



Climate change mitigation and adaptation in agriculture, forestry and fisheries

International treaties and national policies seek to enhance global efforts to mitigate and adapt to climate change. While it is important to continue to strive to reduce greenhouse gas emissions, mitigation alone is not enough and will not be felt before the second half of the century. Global warming is already underway and adaptation strategies are now a matter of urgency, especially for the most vulnerable poor countries, which are even now being disproportionately affected.

Changing climate, changing agriculture

Historically, farmers, pastoralists, forest dwellers and fishers have learned to cope with climate variability and have often adapted crops and farming practices to suit new conditions. But the severity and pace of climate change is presenting new, unprecedented challenges. The poor in rural and urban areas will be most adversely affected as they depend on climate sensitive activities and have a low capacity to adapt. Gradual changes in temperatures and precipitation as well as more frequent extreme weather are expected to result in crop failures, livestock deaths and other asset losses, thereby threatening food production but also access, stability and utilization of food resources. In some areas, the changes may well exceed the adaptation capacity of populations.

Agriculture is not only the victim of climate change, it is also a source of greenhouse gases. Crop production and livestock release greenhouse gases into the air and are responsible for the major part of the emissions of methane (from cattle and wetlands, especially rice paddies) and nitrous oxide (from fertilizer use). Changes in land use such as deforestation and soil degradation – two devastating effects of unsustainable farming practices – emit large amounts of carbon into the atmosphere, contributing to global warming.

Farmers and pastoralists can play an important role in reducing global emissions by planting trees, reducing tillage, increasing soil cover, improving grassland management, altering forage and animal breeds and using fertilizer more efficiently among other measures. By maintaining higher levels of carbon in the soil – a process known as “soil carbon sequestration” – farmers can help reduce carbon dioxide levels in the air, enhance the soil’s resilience and boost crop yields.

Successful approaches to adaptation

Adaptation strategies are beginning to take shape as governments, businesses and communities worldwide grow to understand climate change and how urgent it is to address current and potential impacts. To be successful, adaptation measures need to appeal to local practices and vulnerabilities. Planning at the household, community and national levels can limit the damage caused by climate change, as well as the long-term costs of responding to climate-related impacts that are expected to grow in number and intensity.

The adaptation challenge will be greatest for developing countries. At lower altitudes, these countries are more exposed to the most severe impacts of climate change, including flooding, drought and increased incidence of pest and diseases. Together with a high reliance on climate-sensitive activities, such as agriculture and fishing, lower per capita incomes, weaker institutions and limited access to technology and markets this makes many developing countries highly vulnerable to climate change. These countries will need international support to adapt to our new changing environment.

The most effective adaptation approaches in developing countries will be those that address a range of stresses and factors, including land tenure, armed conflict, food insecurity, massive migration and diseases such as HIV/AIDS. Evolving resilient, holistic and secure food systems that can adapt to climate change and other stress factors is the key. Sustainable development and the Millennium Development Goals must serve as a basis for any adaptation policy.

Key facts

- Agriculture and deforestation account for about one third of global greenhouse gas emissions from human activities, specifically 25 percent of carbon, 50 percent of methane and over 75 percent of nitrous oxide.
- About 80 percent of total emissions from agriculture, including deforestation, are from developing countries.
- Climate change is expected to increase the number of undernourished people and may reduce yields of rainfed crops in some African countries significantly as early as the 2020s.
- According to some projections, half of all agricultural land in Latin America is likely to be affected by desertification and/or salinization by 2050.
- Adaptation in developing countries is estimated to cost tens of billions of US dollars annually over the next decades.

An effective adaptation approach is to promote diverse, flexible livelihoods across sectors that reduce people's dependence on climate-sensitive resources. For example, aquaculture and agriculture systems can be integrated to allow rural communities to shift their activities as the suitability of the land and water shifts. Diversifying rural enterprises may reduce farmers' income in the short term but it will ultimately protect them against possible food shortages and other vulnerabilities in the future.

Putting policies in place

The next 10 to 15 years is the generally agreed upon window in which the international community must mobilize global financing and put long-term adaptation plans in place. While the majority of least developed countries has already prepared National Adaptation Programmes of Action, their implementation will be a challenge. Many adaptation measures will focus on strengthening measures that already exist, such as early warning systems, systems to identify climate change "hot spots" and disaster risk management. Others will focus on rural investments to reduce the long-term

effects of short-term climate variability on food security, through crop insurance (*see* Insuring against weather-related crop failure *below*) and incentives that encourage farmers to adopt better agricultural and land use practices.

Policies need to be integrated across levels and sectors and should take advantage of potential synergies between climate change mitigation and adaptation as well as food security and sustainable development. Similarly, agricultural constituencies should regularly participate in international climate change negotiations.

Building capacity and awareness in developing countries will also be essential. National extension and agronomic research services have an increased role to play in data collection, analysis and dissemination. Governments and local communities need to be up-to-date on the latest climate-related research, methods and tools, including local impact assessments and funding mechanisms such as the carbon market funds. With regard to adaptation, decision makers at all levels must maintain the capacity to make continuing adjustments following a "learning by doing approach".

Insuring against weather-related crop failure

Weather-based index insurance is a relatively new risk management tool that links insurance payouts to objective, measurable variables like rainfall or temperature. Such insurance policies allow farmers to better manage risk and encourage them to invest in agricultural activities that require a higher initial investment. Because triggers can be verified independently, there is far less likelihood of fraud or

political interference, making banks and insurance companies more likely to provide index insurance to poor rural communities. Payouts are proportional to the difference in rainfall or temperature, and thus only provide farmers with partial protection. Smallholder farmers in a 2005 study in Malawi reported that index insurance was their primary strategy for climate change adaptation.

Glossary

- **Adaptation:** actions by individuals or systems to avoid, withstand or take advantage of current and projected climate variability, changes and impacts. Adaptation decreases a system's vulnerability or increases its resilience to impacts.
- **Adaptive capacity:** a system's inherent ability to adapt to climate change impacts.
- **Mitigation:** actions to reduce greenhouse gas emissions by sources and/or enhance carbon removal by sinks.
- **Resilience:** the ability of a system to withstand negative impacts without losing its basic functions.
- **Vulnerability:** the potential for a system to be harmed by climate change, considering the impacts of climate change on the system as well as its capacity to adapt.

Contacts

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