conservation agriculture was adopted specifically to address the problems of maize production, and in adopting the method it is important to determine the precise issues you need to address.

IFAD's director for Eastern and Southern Africa, Mr Périn Saint Ange, summed up the discussion by noting that conservation agriculture needs to be implemented in a more structured and coordinated manner, with better management of investments, more up-scaling of successful initiatives and documentation of how it is working at the farm level. He pointed out that the risks of conservation agriculture need to be managed to ensure maximum opportunities for results in the field.

* IFAD, Smallholder conservation agriculture: rationale for IFAD involvement and relevance to the East and Southern Africa region, 2011, pp. 27-28.

with middlemen and decide when to send their products to market to obtain the best prices. Government workers visiting project sites are using cell phones to send data back to ministries, preventing days if not weeks or months of delays in recording rural statistics.

Mr Gates stressed the important role that information technology can play in revolutionizing agriculture. "From genomic science to information technology, new discoveries are making it possible for us to solve problems in new ways," he told the audience. "A huge part of the job we share is bringing today's breakthrough agricultural science and technology to help poor farmers." One initiative he described is Digital Green in India, supported by the Gates Foundation. It makes videotapes of women farmers demonstrating improved techniques and uses them to teach other farmers. The approach plans to reach over 1 million farmers in 10,000 villages over the next few years, complementing the classic agricultural extension system in a very cost-effective fashion.

Governments need to play a larger role in getting these technologies to smallholder farmers. The Bolivian Minister for Rural Development and Land, Ms Namesia Achacollo Tola, discussed the important role of the state in supporting technology transfer. "The government has to help smallholder farmers, cooperatives and associations to access technology, to ensure they have the right conditions for growth," she said.

A new green revolution?

The need to scale up successful approaches emerged at several of the Governing Council sessions. The consensus was that a new green revolution is needed – but it must be a 'sustainability revolution'. Ms Penunia Banzuela, remembering how the green revolution of the 1960s and 1970s brought together governments, donors and researchers – and plenty of funding – called for a similar effort today. "If we put all our energies, all our time and all our money into sustainable ecological agriculture with smallholder farmers at the heart of it, I think we will be able to mainstream it."

Several other participants pointed out that it would have to be very different from the top-down green revolution of decades past. Ms Anderson, of the International Potato Center, noted that it was a very linear, 'pipeline' paradigm, in which technologies were generated at the top and simply handed over to farmers; no one asked the farmers if they were what the farmers needed. Given the current need for locally specific solutions, she said, "The farmers' organizations today have to give voice to the needs and opportunities of their membership so that there is a better match between the technologies and what they actually need."

That point was reinforced by Mr Seré. The successes achieved in the 1960s and 1970s, when large areas were under irrigation and in homogenous conditions, were the "easy wins," he said. "We now need to move a lot more into rainfed agriculture, which is very variable, so a central plan rarely works. This is the big challenge for development: that you need to empower people to find their own solutions." Participants in the Governing Council side events discussed some of those solutions, including conservation agriculture (see box 5) and community management of natural resources (see box 6).

Smart use of inputs

Given the little unexploited land available for expansion of agriculture in many parts of the world, intensifying production is the only long-term solution to future food security. It will require more efficient use of fertilizer and irrigation, maximizing the use of natural processes such as nutrient cycling, nitrogen fixation and integrated pest management, while reducing the use of external inputs that have the greatest potential to harm the environment or the health of farmers and consumers.

Community management of natural resources

One of the most important aspects of locally devised solutions is community management of natural resources, which is most common in forestry systems. The side event on **Community and participatory management of natural resources: Experiences from Mesoamerica's indigenous people and forest communities** featured a discussion with Mesoamerican rural organizations and indigenous community leaders. They explored how to enhance community management of resources and their potential contribution to the green economy, with a focus on forestry.

Forests have long been recognized for delivering economic and non-economic benefits to rural communities and smallholder farmers. These range from non-timber forest products to building materials to more productive land. Forests sustain more than half of terrestrial species, regulate climate through carbon storage and protect water.

However, no clear global regime has yet been established to attract investments that can facilitate equitable and sustainable use of forests. As a result, most efforts are directed at traditional conservation. The estimated annual expenditure on these protected areas is US\$10 billion. But recent evidence shows that community-managed forests are both more profitable and better conserved than state-protected spaces. And the ability to generate reasonable returns from forests can be an important factor preventing deforestation.

The key issues discussed by the participants included the following:

- **Sustainable production:** The panellists pointed out that sustainable production is a powerful conservation tool. The transaction costs to the community are generally compensated by incentives, such as more predictable incomes and diversification of options. As sustainable forestry practised through small-scale enterprises becomes lucrative, smallholder agriculture is more a complement than a threat to forests.
- **Sustainable agriculture and sustainable forest management:** Very often rural families combine forest use with sustainable agriculture practices. Agroforestry can provide environmental benefits in terms of re-greening deforested areas, as well as economic and social benefits for rural families.
- **Women, young people and communities:** Forestry management also provides opportunities for women and young people, helping to prevent migration. Though it is often difficult to get respect for indigenous knowledge from the authorities, forest communities would like to see their young people engaged in the technical side of managing forest resources. Collective management of resources is not easy, but the process strengthens community organizations, increasing their resilience.
- **Legal frameworks:** Communities and small-scale forest companies need long-term, renewable contracts for forestry management activities. New legal arrangements that allow wider participation (including ownership) by forestry users would result in more active engagement.
- **New opportunities arising from the international agenda:** Schemes such as REDD+* can provide the incentives, financial and other, for sustainable use.
- **Financing and enabling conditions:** Reforms in forest governance are needed to make green financing accessible to poor rural people. Funding is needed for innovation, technical expertise and new investments, but subsidies and credit are increasingly scarce.

Resident communities, indigenous people and smallholder foresters must be seen as partners and contributors, the panellists said. That calls for challenging and changing the standard top-down approach, which requires dialogue and policy and financial support. The result will be a more inclusive approach in which all actors' activities are complementary, helping to preserve forests and their vital services. Participants also called on IFAD to play a larger role in making credit available directly to rural communities, supporting dialogue among marginalized groups and aiding reforms that will enhance sustainable production and markets.

* Reducing emissions from deforestation and forest degradation, plus conservation, sustainable management of forests and enhancement of forest carbon stocks.

- **Fertilizer.** Several of the speakers as well as members of the audience talked about the importance of shifting from inorganic fertilizer to manure, mulch and other forms of organic fertilizers. Mr Leu of the organic agriculture federation mentioned studies in Africa showing that productivity was equal to or greater with organic fertilizer than with expensive chemical fertilizer. A rice intensification initiative in Cambodia has achieved a 60 per cent increase in yield with a 72 per cent decrease in use of chemical fertilizer. But organic fertilizers are not a perfect solution because applying manure and mulching take more time and labour, adding to the workloads of already overburdened women.

Agriculture in Africa has used very little fertilizer of any type – as of 2002, the amount used there was unchanged since 1980.³⁰ Several agriculture ministers from Africa attending the Governing Council meeting mentioned the need to increase fertilizer use in order to raise productivity. But the lessons learned about the hazards of excessive chemical fertilizer, from both recent experience and the green revolution, must be applied smartly to avoid polluting waterways and to prevent the need for ever-escalating amounts to maintain yields. Mr Eker of Turkey noted that his country provides subsidized fertilizer only after farmers have their soil analysed to determine precisely what it needs.

