Climate change and the future of smallholder agriculture

How can rural poor people be a part of the solution to climate change?

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IFAD Policy Reference Group on Climate Change
The preparation of the paper was co-ordinated by Mr. Atiqur Rahman

For queries on the paper and work of the Policy Reference Group on Climate Change at IFAD, contact Atiqur Rahman, Policy Division, IFAD, Rome, Italy (e-mail: at.rahman@ifad.org; telephone: +39 06 5459 2390; fax: +39 5459 3390).

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QUESTIONS GUIDING THE ROUND-TABLE DISCUSSION

- How can poor rural people be helped to adapt to a new magnitude of climate change?
- How can poor rural people benefit from mitigation mechanisms and be paid for the environmental services they provide?
- What can the global development community do to help the small holder farmers adapt to and mitigate the effects of climate change?

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1. The impact of climate change on agriculture and smallholder farmers

The evidence from the Intergovernmental Panel on Climate Change (IPCC) is now overwhelmingly convincing that climate change is real, that it will become worse, and that the poorest and most vulnerable people will be affected first and most.[1] One of the sectors most sensitive to global warming is agriculture.[2] Under a "business as usual scenario", agricultural productivity in general could decline between 10 to 25 per cent by 2080. For some countries, the decline in yield in rainfed agriculture could be as much as 50 percent.[3] Such trends clearly threaten the achievement of the Millennium Development Goals (MDGs).[4]

Rural households engaged as subsistence and smallholder farmers in developing countries are most vulnerable to the impacts of climate change on agriculture.[5] Understanding the impacts in different locations and the potential responses to cope with them is still at a very early stage, even amongst researchers and governments. Nevertheless, there are some indications of the ways in which climate change will affect small holder farmers.[6] These include

- increased likelihood of crop failure;
- increase in diseases and mortality of livestock, and/or forced sales of livestock at disadvantageous prices;
- increased livelihood insecurity, resulting in assets sale, indebtedness, out-migration and dependency on food aid; and
- Downward spiral in human development indicators, such as health and education.

Such impacts will further aggravate the stresses already associated with subsistence production, such as isolated location, small farm size, informal land tenure, low levels of technology and narrow employment options, in addition to unpredictable and uneven exposure to world markets that smallholder farmers particularly risk-prone in the face of climate change. Moreover, the integration of smallholder farmers to the emerging structures and mechanisms to deal with

[1] IPCC 2007(a,b).
[2] Cline 2007a.
[3] Ibid.
[4] UNDP (2007a) depicts many ways in which climate change may adversely affect human development.
[5] Easterling et al. 2007.
[6] IPCC (2007a).

climate change has been limited. They have little access to resources and scientific knowledge, which could enable them to meet the emerging challenges of climate change effectively.

2. Response options: adaptation and mitigation

Any comprehensive strategy for addressing climate change must include both mitigation and adaptation.

For the most vulnerable people, whose livelihoods are being impacted now, adaptation is urgent. However, concerted and sustained mitigation efforts worldwide, starting with the largest contributors to greenhouse gas (GHG) emissions, are also urgent to prevent further deterioration in the medium term. Among the many mitigation measures currently under development, some could provide new opportunities to hundreds of million of smallholder farmers, pastoralists and forest dwellers, through their roles as sequesters of carbon, through the changes they can make in their land use and cultivation practices to reduce GHG emissions, and as small scale producers of clean energy.

Adaptation

Adaptation can be both autonomous and planned.[7] *Autonomous* adaptation is the ongoing implementation of existing knowledge and technology in response to the changes in climate experienced; and *planned* adaptation is the increase in adaptive capacity by mobilizing institutions and policies to establish or strengthen conditions that are favourable to effective adaptation and investment in new technologies and infrastructure.[8]

Autonomous adaptations are highly relevant for smallholder farmers. Mostly located in areas of ecological fragility, they tend to have an extensive knowledge base to draw upon in coping with adverse environmental conditions and shocks. Autonomous adaptation options can be, for example:

- changing inputs such as crop varieties and/or species and using inputs with increased resistance to heat shock and drought; altering fertilizer rates to maintain grain or fruit quality consistent with the climate; and altering amounts and timing of irrigation and other water management practices;
- making wider use of technologies to 'harvest' water, to conserve soil moisture (e.g. crop residue retention) and to use water more effectively in areas where there is a decrease in rainfall;
- utilizing water management to prevent waterlogging, erosion and nutrient leaching in areas where there is an increase in rainfall;
- altering the timing or location of cropping activities;

[7] *Autonomous* adaptation is the ongoing implementation of existing knowledge and technology in response to changes in climate. *Planned* adaptation, on the other hand, is the increase in adaptive capacity through mobilizing institutions and policies to establish or strengthen conditions favourable for effective adaptation and investment in new technologies and infrastructure. Easterling et al. (2007)

[8] Easterling 2007

- diversifying income by integrating into farming activities additional activities such as livestock raising[9]; and
- using seasonal climate forecasting to reduce production risk.

