

Food and forests: understanding agriculture and conservation trade-offs in Zambia

In Zambia as in many countries in Africa, policymakers need to better understand and manage the major trade-offs — existing and future — between two competing objectives: increasing agricultural production to meet growing domestic food demand and conserving nature.

Figure 1. Change in cereal yield and cultivated area, Zambia 1994–2014 (based on FAO data³)

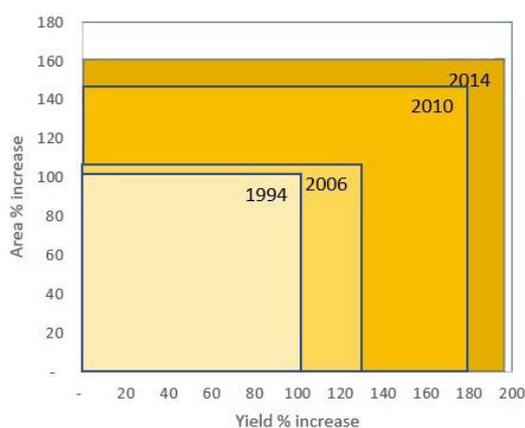
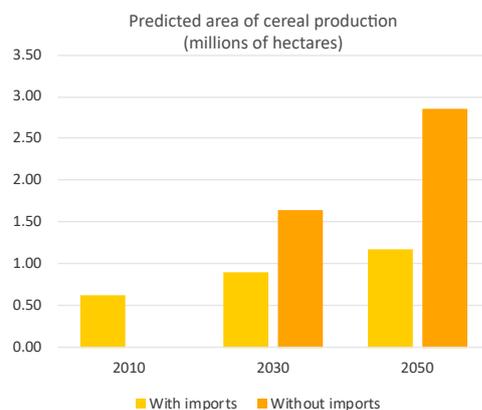


Figure 2. Cereal area with and without imports (from IFPRI's IMPACT model²)



Competing policy objectives and implications for land use

Cereal production in Zambia tripled over the period 1994–2014 (see Figure 1). Based on the IMPACT model of the International Food Policy Research Institute (IFPRI)², van Ittersum et al. in their paper entitled “Can sub-Saharan Africa feed itself?” note that food demand in Africa is projected to again triple over the period 2010–2050 — a growth rate much higher than in other continents.⁴ This growth in demand is a function of improving food security and increasing consumption of meat as well as population growth. In Zambia, cereal demand is predicted to grow by a factor of 3.4 over this same period.

The IMPACT model also predicts that the

country will only produce 41% of its total requirement for cereals in 2050 and will import the remaining 59%. Under this scenario, and assuming no increase in yield per hectare (ha), the area of cereals would expand by only 1.9x rather than the 4.5x expansion needed if the country was to become self-sufficient (see Figure 2). However, a high level of cereal imports is not consistent with the long-term vision for Zambia's economy. Zambia's Seventh National Development Plan (NDP) 2017–2021 identifies agriculture as key to diversifying Zambia's economy away from its heavy reliance on copper exports and to reduce poverty. The NDP emphasises increasing total agriculture outputs and investment in value

Summary

Agricultural expansion is the number one driver of the loss of nature and its biodiversity and ecosystem services.¹ But efforts to rapidly reduce these losses must recognise the political and economic realities of developing countries striving for food security, economic growth and poverty eradication in the face of climate change. How to balance the competing objectives of agricultural production (SDG 2) and nature conservation (SDG 15) is a critical challenge for sustainable development, and there is growing recognition that success will require transformative change.

Background

In contrast to the situation in Latin America and parts of Southeast Asia, in most countries in Africa it is the expansion of staple food crops to meet growing domestic demand rather than export commodities which drives the loss of nature and its biodiversity and ecosystem services. In Zambia, the expansion of maize production over the period 2010–2050 is projected to far exceed that of any other crop type.²

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addition. It also sets out ambitions to be self-sufficient in staple food crops and to increase agricultural exports to contribute to foreign exchange earnings.⁵

About 60% of Zambia’s total land area (74.3 million ha) is forested (land with a tree canopy cover of greater than 15%). Of the remaining 40%, about 32% (23.8 million ha) is used for agriculture including 4.5% (3.3 million ha) used for annual crops and the remaining grassland and shrubland used for livestock⁶ — see Figure 3. Maize is the principal crop and currently accounts for nearly 50% of the arable land.⁷

