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The dilemma of climate-resilient agricultural commercialisation in Tanzania and Zimbabwe

Key messages

Climate change complicates promising prospects for agricultural commercialisation as vehicles for poverty reduction in Tanzania and Zimbabwe. Key reasons are:

- Increased uncertainties in the timing, amount and intensity of rainfall make it harder to grow commercial crops such as tobacco in Zimbabwe and sunflower in Tanzania.
- Increased climate uncertainty can widen the gap between those who have resources to adapt and those who do not.
- For farmers who do not have access to good adaptation options, it can lead to a dilemma between risking a poorly-adapted but commercially-lucrative crop with a risk of losing the harvest, or sticking with better adapted crops of much lower commercial value.

Ultimately, the prospects for climate-resilient, commercially-viable agriculture are more dependent on wider structural factors than what individual farmers can do with the right crop or farming system.

With these constraints, climate-resilient commercialisation can be supported through measures such as:

- Investment in irrigation infrastructure for farmers who lack access.
- Stronger support for the commercialisation of better-adapted crops.
- Addressing historical marginalisation and increased public investment in dryland areas.

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What is the issue?

The implications of climate change for agricultural commercialisation – and the implications of agricultural commercialisation for climate change – are profound. On the one hand, agricultural production is, by nature, highly sensitive to climate change and variability. On the other, commercial agricultural production for international food markets is one of the lead sectors for generating greenhouse gas (GHG) emissions that are driving anthropogenic climate change (Vermeulen et al., 2012; IPCC, 2014). This presents the following conundrum: the burden of the changing climate fall most heavily on smallholder farmers in countries across sub-Saharan Africa, where agricultural commercialisation is seen as an important route out of poverty (Christiaensen, Demery and Kuhl, 2011; Lowder, Skoet and Raney, 2016). What, then, are the prospects for climate-resilient, commercially-viable smallholder agriculture in sub-Saharan African countries which are facing this dilemma? We have explored this question through APRA research produced in Singida, Tanzania, and Mazowe, Zimbabwe (Mutabazi and Boniface., 2021; Newsham, Shonhe and Bvute, 2021; Newsham et al., in review).

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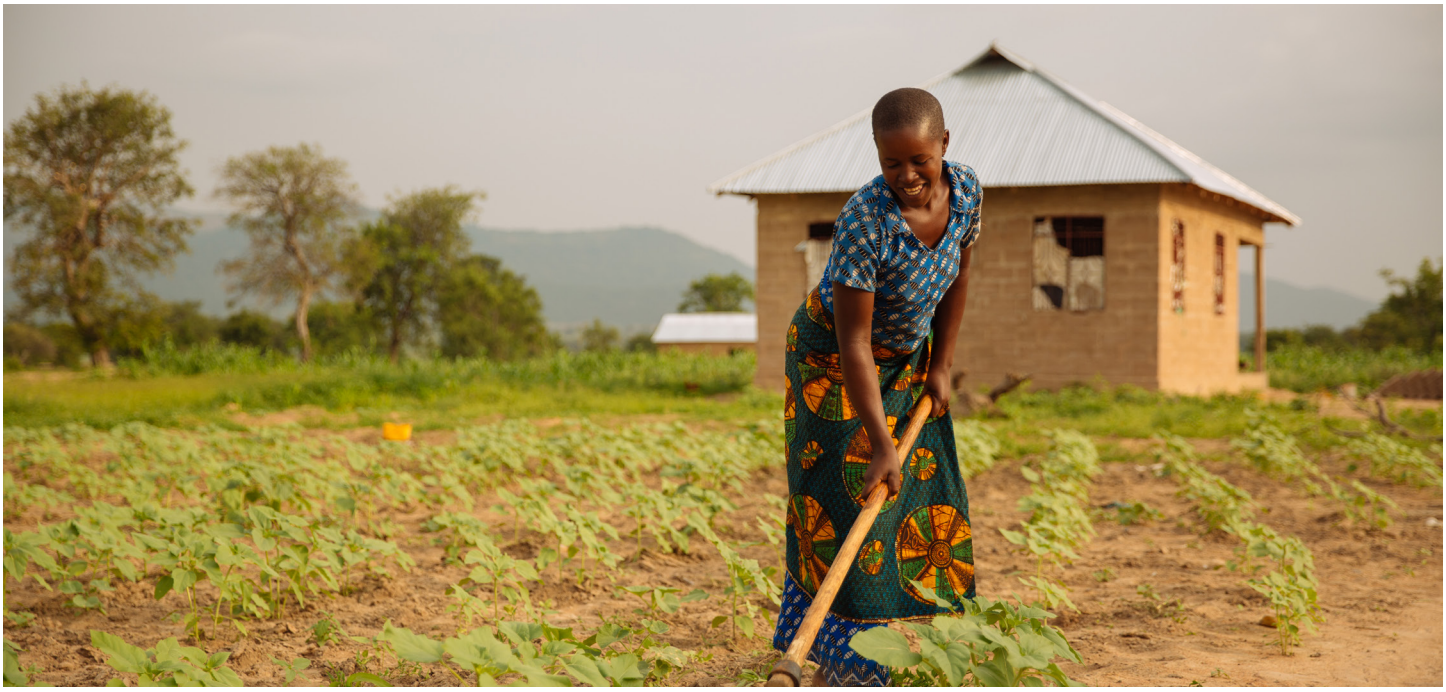

