

# Effect of **CLIMATE CHANGE** on resource-poor small farmers

Climate change is a long-term process which is characterised by warmer than average temperatures or global warming; and rising frequency and intensity of extreme weather events, ranging from droughts to floods. *Peter Jacobs and Rehema Msulwa* investigated the interaction between climate change and primary agriculture in rural Limpopo and found accelerated declines in crop yield and more frequent livestock deaths since 2000.



Decline in crop yield and more frequent livestock deaths since 2000 were common indicators of the depressing impact of climate change on local agriculture

A cross-section of large-scale commercial and smallholder farmers in Mpumalanga and Limpopo account for most of South Africa's sub-tropical agricultural output. Floods devastated large parts of both provinces in February 2000. According to the 2001 Strategic Plan for Agriculture, losses sustained as a result of this extreme weather event translated into a fall in the annual gross domestic product of approximately 1%. This graphically illustrates the kinds of risks to agriculture flowing from climate variability and economy-wide spillovers that could result from extreme weather events.

We conducted a study exploring the interactions of climate change and primary agriculture drawing on evidence collected from resource-poor small farmers, community leaders and the non-farm unemployed in rural Limpopo, South Africa. Information was collected with the aid of mixed gender and age focus-group sessions for each rural social category – using sets of open-ended questions.

The purpose and scope of this study were to understand and document farming practices among resource-poor farmers in varied agro-ecological settings, their awareness and experiences of climate change and how they have been responding to climate change.

The relationship between modern agricultural systems and climate change is complex and therefore a domain of intense debate. Globally, agriculture might be responsible for 17–32% of global greenhouse gas emissions. According to available South African data, the domestic emission share of its farm sector falls between 6% and 14%, compared to 44% for other developing countries and roughly 6.3% for the United States.

The impact of agriculture on the environment has been occurring mainly through fossil energy-intensive cultivation systems, but also through the misuse and overuse of synthetic pesticides and fertilisers. Inorganic nitrogen additions to restore soil fertility have increased to levels that are ecologically unsustainable while the economic returns appear to be less lucrative than earlier forecasts. Farming methods and agro-sector waste have a significant weight in the greenhouse gas emissions from the pre-consumption segment of the global food system. A recent review of greenhouse gas emissions from concentrated animal feeding operations suggests that carbon emissions

from livestock farming might exceed those of the transportation sector.

## Methods

As an exploratory case study, our fieldwork was based on semi-structured key informant interviews and participatory focus group discussions, which helped us to collect in-depth and verifiable information on recent policy developments and to rapidly collect comparative evidence from different rural sites.

Key informant interviews were conducted with senior officials in the national Department of Agriculture Forestry and Fisheries (DAFF) and the Limpopo Department of Agriculture (LDA). In each interview, we explored issues such as where climate change fits into the work of the agricultural department, the key informant's awareness and understanding of the climate change-agriculture nexus, and a rapid evaluation of the adequacy and effectiveness of current agricultural policy responses to climate change (adaptation, mitigation and resilience issues).

Participatory focus group discussions were set up with farmers, non-farmers and community leaders. The study sites included the five distinct villages in Limpopo: Daumeni (Giyani), an arid sub-tropical agro-ecological zone as well as Muthiba and Makhotpong (Capricorn), Vuvha (Thengue Valley), Mashamba (Elim) and Sterkstroom (Thohoyandou), classified as sub-humid.

Focus group discussions with farmers were fairly well attended and varied between a minimum of 12 to a maximum of 18 participants.

## The policy environment

In the last decade, climate change has been moving towards the centre of South Africa's agricultural policy landscape, for example in the 2001 Strategic Plan for South African Agriculture, but the long-term response to climate change in agriculture needs to fit into and be consistent with the country's broader climate change commitments.

In 2001 the government adopted an overarching policy called the National Climate Change Response Policy. The core message of this policy statement is South Africa's contribution to the transition of the global economy to a low-carbon economy and climate-resilient society. Policy makers

are mindful that this challenge is inseparable from achieving key developmental goals: sustainable development, job creation, poverty eradication, and social equality.

## The farming environment

Resource-poor small farmers live in villages under traditional authority or ex-Bantustan tribal areas where freehold farmland titling is non-existent. Instead, the right to access and use land for farming is based on permission to occupy (PTO) certificates which the traditional chief allocates as the landholding custodian.

Farmland tenure is a critical determinant of how well any farming system operates and affects agricultural productivity; it is therefore a crucial factor to take into account when investigating climate change-agriculture interactions.

Farming generally takes place on relatively small plots of land with the average plot size per farm household ranging from roughly 0.5 ha to about 5 ha. Cereal crop cultivation and harvesting, specifically maize, dominate crop outputs across all research sites. Alongside maize production, which is the dominant staple food crop grown across all sites, some farmers also cultivate and harvest leafy vegetables, legumes and groundnuts.