Many rural communities and indigenous peoples have been maintaining a balance between natural resource use and sustainable development for centuries, adapting autonomously to natural climate changes.

However, while many of these measures are effective against a degree of climatic variability, they may become insufficient in the face of accelerating climate change.

A longer-term planned approach for adaptation is therefore needed to secure sustainable livelihoods of smallholder farmers. It has to incorporate additional information, technologies and investments, infrastructures and institutions and integrate them with the decision-making environment. Insurances, safety nets and cash transfers to reduce vulnerability to shocks are also part of the solution.

In terms of technical options, the planned approach has to include many forms of land use and land use change, new cultivation practices, new seed varieties, etc. It must include an appropriate incentive structure, such as targeted payment for environmental services, which can expand the options that poor communities and indigenous peoples can have for both adaptation and mitigation.

Adaptation strategies can vary, and may be very location specific. They can also involve significant costs and, if the measures are not properly targeted, can produce negative impacts on the poorest and those with insecure access to land. Some adaptation options may increase competition for existing resources – for example, improving plant productivity may increase water demand for irrigation systems in dryland areas, which decreases the availability of water for those who have no access to irrigation schemes. Some adaptation measures may also increase the price of land, particularly in the rental market, thus affecting landless smallholders.

Such potential outcomes make adaptation a complex and a variable undertaking. A number of issues emerge:

How can the capacities of smallholder farmers and their organizations be enhanced so that they can go beyond autonomous adaptation and engage in longer-term planned adaptations to effectively address the uncertainties of climate change?

What specific options are there to make planned adaptation a part of a longer-term development process?

Mitigation

Agriculture is a significant contributor to GHGs.[10] It is estimated that about 10 to 12 per cent of

[9] The autonomous adaptation through diversification extends far beyond integration of other farming activities with agriculture into seeking market opportunities. These include petty trading and emigration induced by 'push' factors.

[10] This is largely because agriculture is the main source of two major greenhouse gases, nitrous oxide and methane. Of global anthropogenic emissions in 2005, agriculture accounted for about 60 per cent of nitrous

total anthropogenic emissions of GHGs are directly generated in agriculture (mostly nitrous oxide from fertilized soils and methane from livestock). If indirect emissions from the fertilizer industry and emissions from deforestation and land conversion are added, the total contribution of the agriculture sector is increased to about 26-35 per cent. About 80 per cent of these emissions come from developing countries.[11]

A variety of options for mitigation (reduction of GHGs) exist in agriculture. They fall into three broad categories:

- Reducing emissions of methane, carbon dioxide and nitrous oxide through efficient management of the flows of these gases in agricultural ecosystems for example, through managing livestock to make more efficient use of feed;

- Enhancing removals (of carbon dioxide): carbon recovery and carbon storage through improved management of agro ecosystems. Carbon storage can also promoted through agro-forestry systems and perennial plantings on agricultural lands.

- Avoiding (or displacing) emissions: crops and residues from agricultural lands can be used as a source of fuel, either directly or after conversion to fuels such as ethanol or diesel. GHG emissions, notably carbon dioxide, can also be avoided by agricultural management practices that forestall the cultivations of new lands now under forest, grassland or other non-agricultural vegetation.[12]

Use of biomass for producing energy

The West Guangxi Poverty Alleviation Project in China, supported by IFAD, is promoting the use of biomass. In 2002, the project designed 22,500 biogas tanks for poor rural households. The biogas units turn human and animal waste into a mixture of methane and carbon dioxide that can be used for lighting and cooking. As a result, over 56,000 tons of firewood is saved every year in the project, which is equivalent to the recovery of 7,500 hectares of forests.

Of particular relevance to smallholder agriculturalists is the potential of agro-forestry in mitigation. Agro-forestry systems contribute simultaneously to buffering farmers against climate variability and changing climates, and to reducing atmospheric loads of GHGs.

The agriculture sector's contribution to achieving GHG reduction goals will depend on economics as well as available technology and the biological and physical capacity of particular soils to sequester carbon.[13] In particular, smallholder farmers from developing countries must be given incentives to adopt GHG mitigation practices.

As with adaptation, along with opportunities mitigation presents many difficulties for smallholder farmers in particular. Not all mitigation options are favourable to smallholder farmers. For example, some options may lead to new demands for land by urban-based elites and carbon

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oxide and 50 per cent of methane emissions. Globally, agricultural methane and nitrous oxide emissions have increased by nearly 17 per cent between 1990 and 2005. IPCC (2007b)

[11] World Bank (2007), p. 201.