- **Irrigation.** Irrigation is a key element for increasing productivity, and here again the issues vary by region. In Africa only 4 per cent of farmland is under irrigation – compared with 40 per in South Asia³¹ – so it needs massive expansion. As African countries build up irrigation programmes, they would do well to reflect on lessons learned from past experience in countries where excessive irrigation led to salt build-up in the soil. In Asia, for instance, nearly 40 per cent of irrigated land in dry areas is now thought to be affected.³² As Rwandan President Kagame said, “In order to break the cycle of drought and famine that afflicts large parts of our continent, we will have to intensify irrigation while managing our water resources better.”

Research and development

Farmers have always experimented in their fields. In addition, for 40 years the research centres of the Consultative Group on International Agricultural Research have been working to improve food security by increasing the sustainable productivity of agriculture in the developing world (see box 7). Ms Anderson told the audience about one such initiative of the International Potato Center: cultivation of potatoes on top of rice paddy across the southern belt of Asia. Even without extra water or nitrogen fertilizer, potato productivity has doubled, she said, and rice productivity too is going up because the method breaks the mono crop cycle. The potential is enormous, given the millions of hectares of rice that lie fallow between cycles. Lessons such as these need to be captured, documented and shared. Institutions like Ethiopia’s Agricultural Transformation Agency, as noted by Mr Gates, can serve as a clearinghouse for efficient dissemination of such innovations.

Access to new skills and knowledge

Practising sustainable agriculture is not easy. It is a skilled activity based on constantly changing environmental, social and institutional conditions that are specific to communities. As Ms Anderson pointed out, climate-smart agriculture is knowledge-based

30 IFAD, Rural Poverty Report, 2011, p. 150.

31 Ibid., p. 149.

32 Ibid., p. 153.

agriculture. To correctly use integrated pest management, for instance, requires ecological knowledge. “We have seen it time and time again – if the training and education are not provided with these more complicated, knowledge-intensive technologies, they do not work,” she said.

Widespread educational reform is also needed. Basic education is frequently biased against agriculture. The technical and vocational education sector, which has the potential to upgrade smallholders’ skills and introduce them to sustainable techniques, needs reinvigoration. It needs to target young people, reduce the gender gap in access, facilitate participation by the private sector, encourage adaptation of sustainable farming practices and green technologies to local realities, and ensure participatory, inclusive approaches with curricula grounded in local conditions.

Farmers also need business skills. One response to this need is ‘farmer business schools’, a variation on farmer field schools set up by the International Potato Center, that teach



Crops for the future

Technology has become a major player in helping farmers cope with the effects of climate change, as scientists have developed crop varieties tolerant to more extreme weather that produce good yields under unfavourable conditions. The question is to what extent these varieties are reaching the farmers and being adopted by them. This topic was addressed during the side event **Crops for the future: enhancing resilience of smallholder farmers through improved crop varieties in the context of climate change**.

One of the main issues of debate was how to increase adoption of these new varieties. It was pointed out that ICARDA has released 880 new varieties during its 35 years, 95 per cent of them in developing countries. While some have adoption rates of 65 to 85 per cent, others have been ignored by farmers.

A possible reason for farmers’ resistance is insufficient collaboration between researchers and farmers. It was suggested that supporting cooperation between them from the very beginning of the process might ease the transfer of technology at the end. Farmers should be considered not just end users or even mere participants in scientific experiments but active contributors to research. Researchers could also learn from experiments carried out by farmers.

How technology is transferred was also discussed. Instead of new varieties being promoted by an extension agent with little knowledge of the specific situation, information technology such as the radio and television, cell phones and the Internet should also be used.

In addition the panellists suggested a more active government role in supporting farmers to learn about and experiment with new varieties, since many do not have the resources to do so themselves. Governments should also make sure that ownership of the new seeds remains in the hands of farmers. And farmers’ own field experiments should be formally incorporated into the research – many have already developed varieties adapted to conditions in their own fields. Future research investments may need to concentrate on transfer of technology more than on its development.

One of the successful practices discussed during the side event is ‘crop museums’ in Bangladesh. At these sites a range of options are displayed together so that farmers can freely decide what might work best for their situation. This approach avoids sending the message that certain technologies are being imposed from above. Another initiative, in Georgia, is extension centres set up by the Government offering low-cost services such as soil analysis and consultation on pest management. The centres also provide training. In addition the country has 12 service centres through which farmers can access tractors and other mechanized services at competitive rates.

farmers how to become capable entrepreneurs. The farmers' representatives who participated in the Farmers' Forum also called upon governments to provide more vocational and entrepreneurial training.

Mr Gates suggested that education could be included in the system of scorecards he proposed. He also reflected on the role of education in dealing with another food security issue raised by Mr José Graziano da Silva, Director-General of the Food and Agriculture Organization of the United Nations: the growing problem of obesity. It was suggested that governments should pursue consumer education to ensure more balanced and healthier diets.

To adopt climate-smart smallholder agriculture, we will need to capture and use the diverse skills of all the actors operating in the sector. But certain groups have traditionally been constrained from contributing to advancing agriculture. Indigenous peoples' loss of land rights has precluded many from applying their deep knowledge to preservation of biodiversity and renewal of the natural asset base on which agriculture depends; women's unequal access to assets such as credit and training has severely limited their productivity; and ambitious young people, in search of decent work and eager to apply their creativity, have been discouraged from farming due to its low status, low income and uncertain prospects. We must make sure that they receive the opportunity to contribute their abilities and knowledge.

Farmers themselves understand the importance of these groups' unique contributions to sustainable increases in agricultural productivity. Participants at this year's Farmers' Forum pledged that at the next Forum, in two years' time, 30 per cent of the delegates will be young people and 50 per cent will be women.

Ramping up: towards a new era of sustainable small-business farming

As the Rio + 20 conference approaches, advocates like Ms Sibanda are cautiously optimistic that agriculture will get a real seat at the table. “We hope that in Rio we will be able to amplify our voices and get political leadership that will fight for sustainable development and fight for green economies – cognizant of the fact that there is no sustainable development without sustainable agriculture,” she told the audience.

And there is no sustainable agriculture without smallholder farmers, given that these represent the vast majority of farms in a large part of the developing world. It is crucially important for the Rio conference to recognize smallholder agriculture and in particular the key role of smallholder farmers because, as Rwandan President Kagame pointed out, “For much of the developing world, agriculture is going to be smallholder based for some time. It will mostly be carried out in fragile environments susceptible to climate change. It is therefore imperative that affected countries and their partner institutions be bold and try what has not been done before.”

One bold approach is the transformation of smallholder farming into sustainable entrepreneurial smallholder agriculture. As IFAD President Nwanze reminded the audience at the opening of the meeting, when smallholder farmers are recognized as small entrepreneurs and gain access to better resources, incentives, markets and an enabling environment, they will be able to transform not just their own lives and communities, but the world.

The first step in helping them make this transformation is establishing the right policies. When asked why such policies are rarely in place, Ms Sibanda highlighted the ‘silo’ mentality that discourages collaboration among ministries, spanning the various domains where policy change is needed to support a more sustainable and entrepreneurial agriculture. She called for bold leadership “that will stand up for making sure that we provide farmers with the tools and the environment to do what they know best.”

One of the necessary tools is financial capital. Smallholder farmers will need significant financial support to adapt to new production systems and technologies while dealing with changing climatic patterns. Resources will also be needed for further development of tools to enable them to step up their productivity sustainably, such as innovative financial products and payment for environmental services.

The average net investment in developing country agriculture required to deliver the production increases needed between 2009 and 2050 amounts to US\$83 billion every year.³³ To that figure must be added the estimated \$7 billion to \$12 billion annual cost of climate change adaptation for developing country agriculture. The first step in raising investment is rebuilding what was lost – from infrastructure to research to extension services – during two decades of decline. In 1979, 18 per cent of official development assistance was devoted to agriculture. By 2009, it was just 6 per cent. In developing countries, government investment fell by one third in Africa³⁴ and by as much as two thirds in Asia and Latin America.³⁵

33 FAO, Background paper for the High-Level Experts Forum ‘How to feed the world in 2050’, 2009, p. 2, available at: www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf.

34 IFAD, The Future of World Food and Nutrition Security (fact sheet), available at: www.ifad.org/pub/factsheet/food/foodsecurity_e.pdf.

35 Ibid.

This decline is starting to reverse. Aid and national budgets for agriculture have been growing since the food price crisis began in 2008. However, the main responsibility for public spending on agriculture lies with national governments, and as a whole they have not yet made the serious investment needed. In 2003, at a meeting in Maputo, African heads of state pledged that by 2008 they would devote 10 per cent of national budgets to agriculture. By 2008 only 8 countries had achieved that level of investment.³⁶

“Our economies are growing,” pointed out Mr Adesina of Nigeria. “We have got to get smarter about generating innovative financing methods to finance green growth in our own countries.” Governments also need to do more of what they do best: establish consistent and supportive policies, remove obstacles that impede smallholders from expanding climate-smart production and provide public goods in research, extension services and infrastructure such as irrigation and roads.

Equally, governments need to improve their internal collaboration. As mentioned, the complex issues involved in sustainably raising productivity cross ministry borders as well as country borders. At the very least, the minister of agriculture and the minister of finance need to work together to determine how to finance sustainable increases in productivity. But ministries of environment, trade and education (among others) also play critical roles in the success of a transformation of smallholder agriculture towards greater sustainability and market integration.

Donors too have to show greater commitment and leadership. During the G8 meeting in L’Aquila in 2009, 40 countries and international organizations agreed to mobilize US\$20 billion over three years to help farmers in developing countries boost their productivity. So far only the equivalent of US\$925 million has been pledged.³⁷ Mr Andrea Riccardi, Italy’s Minister for International Cooperation and Integration Policies, pointed out that in difficult times it is most important to contribute to a vision for the future. “In order to be credible not only to ourselves but before the rest of the world, we have to invest more, not only in terms of resources but in ideas as well,” he said.

Prime Minister Monti made the point that the global food security crisis is much wider and deeper than the economic crisis that has so dominated global attention over the past few years, and that high food prices bring about vulnerability and instability. “A hungry world is an unjust world,” he noted. Recognizing smallholder farmers for their role in feeding the world, and helping them to expand and transform their contribution, is the way to end that injustice while protecting the earth for future generations.

36 African Union, NEPAD, CAADP and COMESA, *The 10 Per cent that Could Change Africa*, available at: www.caadp.net/pdf/CAADP_Forum_Reprint1.pdf.

37 UNCSO Secretariat, *Rio 2012 Issues Brief #9*, p. 4.

Annex 1.

Conversation with Dr Lindiwe Majele Sibanda

“WHAT PROMISE WILL RIO HERALD FOR AGRICULTURE?”

**Highlights from a conversation with Dr Lindiwe Majele Sibanda,
Chief Executive Officer, Food, Agriculture and Natural Resources Policy
Analysis Network**

On agriculture as a special sector.....

It has been a frustrating time since the 14th UNFCCC Conference of Parties, at Poznan [December 2008], where agriculture was a dirty word. There was no mention of agriculture in the climate talks. But one thing that is clear is that you cannot talk about climate change without talking about agriculture. This is a sector that has the highest emissions of greenhouse gases and yet it is also the sector that feeds the 7 billion of the world, so surely it is a special sector that needs to be removed from all the other sectors and not be treated at par with energy, transport and other sectors, because agriculture is special. If we use the right technologies we can make sure that we adapt to climate change, we can also reduce the emissions from agriculture, but most importantly we can produce enough food to feed people. What was frustrating in Durban is that we had to make excuses, we had to beg our negotiators to ring-fence agriculture. We lacked the political leadership that would make the directive through the negotiators to say agriculture is a key sector, take it out of the bunker and deal with it as a special sector.

But we celebrated a bit because for the first time in the history of the negotiations agriculture has a foot in the door. We are being asked to make submissions by 5 March [2012] to justify why agriculture is a special sector, and I want to believe every Member State that has recognition under the UNFCCC process will fight for agriculture.

There has been a big divide between the developed and developing countries. This year the developed countries were clear that agriculture is important, but the division was amongst us, the Group of 77. We failed to speak with one voice. We hope in Rio we will be able to amplify our voices and get political leadership that will fight for sustainable development, that will fight for green economies, but taking into cognizance that there is no sustainable development without sustainable agriculture.

On Rio+20....

I think what is exciting about Rio is that there has been recognition that agriculture is key. But we are a bit saddened that the link between agriculture and the people who produce the food, the farmers, is still very weak. Even weaker is the link between agriculture and women. What we are saying is, for as long as we talk agriculture and do not take a full value-chain approach to the whole sector, we are shooting ourselves in the foot. Because we can talk agriculture and food security, but if we do not put our farmers first, if we do not invest in making the farmers get the right tools and policies they need for producing food in a sustainable way, we are not going to win.

I think we have reason to smile because the United Nations family, under The Future We Want campaign, has articulated seven things that they want to see happen. They speak to jobs, so we need more jobs to be created; we need greener energy; we need greener cities; they speak to food; they speak to water; they speak to oceans; and disaster-free nations. So I think in terms of asking what do we want Rio to deliver, those are the seven thematic areas where we are looking for tangible deliverables. I think we can all be accommodated within that list of seven. We need to articulate how to ask them. I think clearly there can be no global deal without agriculture in the centre of development. There is no sustainable development without agriculture and there is no green economy without agriculture.

On policymaking for agriculture.....

There is a disjoint between the scientific evidence that we have on the table and the policies that we have, so that link will need to be tightened if we are going to talk about sustainable agriculture. I think that we are living in an era of participation. We have tended to create platforms for engagement at the global level but failed to create these platforms at the local level, particularly for Africa, where you are talking of illiteracy of up to 60-70 per cent in some countries and yet everything is still written down and we do not use the radio. We do not use community theatre, just to depict the policies we have in place and how the local voice can inform that process. So we need to change our game. We need to bring more participation of the very people who are affected by the problems we seek to solve.

If you look at the riots that we had in 2007 and 2008 with the food shortages, our policymakers listened. There was not enough food and those who had the food had closed their borders and they could not import from other countries. All this points to a sector whereby the people have to participate in the policymaking process, but we believe that the science has to be in the centre; we believe that the indigenous knowledge that our farmers already have, the coping mechanisms, have to be used to inform policies that are implementable. Currently we have policies that are good on paper but they are not relevant to the plight of the people on the ground.

Farmers have been robbed by the policy process, as their assets have been depleting as they try to cope with the erratic weather on their own with minimum support. We have to have investments in infrastructure that will allow farmers to buy their inputs at affordable rates, and have the policies that make sure that your labour on the soil will yield results that allow you to have a decent livelihood.