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What did we find? Commercialisation stories of vulnerability and resilience

Climate impacts and cropping decisions in Tanzania and Zimbabwe

To understand the role of climate change for commercialisation, we focused on the decisions that farmers are making over the short to medium term, in the context of observed historical trends and impacts, and in view of future climate projections. While 'downscaled' climate projections are available for Tanzania and Zimbabwe (World Bank, 2021), they have limits as guides for decision-making due to their wide range in possible outcomes, and high levels of uncertainty (Conway et al., 2019).

Singida, Tanzania

As a semi-arid region, agro-climatic conditions are a strong driver for the range of suitable crops that can be grown in Singida. However, farmers' decisions must be situated within the broader set of dynamic drivers and pressures, notably market opportunities, gender, and access to land and credit. New commercialisation opportunities over recent years have made farmers look for new crops, such as cotton and sunflower. With climate change and increasing weather extremes, however, local farming systems are increasingly becoming overwhelmed. Our research showed that dryland agrarian communities in Singida face changing climate and weather patterns, with mixed impacts on different crops and livestock species over time and space.

The majority of farmers have stuck with low-risk, low-return dryland crops such as sorghum, pearl millet and sweet potato that were basically bred for drought tolerance. However, with increasing incidence of above-average rainfall in some locations, such dryland crops have suffered from excessive moisture. On the one hand, increasing incidence of excessive rains is affecting crops normally able to withstand water stress such as onion, sunflower and sorghum. As a farmer from Dominiki village explained, 'This year, rains were excessive, so I managed to grow many crops, though sorghum was affected because of too much rains.'

Nevertheless, these changes have also created new possibilities for some farmers to grow high-value, water-demanding crops such as paddy, chickpea and horticulture. Increased episodes of heavy rains have also increased moisture levels in lowland areas and flows in seasonal rivers, hence creating new possibilities for these crops. However, these emerging commercialisation opportunities do not benefit everyone equally, and may expedite existing resource-access disparity into income inequality. For example, this new opportunity for crop farming created by the changing climate is exclusively available to the majority of pastoral families that settled on the previously dryer lowlands where they grazed their cattle – and is not available to traditional crop farmers that settled on uplands with relatively less fertile sandy soils.[2] One farmer in Luono village states: 'My farm is on sandy soil and cannot be irrigated. If you get an irrigated farm for paddy production as in the case of our colleagues (Sukuma), farming is profitable.' The rising demand for land suited to growing onions has also been associated with higher rents, which are unaffordable for resource-poor farmers.

Mazowe, Zimbabwe

In Zimbabwe, as in Tanzania, whilst farmers are always looking for new commercial opportunities, there is a strong concentration on tobacco farming, especially in Mazowe, seen as the heart of national tobacco production. Historically, tobacco has been a key export crop for Zimbabwe and, although production fell after the controversial Fast-Track Land Reform Programme (FTLRP) initiated in the early 2000s, it has now almost recovered to previous levels. The big structural change has been a shift away from large-scale

2 The farmers (*Nyiramba*) settled first on upland areas, as lowland plains were seen as barren and vulnerable to flooding. The pastoral Sukuma arrived later and settled with their livestock on the remaining, vast lowland floodplains. The Sukuma had experience in lowland paddy farming using the *majaruba* system (water harvesting system using bunded basins) to contain rainwater for paddy production. Over recent times, rains have been, in most cases, above long-term averages which has supported paddy production – but, occasionally, rain falls, violently causing devastating flash floods.

tobacco production, which used to account for almost all tobacco grown in Zimbabwe. By 2012, 78 per cent of tobacco production came from small- and medium-scale producers (Sakata, 2018), much of it grown by beneficiaries of land redistribution, and some of it by farmers who continue to live in Zimbabwe's communal areas.

