Agriculture is both a victim of and a contributor to climate change and smallholders in developing countries will be most seriously affected by the impacts.

In many regions, the first impacts of climate change can already be felt. Crops, grazing land, trees and livestock are inherently affected by climatic extremes, including too much or too little water, too high or too low temperatures and the length of the growing season. Moreover millions of farmers own less than one hectare of land, live on less than $1 a day and do not produce enough to feed their families. They are especially vulnerable to climate change.¹

Achieving food security for all will become increasingly difficult. Climate change affects not only yields, but also food quality and safety and the reliability of its delivery to consumers.²

Agriculture also contributes significantly to global greenhouse gas (GHG) emissions. Agriculture, Forestry and Other Land Use (AFOLU) combined contribute 20-24% of total GHG emissions. Whilst AFOLU emissions decreased over the last decade, emissions from crop and livestock production increased, becoming the dominant source of emissions within this category.³

Climate-smart agriculture aims to:

- Provide adaptation and resilience to stresses and shocks
- Generate adaptation and mitigation as co-benefits
- Take a location-specific and knowledge-intensive approach
- Provide integrated options that create synergies and reduce trade-offs

The negotiation of a new international climate change agreement presents an opportunity to address agriculture’s need for adaptation and its vital role in achieving the United Nations Framework Convention on Climate Change (UNFCCC) goal of limiting global temperature rise to 2°C from pre-industrial levels. Negotiators can ensure that these opportunities are not missed by firmly rooting agriculture into the following six major elements of the negotiations.

² Vermeulen et al. (2012), Climate Change and Food Systems, Annual Review of Environment and Resources, 37:195-222
Adaptation in agriculture includes the research, development and adoption of improved crop varieties, livestock breeds and orphan crops that are more suitable to a changing and erratic climate. At the farm level, adaptation includes better use of seasonal forecasting, soil, water and nutrient management, conservation technologies, and diversification of on- and off-farm activities. Farmers also require support to manage pest and disease outbreaks and to alter their cropping practices as well as reliable and affordable access to credit and inputs. Adaptation measures against desertification, droughts and soil erosion already exist, but need to be significantly scaled-up – the costs of inaction are already evident: floods and soil erosion already exist, but need to be significantly scaled-up – the costs of inaction are significant.

Mitigation

Agriculture produces GHG emissions - carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄) - and thus contributes significantly to anthropogenic climate change. The Intergovernmental Panel on Climate Change (IPCC) estimates that agriculture contributes 14% of global GHG emissions, whilst the land use, land-use change and forestry (LULUCF) sectors contributes an estimated 17%.

Emissions of N₂O and CH₄, which originate from livestock and soil, are nearly 300 and 35 times more powerful than CO₂, respectively. N₂O emissions from soils alone constitute around 40% of non-CO₂ emissions. During the 1990s, cutting down trees and clearing land released an average of 6.4 gigatons (Gt) of CO₂ per year into the atmosphere. In comparison, global emissions from crop and livestock production rose to an average of 5.2 Gt in the 2000s and again to 5.4 Gt in 2010.

Emissions from agriculture are expected to continue to grow around 1% per year – an increase incompatible with a stable climate future. Achieving the UNFCCC goal of limiting average global temperature rise to 2°C will be hard to achieve without leveraging the potential of the agriculture sector.

Sustainable land management practices increase ecosystem and farmer resilience to a changing climate and minimize GHG emissions.

Governing must support, develop and build upon community-based adaptation actions.

GOVERNMENTS MUST SUPPORT, DEVELOP AND BUILD UPON COMMUNITY-BASED ADAPTATION ACTIONS.

The government of Bangladesh is working to implement the “Community-based Adaptation to Climate Change through Coastal Afforestation” project in five districts most susceptible to climate change. The project enhances coastal community resilience and introduces new options for community-based income generation such as planting protective and productive vegetation with an elevated mound and ditch structure interspersed with fish nurseries ponds. An estimated 34,350 households have been able to use this model to manage and protect their assets. Such community-based action creates ownership, stimulates innovation and is likely to be more sustainable and resilient. When tailored to specific agro-ecological zones and farming systems, certain adaptation actions can also offer mitigation co-benefits.

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GOVERNMENTS MUST SUPPORT, DEVELOP AND BUILD UPON COMMUNITY-BASED ADAPTATION ACTIONS.
In the face of intensifying climatic stresses and shocks, policies that reduce the risks posed by climate change and enhance both the agricultural sector and farmer livelihoods are ever more important. Low resilience to stresses and shocks may be indicated by a gradual decline in agricultural productivity but, equally, collapse may come suddenly and without warning. Recovery may be rapid, but more often is difficult and incomplete, thereby slowing countries’ overall economic and development efforts.

Farmers face a variety of market and production risks that make their incomes unstable and unpredictable from year to year. Index-based insurance programmes for managing farming risk are showing signs of promise. Those linked to local weather patterns provide an effective, market-mediated solution to smooth incomes, promote agricultural development but also make disaster relief more effective.

Farmers’ resilience can be improved by building stronger and healthier soils that withstand or regenerate faster after climatic stresses. A promising approach is Integrated Soil Management (ISM) that combines organic and conventional farming techniques.

KILIMO SALAMA in Kenya protects smallholder maize and bean farmers from financial loss if their crops are damaged by weather. The partnership between Syngenta Foundation, UAP Insurance, and Safaricom bundles insurance with loans for seeds, fertiliser and extension services. Eight weather stations broadcast weather updates and measure rainfall amounts; when a station detects rainfall levels that are below or above a particular crop’s rainfall needs, a pay-out is triggered.