On political leadership....

I think the sad thing is that policies are within our reach but political leadership needs to put the right policies in place. Once you have the right policies you need to invest, and they are critical ingredients for the agricultural sector. Unfortunately we take a silo approach where, for Africa, after a good 2003, our ministers and our presidents made agriculture a priority through the CAADP Framework, the Comprehensive Africa Agriculture Development Programme, whereby countries committed to putting 10 per cent of their budgets into agriculture. Up to 2012 we only have 10 African countries that are meeting that target. Why is that so? Because people argue that, 'well, we are investing in the ministry of transport, and in other ministries'. But these two ministries are not talking to each other, so we need ministers of finance who can stand up to the call and say 'we need to produce food, our farmers can produce the food, we need to equip them with the right policies and the investment, the infrastructure and the knowledge so that they can have functional markets both to purchase the inputs, purchase the food, and distribute it to the consumers'.

On making agriculture a dignified profession....

Can we bring dignity to the farming profession? We saw the mothers in Kenya [in the IFAD video shown to the audience] who are now able to send their children to school with the money from farming. Surely we need to scale up. We cannot be talking about islands of success. The farmers are willing to continue farming but governments need to meet them half way. Private sector needs to come in and we need to professionalize and make farming a business that yields returns.

Let us put the farmer first and give them the tools for what they know best. For young people, I think it is important to look at agriculture value chains. Young people can go into agriculture through the inputs industry; they can go into the actual farming, there is also the processing, the post-harvest care of the commodities, there is also the marketing side and there is also the science, the research, that is also an avenue. I think what our policies are not doing is to interface the education system with the agriculture system, and it is back to this silo approach where we talk about sustainable development and fail to put agriculture at the centre, as a driver of that sustainable development and a sector that can create the green jobs we are looking at. There are opportunities and Africa has a youthful population. I think 44 per cent of the population in Africa is under 15 – so we have a looming challenge. The time to address the employment needs of these people is now, and agriculture can provide that opportunity.

Annex 2.

Conversation with Mr Bill Gates

“SUSTAINABLE AGRICULTURAL PRODUCTIVITY: THE KEY TO POVERTY REDUCTION”

Highlights from a conversation with Mr Bill Gates, Founder and Co-chair, Bill & Melinda Gates Foundation

On fighting hunger and poverty....

If we look at the last few decades, the international community has not done as much as it could to fight hunger and poverty. Whether we measure it by the amount of reform or the level of investment, it simply has not been centre stage. In South Asia, the pace of productivity growth has slowed dramatically. In sub-Saharan Africa, it never improved a great deal, and those improvements are far too slow. Compared to what is possible, compared to the digital tools of the present, the system we have is outdated and somewhat inefficient. So we need to take country systems, the food agencies and the donors and get them working together in a focused and coordinated way to take advantage of these opportunities to provide small farmers what they need, when they need it.

On smallholder farmers....

More productive small farmers are the key to achieving the Millennium Development Goals on hunger and poverty. Sustainable yield increases can lead to better living for farm families; they will make food more accessible and cheap for the urban poor. As we look at the opportunities, we believe that it is possible for small farmers both in South Asia and sub-Saharan Africa to double their yields in many cases, and in some cases even triple their yields in the next 20 years while preserving the land for future generations. This is an ambitious goal. To meet it, farmers in both regions will have to increase productivity four times faster than they have done in the last 20 years. In human terms, the benefits of these productivity increases would be massive. They translate into more than 400 million people lifting themselves out of poverty. With this vision in mind, I urge IFAD, FAO and WFP to come together to create global productivity targets for small farmers and a system of scorecards to measure how national systems, food agencies and donors are contributing towards the goals of reducing poverty.

On a digital revolution for agriculture....

To meet any ambitious productivity target, we also have to think hard about how to start taking advantage of the digital revolution that is driving innovation in many places, including opportunities for agricultural innovation. A huge part of the job we share [with IFAD] is bringing today's breakthrough agricultural science and technology to help poor farmers. Seeds are just one great example of this. Advances in genomics are changing the way breeders do their work. Let us consider cassava as an example of what this new approach to breeding can do. It is very hard to breed cassava. The plants do not flower easily. We do not have pure breeding lines.

The heritability of key traits is very low. As a result, breeding cycles now take about five years, which means it takes about a decade before you can get a new variety out into the field.

But by taking software approaches and using algorithms to link sequence data from the cassava genome to the phenotype of what we are seeing in the field, we can develop a prediction for how different seeds will perform. So the breeding cycle can be reduced to less than two years. Breeders in developing countries will be able to use sequencing information to predict how tiny seedlings will perform. So the breeding cycle can be reduced to less than two years. And it is not just a shorter cycle. It is also a much higher-quality cycle because breeders will be able to look at multiple traits and focus on the seedlings that combine those traits in the right way. So, in the world we face, with increased climate change, with increased plant diseases threatening small farmers who are already dealing with very low yields, these techniques can make the difference between suffering and self-sufficiency. The question is, how do we accelerate applying these to benefit the people who need them most?

This digital revolution goes beyond seeds. Technology as simple as a digital video camera can be used to record women farmers talking about best practices, and we can take those videos around and use them to help other women farmers understand what the best practices are for them. We have a project using this approach called Digital Green in India. Over the next few years it will reach over 1 million farmers in 10,000 villages. We need to recognize the innovations no matter where they come from and get them out so they are providing the greatest benefit, and the international agricultural system needs to be playing a central role there.

On getting technology to the smallholder farmers....

In agriculture, that mapping to those most in need will not just happen, because the market forces always favour innovating for the rich farmer rather than the farmer who has the greatest need. So market forces are important, market mechanisms are important, but all of us know that that alone will not do the job. The stakes here are very high. If we can find a way to channel this digital revolution to the poorest, they will catch up, they will leapfrog the systems that were not available to them, but if we do not do it we will have a digital divide in agriculture similar to what we have in other areas.

On nutrition and agriculture

As a Foundation one of the metrics that we have been really pushing for, that bridges our health and agriculture work, is trying to dimensionalize the problems that kids have between diet and health, where they do not have full mental development. There are some very strong indicators that this is a huge thing that holds Africa back, mostly due to the episodes of diarrhoea and lack of certain nutrients, and that needs a very strong call to action. Nutrition relates directly to agricultural productivity. When it comes to micronutrients there are different strategies. We are behind a group called GAIN (Global Alliance for Improved Nutrition) that does bio-fortification where you actually change the seed lines to get vitamin A, iron and various other micronutrients into the crops.

On making the voices of the farmers heard....

Farmer organizations are a key element, and particularly in terms of creating a loud enough voice about the things that the agricultural ministry needs to do better. It is only by bringing farmers together that you will be able to say the fertilizer policies are not right; the seed policies are not right; we are not getting enough education; we have a disease problem that you need to go through the entire system and find an innovation that can come here and stop this cassava

disease from causing a huge disaster. There are lots of very successful farmer organizations in Africa. I think the path to success is to have more of them. A lot of IFAD projects are partnered with farmer organizations. I would say more and more of our on-the-ground projects are as well. How do we facilitate those organizations being a more powerful voice?

On climate change and smallholder farming....