Our research took place against a background in which different parts of Zimbabwe had experienced three to six bad rainfall seasons between 2014–2019 (FEWS NET Southern Africa, 2021). This, along with observed climate trends since the 1980s, demonstrate the difficulties farmers are already experiencing as a result of climate change. The starkest finding in recent research by the Zimbabwe National Geospatial and Space Agency is the drying trend across Zimbabwe (ZINGSA, 2020: 10-11). This is most manifest in the late onset and early termination of a rainfall season shortened by 30 days, a decrease in the number of rainfall days and an increase in the number of dry spells of up to 20 days, which affect water availability and crop productivity.

The impacts of these changes registered across our field sites. Farmers voiced concern at the shorter, more erratic rainy season, punctuated by longer dry spells and, in particular, the implications of uncertainty for making decisions. These conditions make it harder to know when to plant, because even though it is increasingly clear to farmers that the rains now regularly arrive later, the erratic rainfall distribution adds to the conundrum. The difficulties posed for tobacco are particularly troubling, especially when grown under rainfed conditions. First, the shorter rainy season increases the risk that there will be insufficient time for the crop to mature, adversely affecting its commercial quality come harvest. Second, when transferring tobacco plants from the seedbed to the ground, each plant requires a minimum of 5L of water; tobacco tends to be planted at densities of between 1,200–1,500 plants/ha. Farmers without access to stable irrigation, but instead relying on the rains, told us that insufficient rainfall and/or prolonged dry spells just after planting, at best, were diminishing crop quality and, at worst, inducing crop failure. These difficulties were, moreover, leading some farmers, particularly in communal areas, to abandon tobacco production altogether.

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Table 1: Farmer ranking of aggregate crop sensitivity to climate impacts[3]

Crop	Aggregated risk totals across climate impacts*			Aggregated risk totals across all farm types
	Chiweshe communal area	Hariana small-scale farms	Arowan medium-scale farms	
Tobacco	11	9	11	31
Maize	9	8	10	27
Sugar bean	11	5	8	24
Soya bean	n/r	7	10	17
Tomato	n/r	13	n/r	13
Groundnut	5	6	n/r	11
Cabbage	n/r	n/r	9	9
Cow pea	7	n/r	n/r	7
Sweet potato	3	2	1	6
Potato	n/r	n/r	6	6
King onion	n/r	1	n/r	1
Rapoko	0	0	n/r	0

Notes: n/r = not reported.

Source: Newsham et al. (in review).

3 This table is a reduction of Annex 1 from Newsham et al. (2021). Rather than considering impacts relevant for each individual crop – drought, flood, erratic rainfall, pests etc – it gives the aggregate score each crop received across all impacts.

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These trends and accounts from farmers flag the increasing requirement for irrigation to guarantee the commercial viability of tobacco production, which brings the effects of differentiated access to irrigation sharply into focus. Whilst very few farmers across our field sites had formal canal irrigation infrastructure, a mixture of hand irrigation with small pumps fed from surface water and wells/boreholes were more common, although contingent on access to labour. These served to mitigate the effects of uneven rainfall, at least to some extent. As a rule of thumb, those given land under the FTLRP were more likely to able to access such forms of irrigation than communal area farmers. Worryingly, those in greatest need of commercial tobacco production as a vehicle for poverty reduction were those worst affected by the drying trend and changes in rainfall patterns during the growing season, owing to insufficient access to irrigation/labour options suitable for tobacco production.

It is unsurprising that against this backdrop, as Table 1 demonstrates, farmers consistently rank tobacco and maize as the crops most sensitive to climate impacts, across communal areas, and small-and medium-scale farms on redistributed land. Yet high levels of climate sensitivity currently do not appear to make the majority of farmers decide against growing them, even factoring in reports from some farmers, especially in communal areas, that they have abandoned, or are abandoning, tobacco.