Since the early 1980s, Zambia has witnessed a rapid degradation of biological resources due to over-exploitation. In particular, agricultural expansion has driven deforestation, causing 90% of the deforestation in Zambia.⁸ The key drivers of the degradation and loss of natural habitats include: high population growth, high poverty levels, low employment opportunities, insecure land tenure, weak governance and low institutional capacity.⁹ Deforestation continues unabated despite the country’s participation in REDD+¹⁰ and an explicit target to reduce the deforestation rate by 25% by 2025.¹¹

Climate change is making the problem worse: Zambia’s average temperatures have warmed by 1.3°C since 1960 and an average decrease in annual rainfall of 1.9mm per decade.¹² Reduced and more erratic rainfall has been more serious in the south and there is a strong trend of farmers migrating from these increasingly dry areas to higher rainfall areas in the north where they create new farms by clearing forest.

In the future, the level of cereal expansion may be reduced by improvements in cereal yields, resulting in less area needed for self-sufficiency (see Figure 4).⁴ The dotted orange line shows the total area of land suitable for cereal production of which 40% is currently forested.¹⁴

Figure 4. Cereal area (Mha) required to be self-sufficient by 2050 (reproduced from Van Ittersum et al 2016)⁴

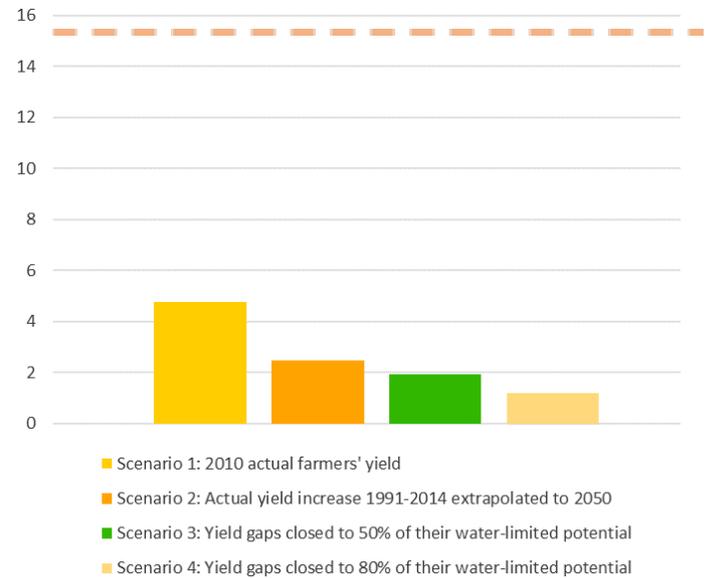
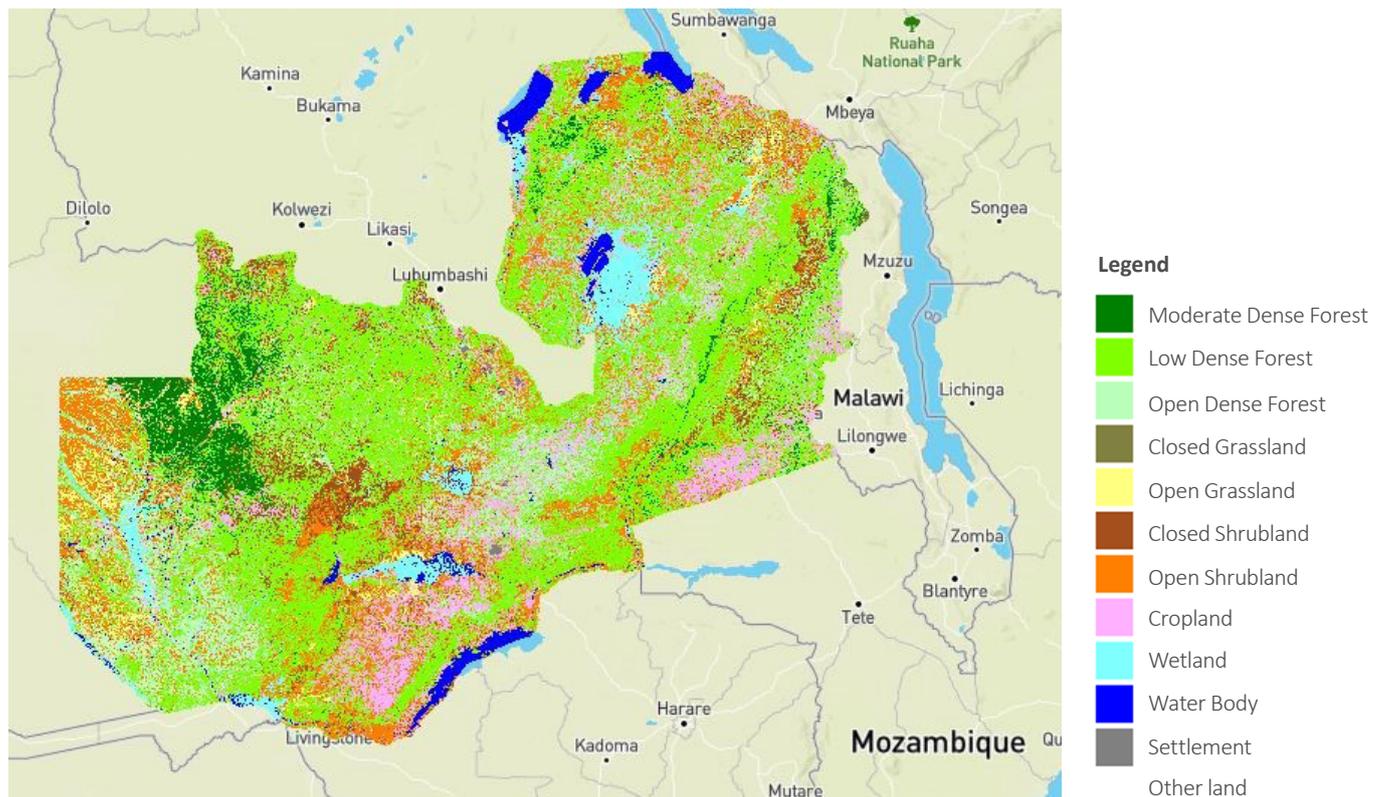