The weather has always been a problem. The climate change will make the weather more variable. You will have more droughts, more floods. The things we need to do for farmers to help them deal with the climate in general is to have seeds that are more resistant that can deal with heat, to have better storage, to have better productivity. These are things that even if we did not have climate change, these are things we need to do. We need strategies to help poor farmers deal with climate change. We have not paid enough attention to small farmers; they are the ones who are going to suffer, whereas they are not the ones who have contributed to the problem. We do not need to set up the FAO for climate change or something; we need to improve the agricultural sector to deal with climate variability.

Annex 3.

Composition of the centre-stage events, high-level panels and side events

Centre-stage event: What promise will Rio herald for agriculture?

Conversation with: Lindiwe Majele Sibanda

Moderator: Naga Munchetty

Centre-stage event: Sustainable agricultural productivity: the key to poverty reduction

Conversation with: Bill Gates

Moderator: Isha Sesay, international broadcaster

High-level panel: Feed the world, protect the planet

Moderator: Nik Gowing, international broadcaster

Panellists:

Pamela K. Anderson, Director General, International Potato Center

Nivedita Banerji, Co-founder and Secretary, Samaj Pragati Sahayog

Estrella Penunia Banzuela, Secretary General, Asian Farmers' Association for Sustainable Rural Development

Andre Leu, President, International Federation of Organic Agriculture Movements

Bruce McNamer, President and CEO of TechnoServe

High-level panel: From words to actions: Creating a sustainable future for smallholder farmers

Moderator: Naga Munchetty, international broadcaster

Panellists:

Nemesia Achacollo Tola, Minister of Rural Development and Land, Plurinational State of Bolivia

Akinwunmi Ayo Adesina, Minister of Agriculture, Nigeria

Mehmet Mehdi Eker, Minister for Food, Agriculture and Livestock, Turkey

Carlos Seré, Chief Development Strategist, IFAD

Side event: Investing in green agriculture: the role of the diaspora

Moderator/Panellist: Pedro De Vasconcelos, Programme Coordinator, IFAD's Financing Facility for Remittances

Panellists:

Ibrahim Hagi Abdulkadir, Permanent Representative of the Transitional Federal Government of Somalia to FAO and IFAD

Virgilio A. Reyes, Jr, Permanent Representative of the Philippines to FAO, WFP and IFAD

Estrella Mai Dizon-Anonuevo, Executive Director, Atikha Overseas Workers and Communities

Tawfiq El-Zabri, Results Based Management Officer, Asia and the Pacific Division, IFAD
Fatumo Farah, Director, Himilo Relief and Development Association
Rose Thompson-Coon, IFAD Acting Country Programme Manager, Somalia

Side event: Achieving food security in sub-Saharan Africa through conservation agriculture

Moderator: Melissa Bell, international broadcaster

Panellists:

Ken E. Giller, Chair of Plant Production Systems, Wageningen University, the Netherlands
Dennis Garrity, Chairperson, Landcare International, World Agroforestry Centre, Kenya
Djime Adoum, Minister of Agriculture and Irrigation, Chad
Florence Chenoweth, Minister of Agriculture, Liberia
Collins Khatiko, Senior Officer, Conservation Farming Unit, Zambia Farmers' Union
Ibrahima Coulibaly, President, National Coordination of Farmers Organisation (CNOP), Mali

Side event: Community and participatory management of natural resources: Experiences from Mesoamerica's indigenous peoples and forest communities

Moderator/Panellist: Levi Sucre Romero, Coordinator, Alianza Mesoamericana de Pueblos y Bosques (AMPB)

Panellists:

Betanio Chiquidama, General Chief of Embera Wounaan group
Marcedonio Cortave, Executive Director, Association of Forest Communities of Petén
Victorio Flores Aguilar, President, Board of Directors, Federation of Agroforestry Producers of Honduras
Gustavo Sánchez, Governing Council Chairman, Mexican Network of Campesino Forestry Organizations

Side event: Crops for the future: enhancing resilience of smallholder farmers through improved crop varieties in the context of climate change

Moderator: Stephan Weise, Deputy Director General (Research), Bioversity International

Panellists:

Tehmina Janjua, Ambassador-designate, Islamic Republic of Pakistan to Italy, Albania, San Marino and Slovenia
Mahubub Hossain, Executive Director, BRAC, Bangladesh
Digna Manzanilla, Agricultural Economist, International Rice Research Institute, Philippines
Henry Saragih, Head, Indonesian Peasant Union and General Coordinator, Via Campesina
Wael Seif, Director, Water Resources Department, Arab Center for the Studies of Arid Zones and Dry Lands
Mahmoud Solh, Director General, ICARDA

Annex 4.

Biographies of panellists

Centre-stage event with Mr Bill Gates: Sustainable agricultural productivity – the key to poverty reduction

Mr Gates is Co-chair of the Bill and Melinda Gates Foundation and Co-founder and Chairman of Microsoft Corporation. He is an investor, philanthropist and author. His foundation works to improve people's health and to alleviate hunger and extreme poverty. Its agriculture development work focuses on helping small farmers become self-sufficient.

Centre-stage event with Dr Lindiwe Majele Sibanda: What promise will Rio herald for agriculture?

Lindiwe Majele Sibanda is Chief Executive Officer of the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN). A leading supporter of the Farming First campaign, Dr Sibanda advocates a holistic approach to sustainable agricultural development. At FANRPAN she coordinates policy programmes aimed at making Africa food secure. Since 2009 she has led the 'No Agriculture, No Deal' global campaign that has mobilized African civil society organizations to push for the inclusion of agriculture in the negotiations on the United Nations Framework Convention on Climate Change. Recently Dr Sibanda joined some of the world's most influential thinkers and provocative voices on the future of agriculture as a member of the Guardian Global Development advisory panel.

High-level panel: Feed the world, protect the planet

Pamela K. Anderson, Director General, International Potato Center

Prior to becoming Director General of CIP, Dr Anderson served as the Deputy Director General of Research at CIP and as Senior Entomologist at the International Center for Tropical Agricultural, in Cali, Colombia (1997-2002). She has served as an adviser to the Federation of American Scientists, a Research Consultant at Harvard University and a member of the Government of Ireland Hunger Task Force. Dr Anderson is an expert on emerging plant diseases. Her research has also included extensive work in agricultural entomology, ecology and plant virus epidemiology, and agriculture-human health linkages, always related to food security and income generation for resource-poor populations in the developing world.

Nivedita Banerji, Co-Founder and Secretary, Samaj Pragati Sahayog (SPS)

Over the past 20 years, SPS has grown to be one of India's largest non-governmental initiatives for water and food security, working with its partners on a million acres of land across 72 of the country's most deprived districts. The work of SPS shows that women-led, farmer-driven, location-specific watershed development combined with bio-diverse agriculture, other nature-based livelihoods and people-centred microfinance can result in sustained higher incomes and empowered communities. It has benefited millions of tribal people across central India.

Estrella Penunia Banzuela, Secretary General, Asian Farmer's Association for Sustainable Development (AFA)

Established in 2002, AFA is currently composed of 10 national farmers' organizations in 8 countries, representing around 11 million small-scale farmers, both women and men. As a social development worker, Ms Penunia Banzuela has spent all her professional years in the field of rural development, working with farmers, fishers and indigenous peoples in various capacities, including community organizer, participatory action researcher, trainer, gender advocate, consultant, campaign coordinator, NGO executive/manager and networker.