Weathering the storm' and 'adaptation traps'

Across both countries, there are important examples of commercial agriculture which assists with asset and capital accumulation and poverty reduction, and which seems, to some extent, to be 'weathering the storm', i.e. coping with climate shocks and stressors in the short term, and even exploiting new opportunities. In Tanzania, dryland farmers in Singida have historically lived with high levels of climate variability as a major driver determining a feasible range of crops and production practices, and the dryland farm sector is considered to offer eminent opportunities for profitable production and commercialisation. In Zimbabwe, land redistribution has increased opportunities for viable small- and medium-scale commercial farming in Zimbabwe, in spite of the shorter and increasingly erratic rainfall season observed in recent decades.

However, the story often looks starkly different for tobacco producers in Zimbabwe's communal areas. Indeed, across field sites in both countries, there are probably more farmers, particularly those already facing structural constraints, that have been left on the margins of commercial viability, and who face an acute dilemma. The choice they face is between growing poorly-adapted crops sold in sometimes volatile international markets, or better-adapted crops with much lower commercial value. Choosing the latter is tantamount to returning to subsistence agriculture, which can no longer meet basic household needs and expenditures, let alone wider development aspirations.

Farmers in this position might be said to be facing an "adaptation trap", and their dilemma is ultimately rooted in a lack of viable alternatives. It explains both: a) stagnant commercial prospects for poorer farmers in Singida, Tanzania, as people have to choose crops they know are reliable under uncertain climates but which have lower commercial prospects; and, b) the adoption of tobacco in and beyond Mazowe, Zimbabwe, by farmers who have subsequently had to abandon it on account of harvest failures. These result partly from a rainy season which has become too erratic to be reliable for rainfed tobacco production, and partly from a lack of access on the part of farmers to effective adaptation measures, most obviously stable irrigation.

What are the implications for policymakers?

Commercialisation and climate-smart agriculture narratives typically focus on what individual farmers can do with the right crop or farming system. Our analysis points instead to the importance of underlying structural incentives and support for commercialisation – or the lack therein – and the sorts of crops that farmers then do and don't see as commercially viable. In Tanzania, the study finds an increasing trend towards adoption of low risk, low value crops, which are viable in the short term but ultimately not likely to be a pathway out of poverty. In Zimbabwe, the obvious pathways farmers find themselves pushed towards are tobacco and maize, rather than better-adapted crops like sweet potato or *rapoko* (finger millet). In both countries, there may be prospects for improving the commercial viability of such better-adapted crops. Yet these must reckon with the current structural conditions that shape farmers' options, such as the marginal place of Singida in Tanzanian commercial agriculture, the continued difficulties of economic life in communal areas in Zimbabwe, and the low placing of tobacco farmers in the value chain. Against this background, the opportunities for existing agricultural commercialisation to contribute to poverty reduction in the face of climate change look less promising.

Nevertheless, even with these constraints, there is clear scope for supporting climate-resilient commercialisation via:

- **Support for irrigation.** In Tanzania, farmers are experiencing higher rainfall, so seek to take advantage of this with the introduction of spate irrigation. In Zimbabwe, farmers on the margins of commercial viability would benefit from irrigation, enabling them to compensate for the increasingly erratic rainy season which, currently, is a leading cause of poor quality or failed harvests.

- **Investments in wider public goods such as farm infrastructure, extension services and systems which are needed to transform and build resilience.** Irrigation support will clearly be helpful, but "success" stories like that of tobacco in Mazowe, or realising the potential commercialisation in Singida, require national-level support over decades in the infrastructure which enables better commercialisation pathways for individual farmers.

- **Stronger support for commercialisation of better-adapted crops.** Farmers in Tanzania or Zimbabwe do not lack options or sufficient agro-ecological knowledge about locally-grown crops that better withstand observed and projected climate impacts. But little is being done to make climate-resilient crops more commercially viable. Work to increase the commercial viability of these crops, via facilitating access to markets and market information, agricultural extension and inputs, would be ways to start to do this in both countries.

- **Urgent international action to engender rapid GHG reductions from global agricultural production.** At the global level, commercial agriculture itself, as one of the largest contributors of GHGs, is creating problems for the viability of smallholder farming in countries like Tanzania and Zimbabwe. Policymakers looking to promote agricultural commercialisation as a means to poverty reduction cannot credibly separate work they might seek to do in, for instance, sub-Saharan Africa, from the dynamics which make global agriculture so environmentally unsustainable.

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