Figure 3. Zambia land cover 2010 (map developed by RCMRD SERVIR Eastern and Southern Africa and Zambia government agencies¹³)



Suitability is defined in purely agroecological terms, without taking into consideration the impacts of climate change. On this basis, Zambia has a lot more forest and other natural habitat that seems suitable for cereal production compared to Ethiopia and Ghana, and therefore potentially more room for manoeuvre in trying to conserve key areas of natural forest that lie beyond areas protected by customary arrangements and state protected areas. But further research is needed to understand the potential of using this apparently suitable land to meet increasing domestic food demand.¹⁵

Box 1. Zambia in brief

Zambia's population was estimated at 17.8 million in 2018 with an annual growth rate of 3%.¹⁶ Nearly two-thirds of people live in rural areas, with 54.4% living under the poverty line, with higher rates in rural areas.¹⁷ In the 2018 Global Hunger Index, Zambia ranks 115th out of 119 qualifying countries. Malnutrition and stunting rates in children are the highest in Africa.¹⁸ Zambia's economy heavily relies on copper exports (14.8% GDP in 2017) and the service sector (57.3% GDP in 2017).¹⁹

But while agriculture, forestry and fishery contribute less than 10% GDP, 85% of the population is dependent to some degree on agriculture.²⁰ Most farmers (70%) cultivate farms under 2 ha.²¹ Only 1.54% of farmers cultivate more than 20 ha – yet they control 70% of cropped land.²²

Are agriculture and environmental policies working for trade-off management?

Policy makers in Zambia continue to devise agricultural development, environmental and conservation policies based on an insufficient understanding of the existing and future trade-offs between the competing objectives of producing more food and the conservation of natural habitats and their biodiversity and ecosystem services. Although national policies recognise that biodiversity and nature underpin agricultural productivity, there is not the technical capacity or finance available to manage the environmental impacts of agriculture expansion. As a result, targets for both agriculture (Box 2) and conservation (Box 3) continue to be missed and many policies remain ineffective. There are more than 30 legislative instruments in Zambia that address the conservation of biodiversity and protection of the environment. Most were enacted more than 30 years ago. Despite containing good provisions for sustainable natural resource management, most lack targets aligned with recent international commitments (see also Box 3). There are major gaps between what national policies state and implementation on the ground, due to poor funding, low staffing levels and a lack of reliable transport for monitoring, and a lack of synergy among policies and legislation.