Andre Leu, President, International Federation of Organic Agriculture Movements

Mr Leu has over 20 years of experience teaching at the tertiary level and holds university degrees in communications and adult education. He has 40 years of experience in all areas of organic agriculture, including growing, pest control, weed management, marketing, post-harvest management, transport, grower organizations, development of new crops and education, in Australia and many other countries. Mr Leu and his wife own an organic tropical fruit orchard in Daintree, Queensland.

Bruce McNamer, President and CEO, TechnoServe

TechnoServe is a non-profit economic development organization that helps entrepreneurial men and women in the developing world to build businesses that provide jobs, income and economic opportunity. Before joining TechnoServe, Mr McNamer was a senior executive/founder at the start-up companies Verified Identity Pass (Clear ID), Appfluent Technology and Varsity Group. He was an investment banker at Morgan Stanley and a management consultant at McKinsey & Company. He was also a White House Fellow at the National Economic Council and a Peace Corps Volunteer in Paraguay.

**High-level panel: From words to actions:
Creating a sustainable future for smallholder farmers**

Akinwunmi Ayo Adesina, Minister of Agriculture, Nigeria

Mr Adesina served as Vice-President (Policy and Partnerships) for the Alliance for a Green Revolution in Africa. He is a distinguished agricultural economist with over 20 years of professional experience in African agriculture.

Carlos Seré, Chief Development Strategist, IFAD

Prior to joining IFAD, Mr Seré worked as Director General for the International Livestock Research Institute in Nairobi. Before that, he worked for the International Development Research Centre as Director of the Regional Office for Latin America and the Caribbean in Montevideo, Uruguay. From 1982 to 1990, Mr Seré worked as Senior Economist and Head of the Economics Section of the Tropical Pastures Program at the Centro Internacional de Agricultura Tropical in Colombia.

Mehmet Mehdi Eker, Minister for Food, Agriculture and Livestock, Turkey

Dr Eker was appointed Minister in 2005. Previously he held other positions in the Ministry, including Director General of Protection and Control and Assistant Director General, General Directorate of Agricultural Production and Development. In the 1980s Dr Eker was a veterinarian specialist with the Directorate of the Board of Research, Planning and Coordination in what was then the Ministry of Agriculture and Rural Affairs.

Nemesia Achacollo Tola, Minister of Rural Development and Land, Plurinational State of Bolivia

Ms Tola was appointed Minister in January 2010. The daughter of agricultural migrants, she has had a long career in union leadership in her native Santa Cruz. She became Santa Cruz departmental leader of the Bartolina Sisa National Federation of Campesino Women of Bolivia in 2001 and Executive Secretary of Bartolina Sisa in 2004. In 2003 she was chosen as departmental leader of the Movement for Socialism.

Side event: Investing in green agriculture: the role of the diaspora

Ibrahim Haji Abdulkadir, Permanent Representative of the Transitional Federal Government of Somalia to FAO and IFAD

In the past two decades, since the collapse of the Somali state, H.E. Ambassador Ibrahim Haji Abdulkadir has led Somali community and intellectual associations. In this role he has promoted and organized many social activities and forums on issues affecting the Somali diaspora and the reconstruction of the Somali state.

Virgilio A. Reyes, Jr, Permanent Representative of the Philippines to FAO, WFP and IFAD

Before assuming his current position in November 2011, H.E. Ambassador Virgilio A. Reyes, Jr served the Philippine Government in various capacities in several countries. He was Ambassador Extraordinary and Plenipotentiary in South Africa with jurisdiction over eight other countries (2003-2009); Minister and Consul General at the Philippine Embassy in Chile (1998-2000), Mexico (1997-1998) and Myanmar (1994-1997); and Third, Second and First Secretary at the Philippine Mission to the United Nations (1983-1991). He served in the Home Office as Director of the China Division of the Asia-Pacific Affairs Office as well as Vice-Director of Ceremonials in the Office of Protocol and Special Assistant to Foreign Affairs Secretary Carlos P. Romulo. Mr Reyes also worked as Executive Director of the Office of Policy Planning and Coordination, Special Assistant in the Office of the Undersecretary for Special Projects and Executive Director of the Maritime and Ocean Affairs Center. His last position, from 2009 to 2011, was Assistant Secretary for Middle East and African Affairs at the DFA.

Pedro De Vasconcelos, Programme Coordinator, IFAD's Financing Facility for Remittances

Pedro De Vasconcelos joined IFAD in 2007 as Programme Coordinator of the Financing Facility for Remittances. From 1998 to 2000, he served at the United Nations Conference on Trade and Development in Geneva under the project MicroBanks in cooperation with the Banque Internationale à Luxembourg. He then joined the Multilateral Investment Fund of the Inter-American Development Bank in Washington, D.C., and was responsible for launching and coordinating the remittance programme for Latin America and the Caribbean until early 2007.

Estrella Mai Dizon-Anonuevo, Executive Director, Atikha Overseas Workers and Communities

Estrella Mai Dizon-Anonuevo has been Executive Director of Atikha Overseas Workers and Communities Initiatives Inc. since 2005. Previously she worked as a researcher at the Frankfurt Institute for Women Research and co-authored the book *Ein Traum vom Besseren Leben*

(*A Dream of a Better Life*). She also worked on the research staff of the Center for Women's Resources and authored the publication *Migration of Women: The Social Trade Off*. She is one of the editors of *Women Migration and Reintegration*, a book on research conducted by Atikha on the social cost of migration and the plans for reintegration of migrants in Hong Kong (China) and Italy. Ms Dizon-Anonuevo also led the management of several migration and development projects including the EC-UN Joint Migration and Development Initiative and an IFAD-assisted project that involved engaging and mobilizing the resources of migrants from Italy towards agri-based cooperative in the Philippines.

**Tawfiq El-Zabri, Results Based Management Officer,
Asia and the Pacific Division, IFAD**

Tawfiq El-Zabri, an economist by training, worked at the World Bank and IMF before joining IFAD in 2000. Mr El-Zabri's family migrated repeatedly in pursuit of education and work opportunities, while maintaining a close link with their village and relatives in the Occupied Palestinian Territory before returning home for retirement. He witnessed similar dynamics in roles as IFAD Country Programme Manager for Romania, the former Yugoslav Republic of Macedonia, Jordan and Somalia and as the responsible officer for programmes in the Occupied Palestinian Territory. He worked with rural and migrant communities to channel resources and investments to support locally driven change.

Fatumo Farah, Director, Himilo Relief and Development Association

Himilo Relief and Development Association is a leading migrant development organization focused on linking migration and development. During her tenure, Ms Farah has advocated the importance of migrants' contribution to their home countries. Over the years, she has set up a social enterprise focusing on capacity building. In 2006, Ms Farah won the Best Migrant Idea award from the Netherlands' migrant organization Stichting Mondiale Samenleving.

Rose Thompson-Coon, IFAD Acting Country Programme Manager in Somalia

Rose Thompson-Coon joined IFAD in 2008 as an Education and Gender Officer in the Belgian Fund for Food Security Division. In January 2011 she joined the Near East and North Africa Division. Since August 2011 she has managed the IFAD Somalia country programme and provided support to other Near East and North Africa portfolios on thematic issues such as gender and youth employment. Prior to joining IFAD, Ms Thompson-Coon worked as a development consultant for the Finnish Consulting Group. She also has many years of experience in the education sector in Finland.

