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CLIMATE SMART AGRICULTURE FOR DEVELOPMENT

POLICY BRIEF **JULY 2019**

Zambia's Agricultural and Food Systems: A Scenarios Analysis

SUMMARY

Zambia is at an important moment in the development of its national agricultural and food system. The Zambian government is committed to promoting agricultural diversification and commercialization as a principal pathway through which to stimulate economic growth, alleviate poverty and achieve food and nutrition security. The population is expected to more than double by 2050 and, like many other countries in the region, much of this growth will be in urban centres. As food prices increase and diets shift, Zambia faces a growing 'double burden' of malnutrition. Undernutrition and micronutrient deficiencies persist among lower-income households and vulnerable segments of the population, while overweight and obesity rise among higher-income families.

With climate change expected to lower crop yields and increase pressure on the country's already inadequate irrigation infrastructure, the Zambian government faces significant challenges to achieving its national policy objectives and delivering food and nutrition security to its growing population. Policymakers in Zambia should account for the uncertainty surrounding the future trajectory of these trends and their likely impact on agricultural production and food security in policy development and decision-making approaches.

To support policy decisions on the future of the country's agricultural and food system, a scenario exercise was conducted in September 2018 with a selected group of stakeholders from government, academia, civil society and the agriculture sector. Two impactful trends (or critical uncertainties) were selected that had high uncertainty in the way they would develop and shape the food system i.e climate change risks, and agricultural trade and market. These critical uncertainties create a 2x2 matrix that frames four potential futures—one in each quadrant. Each one of these futures was then explored, allowing participants to consider the inherent uncertainty the future holds, and understand how choices, decisions and extraneous factors might contribute to very different outcomes.

POLICY IMPLICATIONS

- Diversifying agricultural production and farming practices brings multiple benefits: climate adaptation, creation of new market opportunities, improved nutrition and greater dietary diversity
- The functioning of land tenure and land administration systems will have varying implications for agricultural investment, smallholder farmers' tenure rights and overall livelihoods outcomes
- Integrated planning across sectors, e.g. water, energy and health, is important to avoid policy contradictions. Building contingency into sectoral strategies will be particularly important to strengthen long term resilience
- High climate risks bring little if any benefits, therefore efforts to limit warming are needed. Implementation of adaptation and mitigations measures at domestic level e.g. through climate smart and sustainable production systems and involvement of Zambia in global climate actions is important (despite the country's very limited contribution to climate change)

KEY SOCIO-ECONOMIC AND ENVIRONMENTAL DRIVERS OF ZAMBIA'S AGRI-FOOD SECTOR

Zambia is going through an important period in the development of its national agricultural and food system.[1] There is strong political will for the diversification and commercialization of agriculture to stimulate economic growth and achieve food security[2]. Both the Second National Agricultural Policy (SNAP) and the Seventh National Development Plan (SNDP) identify agricultural development as a key pathway through which to deliver economic development and poverty alleviation. Projected drivers of food system change in Zambia over the coming decades span social, technological, economic, environmental and political domains.

Zambia is expected to experience significant population growth in the coming decades, above all its urban centres. The country has one of the highest fertility rates in the world[3] and, with life expectancy increasing, the population is projected to more than double from its current 17.6 million to approximately 41 million by 2050. Rates of urban population growth are particularly high in central areas of Zambia, in the cities of Lusaka, Ndola, Kitwe and Mufurila, in part the result of net rural-urban migration driven by high urban employment opportunities[4] and significant foreign investment in urban infrastructure and commerce[5].

Zambia, like many countries around the world, now faces a double burden of malnutrition. As evidence of recognition and commitment to address it, four of the eleven strategic directions of interventions included in the National Food and Nutrition Strategic Plan 2017–2021 have a direct focus on tackling problems of undernutrition and the growing occurrences of nutrition-related noncommunicable diseases such as obesity, hypertension, cardiovascular diseases, type I diabetes and some forms of cancer.[6]

Reforms to land ownership, through the Land Conversion of Titles Act 1975 and the Lands Act of 1995, have paved the way for greater investment in agricultural land by both domestic and foreign investors. Large-scale investments in sugarcane and soybean production, for example, have followed government investments in the promotion of commercial agriculture, electrification and food processing infrastructure.[7]

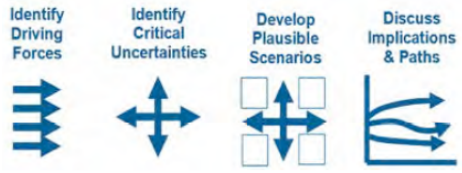
There will be varied impacts from increase or decrease in rainfall on farming generally and crop production and livestock in particular. Increases in rainfall may result in waterlogged agricultural fields, destruction of crops (in both pre- and postharvest), contaminated water supplies and increases in incidence of crop and livestock disease. Reductions in rainfall are likely to reduce water availability for both crops and livestock and affect quantity and quality of pastures.

FUTURE SCENARIOS: A PARTICIPATORY APPROACH

There is considerable uncertainty surrounding how Zambia's food system will evolve between now and 2050. Any 'best estimate' forecast of such a complex system over such a long timeframe will certainly be wrong. Accordingly, plans to develop Zambia's agricultural and food system should be sensitive to this uncertainty. They should allow decisionmakers to explore how choices and events might shape different futures and identify strategies that are resilient to uncertainty: no regret options that should pay off in a range of possible futures, rather than the one we hope for or expect.

A scenario exercise can help with planning for uncertainty by exploring the range of possibilities that the future may hold. In such a process, a group

Figure 1: The Steps in a Scenario Exercise



of participants identifies a set of driving forces that will shape future outcomes over the period in question. Through discussion, two impactful trends (or critical uncertainties) are selected over which there is high uncertainty, thus maximizing the range of possible future outcomes. Ideally these should also be as independent as possible in order

to maximize the extent of future possibilities. These are used to create a 2x2 matrix that frames four potential futures—one in each quadrant (see figure 2 below). Each one of these futures is then explored, creating a rich, narrative-driven scenario into which the other (discarded) driving forces can be integrated. Exploring these four scenarios through discussion allows participants to better embrace the inherent uncertainty the future holds, and understand how choices, decisions and extraneous factors might contribute to very different outcomes.

A scenario exercise for Zambia's food system was conducted in September 2018 with a selected group of stakeholders from government, academia, civil society and the agriculture sector.

IDENTIFYING THE MOST CRITICAL UNCERTAINTIES

Workshop participants identified, discussed and ranked in terms of perceived importance, the following shortlist of uncertainties for Zambia:

Table 1: Driving forces, critical uncertainties and ranking importance in shaping Zambia's agri-food system

Uncertain trends	Key Questions	Ranking
Climate change risks	• How will climate change affect agricultural production and the suitability of crops in different regions of Zambia? • Will adaptation efforts be effective in the face of such uncertainty? • Will international efforts to address climate change be successful?	1
Agricultural trade and markets	• