Sentinel
Social and Environmental Trade-Offs in African Agriculture

Policy Brief
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Agricultural expansion in Zambia: what are the drivers and implications?

In this policy brief, we highlight what we currently know about the drivers of agricultural expansion in Zambia and their implications for food security, livelihoods and biodiversity conservation. Data was gathered using a suite of rapid-assessment participatory rural appraisal (PRA) tools during fieldwork conducted in 2019 by the Sentinel project team in five communities.

Summary

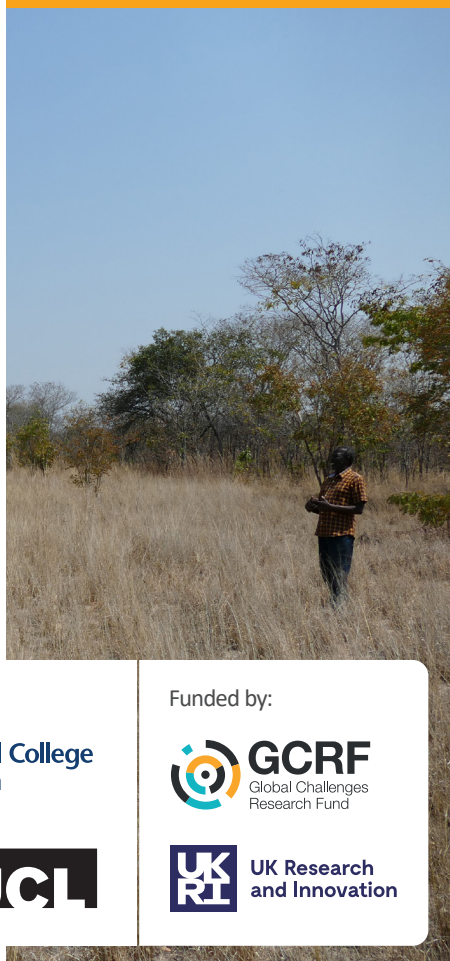
Agricultural expansion in Zambia can be attributed primarily to an increased demand for traded and staple crops, exacerbated by internal patterns of migration and the impacts of climate change. Historically, weak resource governance has enabled much of this expansion to occur in forests that are important for biodiversity and other ecosystem services thereby presenting a trade-off situation. Managing landscapes to meet multiple and often competing objectives — such as food security, poverty reduction and conserving natural habitats — requires a more detailed understanding of the drivers and impacts of agricultural expansion.

Meeting rising food demand and livelihoods needs

More than half of Zambia's population is poor,[1] 48% is under-nourished[2] and the country's population is predicted to more than double by 2050 (see Box 1).[3] The total land area in Zambia is approximately 75 million hectares (ha), of which around 42 million ha (or 58%) is suitable for agriculture.[4] As of 2018, total agricultural land was approximately 32% of the total land area.[5] Agricultural expansion into natural vegetation, particularly forests, has been occurring for many decades (as indicated by a recent study — see Figure 1)[6] and will continue to do so to meet the increasing demands for food and cash. Zambian policymakers have a window of opportunity to take action to actively manage this expansion and reduce the negative environmental impacts of future agricultural expansion.

Box 1. Background in brief — Zambia

- Zambia's population is currently 18 million[7] and is projected to reach 39 million by 2050.[3]
- About 58% of the population is considered 'poor' and lives on less than US$1.9 per day — three quarters live in rural areas.[1]
- Maize remains the main staple crop. Its production is expected to continue to rise, surpassing any other food crop produced in Zambia by 2050.[8,9]
- About 71% of Zambia's land is under customary rights ownership.[10,11]
- About 65% of Zambia is covered by forest (closed and woodland) and grasslands. The woodlands are comprised of mostly pristine miombo (41%) and mopane (5%) types, and grassland covers 27%.[12]
- Zambia has lost about 7.1% of total tree cover since 2000 — equivalent to 1.7 million ha.[13]



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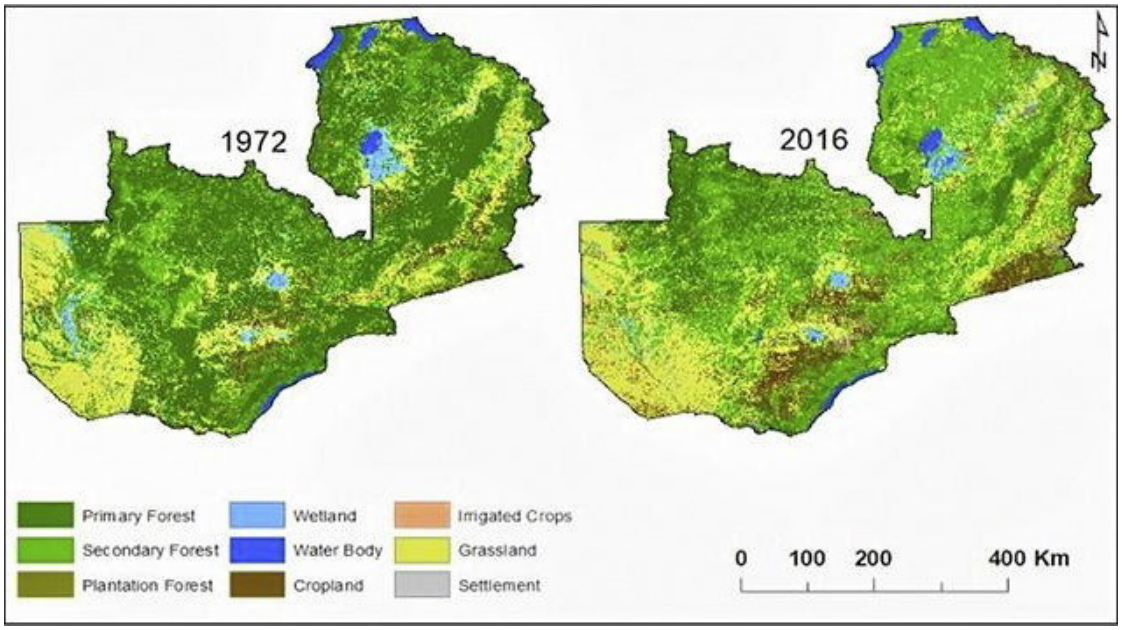

Figure 1. Land-cover change for Zambia, 1972 and 2016. [Source: From Phiri *et al.* (2019)[6] with permission from the publisher.]

The socio-economic and environmental implications of agricultural expansion

Across the five communities interviewed (Figure 2), it was reported that livelihoods have improved for those who have been able to cultivate new land in previously uncultivated areas. Yet despite this, some research participants in one community reported that these benefits are unlikely to be sustainable in the long term. If such expansion into natural habitats continues, participants suggested the following impacts would be probable in the next 10–20 years:

- Households dependent on forest products who are already losing access to products like wild animals and grazing land could continue to experience these losses if nothing is done to curb expansion. For example, timber production has already declined in some communities, consequently leading to poverty at the community level among those dependent on timber sales.
- Future agriculture will probably be affected by many challenges. For example, crop and livestock diseases are likely to increase due to poor access to water and fodder caused by tree clearing. Soil quality and yields will also decline due to erosion and poor rainfall, consequently leading to more hunger.
- Residents may have to travel longer distances to find fertile lands to cultivate or find wild honey to harvest as trees that support honey production are being lost.

In all the communities, a number of negative impacts are already perceived to be occurring. For example:

- There is already conflict between one local community and recent settlers from southern Zambia who have now occupied the gazetted forest to the detriment of other community members.
- Participants have reported increased drought in three communities. Some participants linked these changes to climate change, telling us that the onset of rainfall is now delayed, which has led to difficulties in ploughing the land and consequently poor yields in one community.
- All communities we visited reported a notable decline in local species richness and abundance, particularly in terms of indigenous tree species and wildlife. This has led to a decline in medicinal plants in all of the participating communities. In two communities, households no longer find wild animals to hunt. Reduction or loss of grazing lands has also been recorded.
- In some communities, this loss of species is directly manifested in reduced ecosystem services, such as pollination, that make important contributions to livelihoods. Several households reported both a reduction in the amount of honey produced and a decline of wild bee colonies.

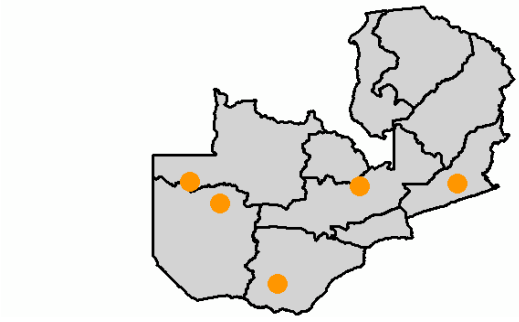

Figure 2. Approximate locations of the five communities where research was conducted.

One community was found to be depleted of indigenous hardwood species, such as African teak (*Baikiaea plurijuga*) and many of the sites experience increased incidence of pests and diseases. A decline of tree species, identified in several of the communities, can be attributed to a number of factors beyond just agricultural expansion, such as charcoal production or timber extraction.

Overall, it appears that agricultural expansion, and a consequent loss of tree cover, is leading to a rapid degradation of soil quality and an increase in soil erosion. Two of the communities we spoke to directly associated the local-level depletion of tree cover with the decline in rainfall intensity and the increased prevalence of drought. This experience of drought has led many farmers to rely more on natural forest resources for income and subsistence, further heightening the long-term impacts on the natural environment.

Drivers of agricultural expansion

Global drivers of agricultural expansion include increased global demand for commodities and climate change (see Figure 3).

The drivers of the documented agricultural expansion occurring in Zambia are both direct and indirect and operate at multiple levels. At the national level, agricultural and food policies drive agricultural expansion alongside an increasing population and changes in diet.

Specifically, the research participants highlighted that as populations continue to increase, unless agricultural productivity per unit area cropped increases, new lands will continue to be cultivated to cope with soil fertility losses. The research participants tended to focus on local drivers, such as households'

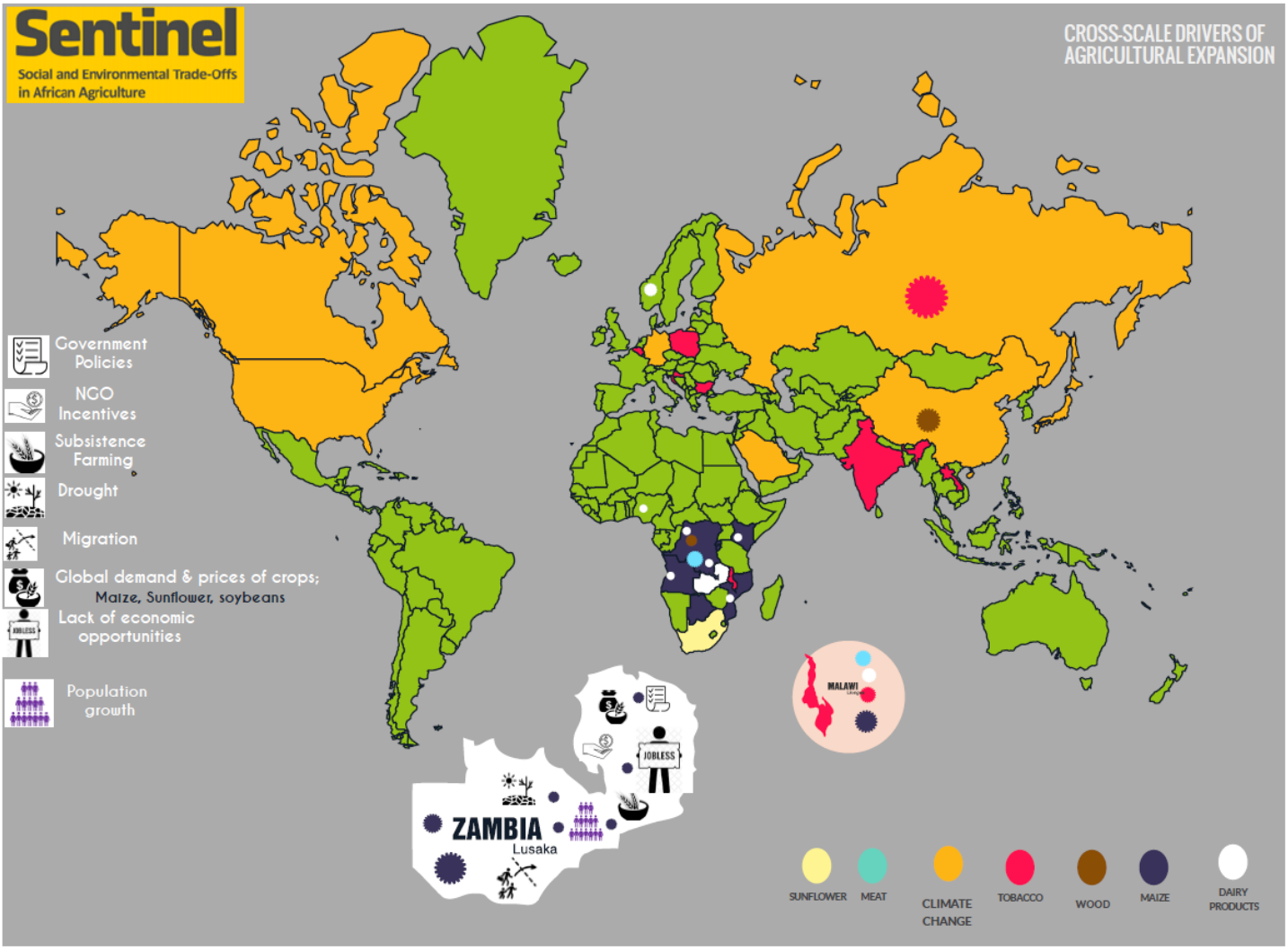

Figure 3. Drivers of agricultural expansion operating at global, national and local levels in Zambia. Climate change in orange represents countries with highest greenhouse gas (GHG) emissions. Green is the default colour on the map. Malawi imports several crops from Zambia. Other round-colour codes represent countries of destination of the key crops and products that drive land expansion in Zambia. Tobacco is exported to Belgium (large buyer [L]); Bulgaria (medium buyer [M]); Croatia (small buyer [S]); Germany (L); Hongkong (L); India (M); Laos (M); Malawi (L); Poland (S); Russia (S). Dairy — Botswana (M); Democratic Republic of Congo (DRC) (L); Kenya (L); Malawi (M); Mozambique (L); Nigeria (S); Norway (M). Meat — DRC (L); Malawi (M). Maize — Angola (L); Botswana (L); Burundi (S); DRC (L); Kenya (L); Malawi (L); Mozambique (L); Rwanda (L). Soya — Botswana (L); Malawi (S). Groundnuts — Malawi (S). Wood — DRC (S); China (L).

immediate experiences of weather and drought, soil degradation, migration and the need for cash. Different drivers were reported by participants at the site level for each community (Figure 4). Direct drivers include poor harvests, demand for food and fuel, and variability in climate and weather. Indirect drivers include price incentives, government policy to open up game-management areas for habitation, migration and population growth. Climate change-induced drought was reported to be causing internal migration as people seek more stable environments to grow traded and food crops to improve their livelihoods.

In most of the communities, residents perceive climate change-related conditions to be the cause of migration, leading to agricultural expansion into new lands in the destination locations. This was the experience in one of our surveyed communities. Most of the migrants inhabiting the local forests were found to be from the southern part of the country that was hardest hit by drought.[14]

Most farmers we spoke to were inclined to open up new parcels of land rather than directly combat problems such as soil degradation. This decision was often due to the high cost of inputs and in some instances the easy availability of 'virgin land' to cultivate. In at least one community, conservation farming practices had recently been introduced, particularly the practice of preserving at least one hectare of woodland. Some of our key informants said these practices had contributed to an increase in local biodiversity on farmlands. However, elderly farmers also reported that such practices were difficult and expensive to implement. Expansion into previously uncultivated lands was the readily available option taken by those farmers to maintain and increase agricultural production.

At the community level, participants reported that farmers often respond to increased access to markets and increased prices for commodities — global and national-level drivers — by expanding their area of production in addition to intensifying production. This can be likened to the Jevon's-type hypothesis that suggests that the intensive use of inputs can lead to agricultural land expansion.[15] For example, when crops such as sunflower are produced, they are mainly for external markets, most notably as exports to South Africa (Figure 3). Price incentives have led to both more intensive monocropping of improved varieties of maize and sunflower, implying a greater use of herbicides and pesticides in many communities in Zambia, and expansion into natural vegetation, with implications for forest and biodiversity loss.

A high proportion of Zambia's forest is under individual or community ownership and administered by the chiefs under a customary tenure system. Community members with land-use rights rent out forested land to local investors who mostly come from urban centres such as Lusaka in search of land to grow commercial crops in exchange for a fee or inputs such as fertilisers or maize seeds. However, land rented out to local investors is often not well managed, which leads to land degradation. Such land also does not respond well to fertilisers thereby leading to new agricultural expansion. No land titles are involved as land rentals are based on informal arrangements, and such transactions were reported to mostly take place without the chiefs' consent.