**Side event: Achieving food security in sub-Saharan Africa
through conservation agriculture**

**Ken E. Giller, Chair of Plant Production Systems, Wageningen University,
the Netherlands**

Professor Giller's field of expertise covers resources for production of crops and livestock with emphasis on the temporal and spatial dynamics of resources within farming systems and their interactions. His research interests include resource utilization efficiency and scaling in systems analysis, focusing on the role of nitrogen-fixing legumes in provision of food, feed, fuel and soil fertility in tropical farming systems. He leads a number of initiatives such as N2Africa (Putting Nitrogen Fixation to Work for Smallholder Farmers in Africa), NUANCES (Nutrient Use in Animal and Cropping Systems: Efficiencies and Scales)

and Competing Claims on Natural Resources. He joined Wageningen University as Chair of Plant Production Systems in 2001 after holding various teaching positions at Wye College, University of London, and University of Zimbabwe.

**Dennis Garrity, Chairperson of Landcare International,
World Agroforestry Centre, Kenya**

Dr Garrity is also a Distinguished Board Research Fellow at the World Agroforestry Centre, the global leader in advancing the science and practice of cultivating trees on farms, and Drylands Ambassador to the United Nations Convention to Combat Desertification. A systems agronomist and research leader, Dr Garrity has focused on the development of small-scale farming systems in the tropics. He is involved in a global effort to reconsider the future of agriculture in the 21st century by examining unconventional ways of creating more productive and environmentally sound farming systems. Dr Garrity also chairs the Steering Committee for Landcare International, a global effort that supports grass-roots community-based natural resource management. Previously, he served as Regional Coordinator of the Southeast Asia Programme of the World Agroforestry Centre, based in Bogor, Indonesia, and was agronomist and head of the Agroecology Unit at the International Rice Research Institute in the Philippines.

Djime Adoum, Minister of Agriculture and Irrigation, Chad

Dr Djimé Adoum, a graduate of the University of Maryland, served several years at the U.S. Department of Agriculture. In Chad he worked with the Director of Planning and Accountability for the development of systems. He directed the Independent Commission for Inclusive Dialogue, which led to a negotiated solution to the conflict between the Chadian government and armed opponents of the Eastern region. In March 2010 he was appointed Technical Advisor for Rural Development at the Presidency of the Republic of Chad and in September 2011, he became the Minister of Agriculture and Irrigation.

Florence Chenoweth, Minister of Agriculture, Liberia

Ms Chenoweth is an influential global agriculture development and human rights expert with more than 35 years of experience in developing policies and programmes; training/educating on agricultural conservation, reforms and rural development; and collaborating across political organizations at the local, state and international level. Ms Chenoweth is an expert at agricultural and human rights disciplines.

Collins Khatiko, Senior Officer, Conservation Farming Unit, Zambia Farmers' Union

Collins Nkatiko has over 20 years of experience in the agricultural sector in Zambia and currently serves as Director of Field Operations and Programme Manager for the Conservation Farming Unit. Prior to joining the Unit he served in different capacities in development projects and as a Senior Officer in the Ministry of Agriculture for more than 18 years. He holds a Bachelor's degree in agronomy and a Master of Science in applied entomology.

**Ibrahima Coulibaly, President, National Coordination
of Farmers Organisations (CNOP), Mali**

CNOP is a member organization of La Via Campesina, a consortium of organizations and part of a global movement of peasants, family farmers and indigenous and landless people.

Side event: Community and participatory management of natural resources: Experiences from Mesoamerica's indigenous peoples and forest communities

Betanio Chiquidama, General Chief, Embera Wounaan

Mr Chiquidama has served as Embera Coordinator in Panama's Ministry of the Interior and Justice, Coordinator of the BioDarién Project, CPD Leader for the Pro Darién Project and legal representative to the Government of Panama for the implementation of government projects in the administrative region (comarca). Currently he is the Regional Chief of Sambú and President of the National Coordinating Office for Indigenous Peoples of Panama.

Marcedonio Cortave, Executive Director, Association of Forest Communities of Petén

Since 1990 Marcedonio Cortave has been involved in environmental activities, particularly natural resource management and conservation, and has played a leading role in fighting for legal access by communities to the management and conservation of natural and cultural resources. He is the founder of ACOFOP, an association of communities that manages a system of community forest concessions in the Maya Biosphere Reserve. He has been the recipient of several awards for his work, including an Unsung Hero award from the United Nations in Guatemala and a National Geographic award for conservation leadership in Latin America – the first of its kind awarded to a Latin American recipient.

Victoria Flores Aguilar, President of the Board of Directors, Federation of Agroforestry Producers of Honduras

Victoria Flores Aguilar has been a member of the San José Limited Agroforestry Cooperative for 17 years. She is a member of the Reducing Emissions from Deforestation and Forest Degradation (REDD+) Subcommittee of the National Climate Change Directorate, Sub-Coordinator of the Forestry and Land Use Planning Panel for Region 2 of the Comayagua Valley (National Plan) and Vice President of the Indigenous and Campesino Coordinating Association for Community Agroforestry in Central America. Ms Flores Aguilar was a presenter at United Nations headquarters on political lobbying for the National Forestry Project of the Food and Agriculture Organization of the United Nations in Central America and on local governance issues in 2005, and on forestry at the World Forestry Congress in New York in 2000 and 2005. She has represented Honduras on official government delegations at Conferences of the Parties to the United Nations Convention to Combat Desertification.

Gustavo Sánchez, Chairman of the Governing Council, Mexican Network of Campesino Forestry Organizations

The Governing Council of the Mexican Network of Campesino Forestry Organizations, also known as the MOCAF Network, is a civil association set up in 1994 that brings together 50 local forestry organizations of campesinos and indigenous people. By promoting community-based development of forests, the MOCAF Network seeks to raise the standard of living for rural people, particularly those in forest regions. The MOCAF Network takes part in discussions on and design of public policy on rural and forest matters and promotes strengthening of capabilities among its member organizations. It also works to disseminate information among campesino and indigenous populations on relevant matters such as the debate around the National Strategy for Reducing Emissions from Deforestation and Forest

Degradation (REDD+). The MOCAF Network is part of the National Forestry Council and the Mexican Council for Sustainable Rural Development. It currently chairs the Mexican Network of Efforts to Combat Desertification and the Degradation of Natural Resources.

Levi Sucre Romero, member of the Bribri indigenous culture of Talamanca (Costa Rica)

Levi Sucre Romero is an expert on indigenous organizational, cultural and environmental issues in Central America. She has more than 20 years of experience in rural development and community organization, and more than 15 years of experience in the development, implementation and evaluation of projects in communities and indigenous territories. Ms Sucre Romero currently heads the technical and organizational development of RIBCA, which brings together eight indigenous territories in Costa Rica, and coordinates the Executive Commission of the Mesoamerican Peoples and Forests Alliance. She is an agricultural producer and indigenous leader in the Bribri Territory of Talamanca.

Side event: Crops for the future: Enhancing resilience of smallholder farmers through improved crop varieties in the context of climate change

Tehmina Janjua, Ambassador-designate of the Islamic Republic of Pakistan to Italy, Albania, San Marino and Slovenia

Since joining the Pakistani Foreign Service in 1984, Ms Janjua has worked in various countries and regions including the former Soviet Union and Eastern Europe. Prior to her current role, she was a spokesperson at the Ministry of Foreign Affairs and Director General of Strategic Planning at the Foreign Secretary's Office in Pakistan.