Investment in capital-intensive farm inputs is minimal and non-existent in most cases. Water is vital in primary agriculture but the main supply sources are location-specific. Rain-fed farming is widespread in this area and evidence exists of water access through older communal irrigation schemes. It was common for farmers to store seeds for future planting and to use animal manure to sustain soil fertility. In virtually all cases where farmers bought inorganic fertiliser and genetically-modified seeds, they did so because extension officers advised and encouraged them to adopt these farm inputs.

## Awareness of climate change

The overarching goal of this study was to understand how rural communities – particularly resource-poor small farmers – cope with and respond to climate change. Probing the actual knowledge of these communities about this phenomenon was a critical step to gaining insights into local climate change adaptation and mitigation activities – especially agro-ecological (regenerative) farming based on indigenous knowledge.



The concept 'climate change' per se was virtually unknown, even among farmers who reported regular visits from agricultural extension officers. The accelerated decline in crop yield and more frequent livestock deaths since 2000 were common indicators of the depressing impact of climate change on local agricultural outputs and productivity.

Accelerated deforestation to supply wood for energy, indiscriminate burning of bushes, industrial pollution and carbon emissions from cars featured among the key drivers of climate change.

### Responses to climate change

Rural communities voiced many immediate and longer-term interventions to counter the effects of climate change on their agricultural activities and local livelihoods – including adapting how they farm with an eye on cutting its carbon footprint. Although examples of how to respond to climate change were strongly rooted in local experiences, or indigenous knowledge, structured discussion of suggested interventions could be arranged under three themes.

Firstly, resource-poor farmers expressed a strong commitment towards adopting sustainable farming practices that are resilient to climate change. Secondly, there was support for prohibitive penalties on unsustainable natural resource use practices. Thirdly, a popular suggestion favoured intensified state activism (integrated and better coordinated) to promote local climate change adaptation and mitigation actions.

### Regenerating agricultural activities

The package for resource-poor farmers to regenerate their agricultural activities in the context of climate change should include the following:

**Build climate resilient farming systems:** To shrink the carbon footprint of agriculture there must be a switch 'from industrial farming to conservation farming'.

Conservation agricultural systems centre on zero-to-minimal tillage practices but often include innovations from integrated farming systems using animal manure as fertiliser and rotation farming which allows land to lie fallow. Water needs to be conserved and various water-harvesting techniques, as suggested by several farmers' focus groups, can improve water access in areas without functional irrigation systems. Participants generally agreed that institutions are essential to transition to climate resilient farming systems – for local learning and sharing information and implementing climate adaptation and mitigation actions. The entrenched intergenerational knowledge transfer system has been and will continue to serve as a mechanism to exchange ideas and experiences on climate change and sustainable agriculture.

State-driven programmes to promote local climate change adaptation and mitigation efforts: Some communities have been receiving a range of climate-related services from government departments, usually as part of land-care and environmental education and training, whereas others receive absolutely no support. State support to help farmers cope with, and respond to, climatic events was widely perceived as inadequate, with frustrated farmers at Mothiba remarking that the Department of Agriculture has a reputation for 'making empty promises'. Vuyha farmers called for regular community-wide environmental education but also wanted the approach and content – what climate change is and measures to 'deal with things that bring about climate change' – to be more preventative or proactive rather than reactive.

**Cut greenhouse gas emissions – prohibit unsustainable natural resource use practices:** Interventions to cut greenhouse gas emitting activities covered varied types of natural resource uses and were not confined to climate-damaging agricultural activities. Communities generally did not know of any legislation to curb greenhouse gas emissions, except for a few traditional leaders who complained about the lack of enforcing mitigation laws. 'Under our indigenous value system', Mashamba community leaders explained, 'wild fruit trees- Fig tree (Muhuyu), Marula tree (Mufula) and Musuma – were not allowed to be cut'. The local authority has been arresting and charging wood cutters.

There is an urgent need to close the information flow gaps and losses between policy crafting and grassroots implementation. Appropriate mechanisms must be developed to transmit practicable knowledge from top-level DAFF scientists to extension officers interacting with resource-poor farmers by increasing frequency of sessions.

Climate change is a large-scale societal and human concern, yet deep analysis embedded in social structures and human behaviour is absent from almost all big analyses and debates. Instead, the dominant thinking on this subject concentrates on abstract techno-scientific fixes to reduce greenhouse gas emissions usually combined with economic calculus. Social dimensions of climate change receive virtually no attention and the need exists to dramatically raise climate change awareness through participatory approaches. Climate change must be addressed through social structures and human behaviour as well as abstract techno-scientific fixes.

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