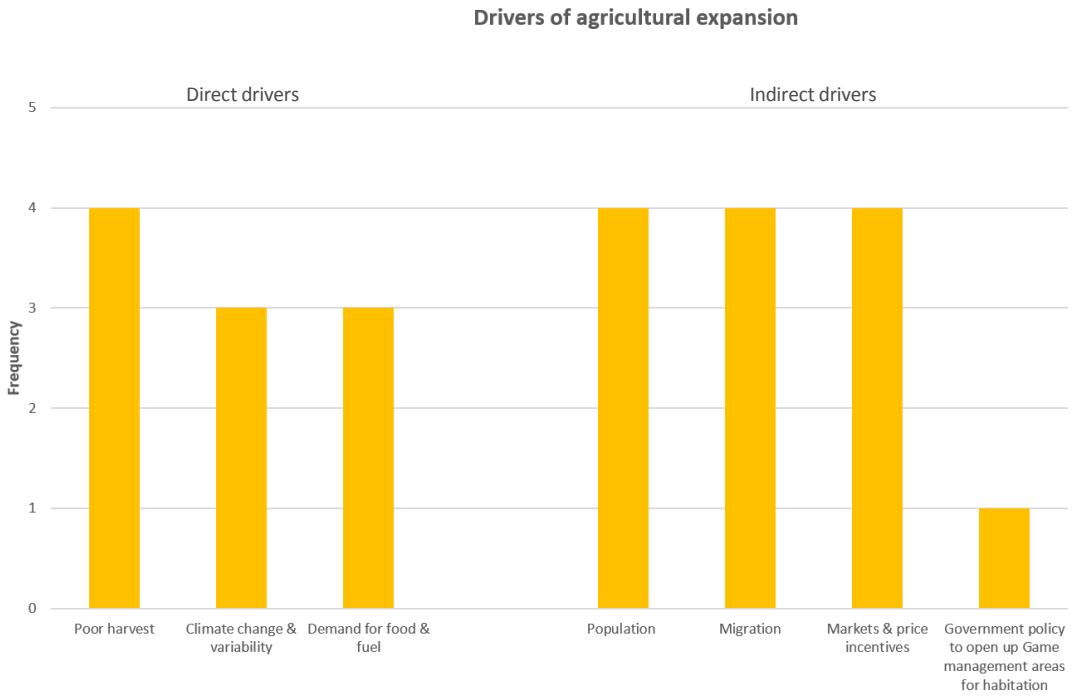

Figure 4. Frequency of occurrence of perceived site-level direct and indirect drivers of agricultural expansion for the five sites in Zambia based on participant accounts from the fieldwork.

A way forward

Zambia's Seventh National Development Plan advocates diversifying the country's economy, in part by expanding agriculture-based revenues.[16] This will almost certainly require an increase in the area of agricultural land and a corresponding reduction in natural vegetation, including forested areas. As such, this has considerable implications for livelihoods and ecosystem services, including biodiversity conservation, across the landscape.

To date, weak local and national-level resource governance has resulted in agricultural expansion, often into forests that are critical for biodiversity conservation and other ecosystem services important for sustainable livelihoods. This expansion could be better managed if there were stronger community-based institutions supported by both customary and formal laws, stronger local forest governance, and incentives and opportunities for agricultural intensification. With stronger institutions governing forests and other areas of natural vegetation, agricultural expansion need not be at the expense of future sustainable food production and biodiversity conservation.[9]

So far there is very little empirical evidence on the impact of agricultural expansion to fully inform decision-making. Going forward, the Sentinel team intends to explore further the impacts of agricultural expansion on different social groups within the study communities. Deeper investigations will be carried out to generate evidence and understanding of the potentially conflicting multiple objectives of food production, livelihoods security and biodiversity conservation, across levels and scales. This will help to better align and target food security and conservation policies in Zambia.

Community chiefs have a critical role to play to ensure community land use is properly planned and local institutions are respected. This will support the management and reduction of potential trade-offs between food production, poverty reduction and conservation objectives. In addition, participatory land-use planning can lead to more sustainable outcomes, where decision-making about the use and management of land, water and natural resources involves local communities and organisations.

Lessons can also be learnt by policymakers from available information and data on the drivers and implications of agricultural expansion so that the expansion can be better managed for the benefit of all stakeholders.

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Page 5 — Focus group discussion participants in a community in Zambia 2019. Credit: Sentinel Reconnaissance Survey Team.

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