RESILIENT AGRICULTURAL GROWTH DOES NOT HAPPEN BY ITSELF – IT NEEDS PRO-ACTIVE POLICIES AND INVESTMENTS.

Successful agricultural development rests on continued technological innovation. Technologies that enhance farmers’ resilience and adaptive capacity include water catchment and conservation, the dissemination of weather data through mobile phones and the development of drought-tolerant crops.

Water is an essential but scarce input for a well-functioning agriculture sector. Already 1/3 of Africa’s population is living in water-scarce regions, set to be exacerbated by climate change. Water-saving drip irrigation systems allow farmers to adapt to shrinking water availability and become more resilient to droughts and variable rainfall patterns.

Farmers can also adapt with information communication technologies (ICT). Today 75% of Africans own a mobile phone, making it increasingly easier to reach those located in remote rural areas with timely weather forecasts. Information shared via SMS allows farmers to plan ahead and make better use of their resources, but only if the supporting infrastructure exists. Under-resourced national meteorological services must be equipped to supply weather information across larger areas.

INNOVATIVE TECHNOLOGIES NEED TO BE MADE READILY AVAILABLE AND AFFORDABLE FOR SMALLHOLDER FARMERS.
Developing countries need adequate funding for adaptation and mitigation projects.

Between 2010 and 2050, the annual cost for adaptation to climate change in sub-Saharan Africa (SSA) will be at least $18 billion and up to $50 billion for the entire continent, in addition to the funding needed to place these countries on a low-carbon development pathway. The level of financing currently reaching African countries is paltry. Of the $34 billion pledged between 2003 and 2013, of which only 45% was allocated to adaptation projects. This funding gap must be met through public resources, allowing local governments to allocate funds according to need.

The opportunity for developing countries to adapt to and mitigate climate change through better farming and land management practices is large. Mitigation co-benefits can result from interventions including ISM and land management practices.

Payments to farmers or landowners to better manage their land or watersheds, to conserve biodiversity or to sequester carbon have been shown to help conserve and restore forest areas and aquifers. Increasing irrigation in Africa from the current 6% of arable land needs to become a major priority and requires substantial investment.

COSTA RICA’S PES programme has strongly contributed to reversing one of the highest deforestation rates in Latin America. Since 2001, nearly 13,000 farmers have participated in a programme that pays land managers to conserve and sustainably manage forested areas or reforest degraded land.

The barriers to implementing adaptation strategies range from limited financial resources to strained institutional capacities.

These barriers can be overcome with stronger political leadership, planning, coordination and institution-building. Governments should integrate climate change planning across government departments and ministries, whilst food security and agricultural development policies should complement and reinforce national climate change adaptation and mitigation goals.

The integration of climate change adaptation strategies into national agricultural development plans under the Comprehensive Africa Agriculture Development Programme (CAADP), serves as a role model for developing countries. Global and regional initiatives that promote investment through country-led plans such as the Global Agriculture and Food Security Programme (GAFSP) and the ASEAN Integrated Food Security Network (AIFS) should be strengthened by integrating climate change goals.

GIVEN THE RIGHT INCENTIVES, FARMERS IN DEVELOPING COUNTRIES CAN ADAPT TO THE ADVERSE IMPACTS OF CLIMATE CHANGE WHILST CONTRIBUTING TO THE MITIGATION OF GHG EMISSIONS.


THE NEW PARTNERSHIP FOR AFRICA’S DEVELOPMENT (NEPAD) Climate Change Fund offers technical and financial assistance to African Union member states and Regional Economic Communities for better planning, coordination, and implementation of climate change activities. NEPAD also provides assistance to mainstream climate change into national policies, particularly National Adaptation Plans (NAPs) and National Agriculture Investment Plans (NAIPs), and helps countries develop policies for improving frameworks in line with international bodies such as the UNFCCC.

The West African Science Service Center on Climate Change and Adapted Land Use (WASCAL) is a research programme designed to enhance the resilience of agricultural systems to climate change. WASCAL aims to identify resilient and adaptive land use systems and develop strategies to conserve or restore ecosystems whilst preserving the natural resource base for future generations.

NATIONAL AND REGIONAL POLICIES MUST COMPLEMENT AND REINFORCE CLIMATE CHANGE ADAPTATION AND MITIGATION GOALS.
We, the members of the Montpellier Panel, believe that a sustainable climate future is not possible without recognising agriculture’s role in the adaptation and mitigation of climate change.

1. **RECOMMENDATION #1: ADAPTATION**
   Governments must support, develop and build upon community-based adaptation actions.

2. **RECOMMENDATION #2: MITIGATION**
   Governments must fund sustainable land management practices and support farmers to increase ecosystem resilience to a changing climate whilst minimising GHG emissions.

3. **RECOMMENDATION #3: RISK & RESILIENCE**
   Governments need to implement pro-active policies and provide investments for resilient agricultural growth.

4. **RECOMMENDATION #4: INNOVATION & TECHNOLOGY**
   Governments need to ensure that innovative and affordable technologies are available to smallholder farmers.

5. **RECOMMENDATION #5: FINANCING**
   Governments must provide the right incentives for farmers in developing countries to adapt to the adverse impacts of climate change while contributing to the mitigation of GHG emissions.

6. **RECOMMENDATION #6: CAPACITY BUILDING & INSTITUTIONS**
   National and regional policies must complement and reinforce climate change adaptation and mitigation goals.

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