Key agriculture policies: issues and challenges

Agriculture policy priorities: productivity increase, employment and markets

Zambia's Second National Agricultural Policy (SNAP) acknowledges the importance of promoting sustainable land-management practices (including conservation agriculture, afforestation, agroforestry and use of renewable energy).²³ But major government agriculture programmes have not translated this policy vision into practice. In addition, they have had unintended negative environmental impacts and delivered limited benefits to smallholders.

Farmer Input Support Programme

Since 2007, the Zambian government has spent over 50% of its agricultural budget supporting maize production and fertiliser procurement through its Farmer Input Support Programme (FISP). As a result, there is an over-application of fertilisers. This has destabilised the composition of nutrients, reduced soil productivity, and polluted groundwater. In addition, this input-focused programme has not succeeded in increasing maize to the extent expected due to poor targeting, crowding out and fertiliser being used for other purposes.²⁴ The overall impact of FISP on poverty has not been significant (Figure 5).²⁵

Box 2. Agriculture policies: poverty, economic diversification and food security

Zambia is one of the signatories of the Comprehensive African Agriculture Development Programme (CAADP). It was launched during the second Africa Union Assembly held in 2003 in Maputo, Mozambique. Parties have committed to allocating at least 10% of their national budgets to agriculture to achieve 6% annual growth of agriculture sector.²⁶ Zambia has also endorsed the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods. The declaration includes targets to end hunger, halve poverty, and ensure at least 30% of farm/pastoral households are resilient to climate shocks in Africa by 2025.²⁷ But in reality, the agriculture budget allocation has been consistently below 10% and only 6% in 2019.²⁸

The government has heeded advice to downsize its fertiliser programme. During the 2017–2018 growing season, 600,000 smallholder farmers were weaned off or did not receive the subsidy.²⁹ But government has provided little alternative support for those smallholder farmers who have grown highly dependent on fertilisers.

Box 3. Environment and conservation policies: sustainable natural resource use

Zambia has ratified several international environmental conventions including the Convention on Biological Diversity (CBD), Convention on Wetlands (Ramsar Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Southern African Development Community (SADC) Protocol on Wildlife and Law Enforcement, and the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). Under the CBD, Zambia has developed its second National Biodiversity Strategies and Action Plan (NBSAP-2). This includes targets to reduce current deforestation rates by at least 25% and to sustainably manage all areas under agriculture, aquaculture and forestry, including forest reserves, game management areas (GMAs), forest concessions and open areas, to ensure conservation of biodiversity by 2025.³⁰

Farm Block Development Programme

This programme aims to create more than 10 farm blocks over 1 million ha. Farm blocks allow more large-scale monocropping and some overlap with forest reserves and GMAs. Farm block development proponents argue that large-scale commercial farms provide employment opportunities and support smallholder farmers through outgrower schemes. But at the local level, negative impacts on smallholder livelihoods have been reported.³¹ The associated social costs include displacement of untitled subsistence farmers, increased numbers of migrant workers and reduced grazing land.³² For example, the 10,000-ha Zambeef estate in Chisamba led to forced removals of people from their farms.³³

As the government continues to focus its limited investment in agriculture on increasing productivity and total production in the short term, intensive agriculture has become widely practised while traditional systems such as chitemene and fundikila are on the decline. These utilise small farm areas with a fallow period of 15 to 20 years, to allow for forest renewal.

Key environmental policies: issues and challenges

Conservation agriculture

Conservation agriculture (CA) has been one of government’s key strategies to improve agriculture productivity and reduce negative environmental impacts. Government, donors and NGOs have actively promoted CA since the early 1990s among Zambian smallholder farmers as a practice that can help improve crop productivity, improve soil fertility, and mitigate against low and variable rainfall.³⁴ CA includes minimum tillage, intercropping and agroforestry. It assumes that increased agriculture productivity will in turn reduce pressure on forest areas and other natural habitats. But the uptake of CA in Zambia remains relatively low. There is also