[12] These generic options are complemented by specific options such as those put up by IFAP (adoption of more sustainable agricultural practices and technologies, and sustainable land management such as zero tillage, agro-forestry, direct seeding, etc.). See address by President of IFAP at the COP – MOP 13, December 14

[13] Paustian et al., 2006

investors, which is then taken out of short-term production in the interests of long-term carbon sequestration practices (such as plantation forestry). This will have an impact on the amount of land available for livelihood activities, and will have major implications for access rights of poor rural people.[14] Mechanisms to buffer smallholders against such negative impacts associated with mitigation are therefore essential.

Overcoming these impacts will require action on many fronts. Governments, donors, international agencies, the private sector and others that focus their efforts on the agricultural and rural sectors and work towards poverty reduction could be useful partners in developing and supporting win-win situations.

In light of the discussion above, the issues for smallholder farmers for mitigation are:

Which option(s) (see the bullet points above) has(ve) the most potential for smallholder farmers?

How can payment for environmental services be employed to give incentives to smallholder farmers to provide natural resources conservation and mitigation services?

What support will smallholder farmers need beyond these from international agencies?

What potential win-win options are there for smallholder farmers? What are the specific constraints in promoting them, and how these can be removed?

3. Financing adaptation and mitigation activities of smallholder farmers

Both adaptation and mitigation will need additional[15] resources. Unfortunately, financial support for smallholder farmers for implementing adaptation and mitigation options has been too little and too slow in reaching them.

OXFAM estimates that the total cost of adaptation could be about USD50-80 billion each year (Raworth 2007).[16] UNDP (2007) puts the figure at additional USD86 billion. The investment needs in year 2030 for reducing mitigation in agriculture also runs into billions of USD.[17] Current estimates of costs are tentative,[18] and depend on the climate change scenario, and how ambitious the adaptation regimes are expected to be.

[14] Brown et al., 2007

[15] Additional to the current level of Official Development Assistance, which in 2006 stood at about USD 104 billion?

[16] UNFCCC (2007) estimates that in the agriculture, forestry and fishery sectors, a sum of about USD 14 billion will be needed to meet adaptation cost in 2030.

[17] *Ibid.* Reduction of NO2 and methane (20.2 billion USD), agroforestry (15 billion USD), reduction of deforestation (12.2 billion USD), forest management (7.2 billion), which are just a few of a long list of costs in the agro-forestry sector. Note that these are not cumulative figures.

[18] On the basis of 13 NAPA budgets, Oxfam estimates that for all developing countries an additional USD7.7 billion (projection on population basis), USD33.1 billion (projection on GDP basis) and USD14.4 billion (projection on land area use basis) are needed. See Oxfam briefing paper 104 (2007). An UNFCCC-sponsored study on financial flows estimates the cost of adaptation in the AFF sector in 2030 at about USD14 billion, but warns about the tentative nature of its estimates.

Detailed financial assessments by the United Nations Framework Convention on Climate Change (UNFCCC, 2007) and others show that the current availability of additional resources is much smaller than the need.

Adaptation

The Global Environment Facility (GEF)[19] is the primary institutional structure through which most of the funds set up under the UNFCCC and the Kyoto Protocol are channelled. There are four financial resources for adaptation currently managed by the GEF: the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF), the Strategic Priority on Adaptation (SPA) under the GEF Trust Fund and the Adaptation Fund.[20]

Through the SPA, the LDCF and the SCCF, the GEF has provided (as of 2007) USD289 million for adaptation.

The Adaptation Fund was formally set up at the 13th Conference of Parties (COP13) in Bali.[21] It is intended to support "concrete adaptation activities" and is based on private-sector replenishment through the 2 per cent levy on Clean Development Mechanism projects, plus voluntary contributions. The Adaptation Fund is expected to become the largest and most reliably funded of the existing funds. The World Bank estimates that the amount of money available may total from USD100 to 500 million by 2012.[22]

In addition, a number of bilateral funding agencies from countries such as Canada, Germany, the Netherlands, Japan, the United Kingdom and the United States have allocated funding for adaptation activities such as research and pilot projects. To date, bilateral donors have provided about USD110 million for more than 50 adaptation projects in 29 countries.[23]

In addition, the World Bank, UNDP and others (such as the Asian Development Bank) have initiated facilities to meet the growing funding needs for adaptation, mitigation and technology development. UNDP's MDG Carbon Facility is a mechanism, inter alia, to increase access of developing countries to carbon finance and leveraging networks, expertise and management capabilities to support the development of quality projects in poor developing countries to support the achievement of the MDGs, specifically the goal of sustainable development.