Mahabub Hossain, Executive Director, BRAC, Bangladesh

Dr Mahabub Hossain, also known for his work on the evaluation of the Grameen Bank microcredit programme, received the first Gold Medal from the Bangladesh Agricultural Economist Association. In his long career Dr Hossain has contributed to research on development economics and agricultural development policy in South and Southeast Asia. He has been instrumental in the development of the Asian rice economy. His work in identifying the constraints and impact of agricultural technology on income distribution and poverty influenced the formulation and priority-setting of research programmes at the International Rice Research Institute and in several national agricultural research systems. In 2007 Dr Hossain joined BRAC as its Executive Director. In this capacity he led poverty reduction programmes focusing on empowering women in Afghanistan, Bangladesh, Haiti, Liberia, Pakistan, Sierra Leone, South Sudan, Sri Lanka, the United Republic of Tanzania and Uganda.

Digna Manzanilla, Agricultural Economist, International Rice Research Institute, Philippines

Dr Digna Manzanilla, a passionate researcher, worked with the Government of the Philippines and with international organizations and partners in Asia prior to joining IRRI in 2008. At IRRI, she has contributed to a number of research projects including the development of response plans, assessment of outcomes and estimation of economic losses of submergence-tolerant rice varieties and associated production practices in Southeast Asia. Dr Manzanilla also serves as associate coordinator for the Consortium for Unfavourable Rice Environments for the consortium of national research and extension systems. Her research

focuses on socio-economic dimensions of rice research in unfavourable environments; technology validation and dissemination strategies; gender issues and participatory approaches in development; research-to-impact pathways; and capacity building and knowledge management.

Henry Saragih, Head of the Indonesian Peasant Union and General Coordinator of Via Campesina

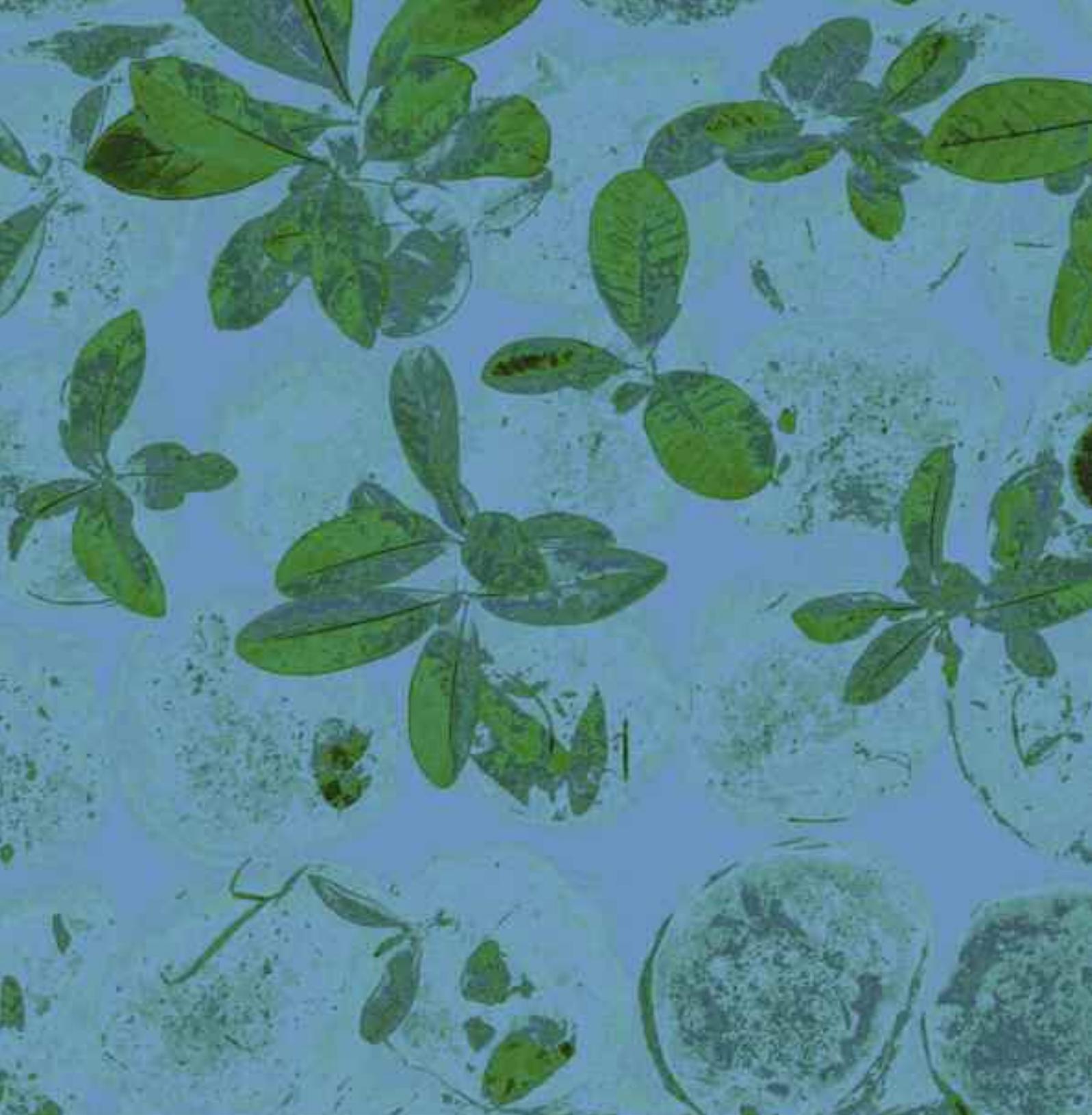
Over the years, Mr Saragih has been advocating for farmers' issues and rights. Thanks to his lobbying efforts with the United Nations, today the role and rights of smallholder farmers are recognized across the world. In Indonesia, his movement is pushing for a Law on Farmers' Protection and Empowerment and an amendment of the Law on Food. Mr Saragih leads a global movement for food sovereignty, advocating a return to locally produced food to address the global food crisis and environmental degradation. He is also a member of the Steering Committee of the Farmers' Forum.

Wael Seif, Director of the Water Resources Department, Arab Center for the Studies of Arid Zones and Dry Lands

Dr Wael Seif is an expert in hydrogeology and integrated water resources management. In 2005, he joined the Department of Water Engineering in the Faculty of Civil Engineering in Damascus University, where he still teaches water management, hydrogeology and hydraulics at undergraduate and graduate levels. He has contributed to national water strategies, river basin policies and water policy development at local and national level. Since 2005, Dr Seif has also served as resident adviser for the Syrian Dutch Water Cooperation. He supported the establishment of the Raqqa water training centre and led the capacity-building programme in integrated water resources management.

Mahmoud Solh, Director General, International Center for Agricultural Research in the Dry Areas

Dr Solh returned to ICARDA in 2006 as Director General after 16 years of working in various capacities. These included Lentil Breeder, Regional Food Legume Breeder in North Africa, Regional Coordinator of the Nile Valley and Red Sea Regional Programme, and Assistant Director General for International Cooperation. He also spent four years leading the Plant Production and Protection Division at the Food and Agriculture Organization of the United Nations. Throughout his career, his activities have focused on food security, poverty alleviation, and sustainable agricultural systems; planning, implementation and evaluation of agricultural research for development; capacity building and human resource development in national agricultural systems; and promotion of North-South and South-South cooperation.



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