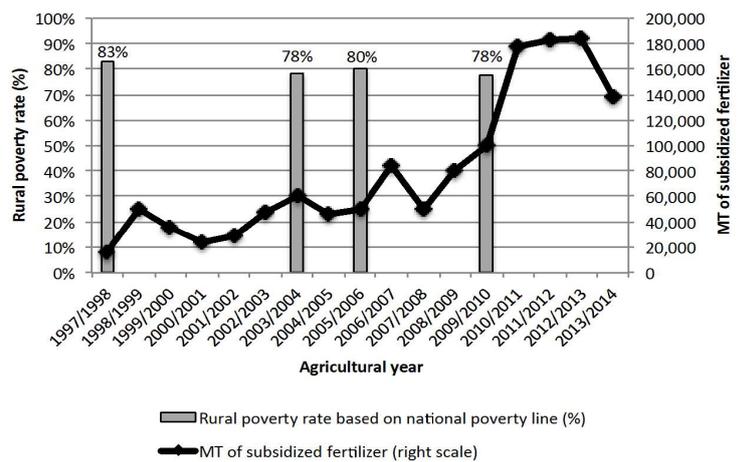
no documented evidence on whether CA farming will indeed reduce the need for agriculture expansion without being coupled with other policy instruments and incentives.

Protected areas

Over 30% of Zambia’s land is managed as protected areas of various types, which includes 20 national parks (covering 6.3 million ha); two wildlife sanctuaries, 10 bird sanctuaries and 36 game management areas (with a total area of 16.57 million ha); and 115 game ranches (578,100 ha).³⁵ However, all face increasing threats of encroachment and some areas are already severely degraded.

- Available data indicate that 47% of national forest reserves have been encroached by human settlements and agricultural activities (from 21% in Kafue Basin to 100% in the Middle Zambezi). These threats extend to the 59 botanical reserves within the protected forest areas, where 15% and 24% have been significantly disturbed by man (and in some cases by large wild animals) and encroachment.
- Encroachment has occurred in all GMAs. Bilili Springs and Mukungule are the most encroached, primarily for settlement purposes, while six out of the 20 national parks have also been encroached, thereby degrading wildlife habitats.³⁶ Mumbwa has also witnessed an increase in encroachment due to agricultural activities, resulting in degradation of GMAs by 25%.³⁷

Figure 5. Comparison of rural poverty and quantity of subsidised fertiliser distributed through government programmes, 1997/98–2013/14 agricultural years. Reproduced from Mason & Tembo (2015) [Fig.1, page 2].²⁵



Looking ahead: key messages

Based on existing land suitability evaluations, Zambia is one of relatively few countries in sub-Saharan Africa where cereal production currently uses only a small fraction of the potentially suitable land. This is in contrast to Ethiopia and Ghana where more than half of the land considered suitable for cereal production is already being used.⁴ A priority for Zambia is to better understand current land use and why forests and other natural habitats with high biodiversity value are still being degraded by agriculture expansion when there is alternative land of lower biodiversity value that could be used.

A number of good policies exist in Zambia for the sustainable management of land and natural resources. There is also evidence of political will to sustainably manage the environment, particularly in the stipulations of Vision 2030³⁸ and the Seventh National Development Plan (2017–2021).⁵ But a lack of understanding and effective management strategies continues to hinder their effectiveness.

Building on these policies and political will, researchers and NGOs can support government to gain better understanding of land use trade-offs and learn from efforts to better manage those trade-offs. There is a need for better understanding of these trade-offs and for an open discussion about the competing objectives – and how these trade-offs could be better managed. In addition, there is a need for horizontal and vertical policy integration, improved institutional and human capacity, and stronger stakeholder participation in policy formulation and implementation. Policymakers and planners must engage the full range of stakeholders in trade-off management processes, especially those who have a strong interest in the outcome but little influence and are therefore more likely to lose out, such as poorer farmers.

Zambia has a number of examples of success in this respect such as the Community Markets for Conservation (COMACO) not-for-profit company in Eastern Zambia. Working with communities living in and around GMAs, COMACO has demonstrated the importance of recognising trade-offs and designing approaches to explicitly address them which has enabled farmers to improve their incomes while at the same time improving wildlife conservation in the GMAs.³⁹ In addition to its success with biophysical interventions such as improved farming practices and land-use planning, COMACO demonstrates the value of investing in effective and equitable stakeholder engagement in trade-off management which is crucial for transformative change.⁴⁰



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About the Science for Nature and People Partnership (SNAPP)

The mission of SNAPP is to deliver evidence-based, scalable solutions to global challenges at the intersection of nature conservation, sustainable development, and human well-being.

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Social and Environmental Trade-Offs in African Agriculture

Sentinel is an interdisciplinary research project seeking to address the challenge of achieving 'zero hunger' in sub-Saharan Africa, while at the same time reducing inequalities and conserving ecosystems.

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