Access to most of these funds by smallholder farmers so far has been rather limited.[24] Among various barriers to access, the complexity of project design and implementation, and the need to comply with overwhelming administrative and financial management requirements have been identified as most critical.[25]

[19] The Global Environment Facility (GEF) is the primary financial mechanism of the UNFCCC. It provides the structure for the transfer of financial resources from developed to developing countries.
[20] GEF (2007b).
[21] The management structure of the Adaptation Fund was finalized at COP13 to the UNFCCC in Bali in December 2007, and the fund is expected to become operational in June 2008. The fund will be located at the Global Environment Facility (GEF) and will be administered by a 12-member committee.
[22] World Bank 2006
[23] Reid and Huq 2007
[24] Some of the funds are relatively new and therefore it is too early to judge their accessibility. However, most of the funds which are set up for some time are judged to have very limited accessibility by poor smallholder farmers.
[25] Solomon 2007

Mitigation

In mitigation, options for financing are much broader and are emerging rapidly. The growing market for carbon for projects and activities, through both the Clean Development Mechanism (CDM) and voluntary markets, demonstrates that the sequestration of carbon could offer opportunities for smallholder agriculturalists to gain from the mitigation potential of the agriculture sector. However, the participation of developing countries, and particularly the poorest communities within them, in the global carbon market, has been extremely challenging, because the modalities and procedures of the CDM in particular are complex and present many barriers to action.

Part of the problem lies in the detailed set of standards for CDM verification, which results in high transaction costs for CDM certification, and this excludes small-scale projects. Smallholders would tend to be uncompetitive sellers in carbon markets because of such high transaction costs. Smallholder farmers are also less likely to be competitive in terms of abatement costs of producing carbon sequestration services in general, as compared to plantations. Efforts to overcome these barriers are important in engaging small holder farmers in mitigation efforts and in making sure they benefit from the opportunities presented.

One way of effectively engaging smallholders in the mitigation process is to expand the concept of carbon trading to include compensating rural communities for soil conservation and reforestation. Again, payment for environmental services, through which poor rural people are paid for protecting biodiversity and the environment, is another option.

A number of issues arise from the foregoing discussion:

How can smallholder farmers increase their access to these resources?

How can smallholders (and their organizations) benefit from the emerging carbon market?

How can private-sector interests be linked with the needs of smallholder farmers to develop win-win situations?

4. Building partnerships to enable poor rural people to engage in adaptation and mitigation

Meeting the challenge of climate change requires the support and coordinated action of the international community as a whole. International organizations such as IFAD, FAO, WFP and other development agencies can bring their collective expertise and resources to support smallholder farmers, based on the principles of common but differentiated responsibility.

IFAD has a history and experience of working with poor rural people in a wide variety of developing country settings. Its past projects on natural resources management, on relieving water stress, aridity, flood control and desertification have produced a body of experience of doing things at the field level in meeting weather induced challenges. On the institutional side, it is further strengthening the common and inclusive framework for regular interaction between itself, governments and Farmers Organisations to work together in the field, in development programmes and in shaping pro-poor policy frameworks. IFAD houses the Global Mechanism and is an executing agency of the GEF. With its network of partners, both national and international, IFAD is well placed to bring these experiences to respond to climate change

challenge through building capacities at the national and local levels, designing climate proof investments, and mobilizing resources...

FAO has long-term experience in dealing with agriculture in general and in the forestry sector in particular. It is an important source of global technical expertise and information related to coping with climate change. Its work in the agro-forestry sector has yielded a rich body of experience that can be used for strengthening and developing effective adaptation and mitigation mechanisms for poor rural people. WFP has been at the forefront of providing support to people when climate-related disasters, and conflicts, cause mass displacement of poor people and push people into severe food insecurity. The civil societies have been very active and vocal in supporting poor rural people in meeting the challenge of climate change. And the private sector is fast becoming the major source of funds for both adaptation and mitigation. [26]

The food agencies in Rome, on their own and working together with governments, the private sector and organizations of poor rural people, can be a formidable force to support smallholder farmers to meet the challenge of climate change. They could have a wide reach and influence at the local, national and international levels. Working together they could support better assessment of climate related risks and vulnerabilities, design pro-poor projects which could qualify for support from various existing adaptation and mitigation facilities, fund research and develop technologies. In general, a partnership of the UN food and agriculture agencies in Rome and governments, broadened to include farmers' organizations and CSOs, could create a more conducive environment for helping poor rural people to be a part of the solution of climate change, an environment in which measures to address climate change could converge with and support the achievement of the first Millennium Development Goal.

What do IFAD and the other food and agriculture agencies need to do differently from what they are doing now to move in the direction of increased collaboration on climate change issues?

[26] According to UNFCCC (2007), a large part of the additional resources will be generated in the private sector.

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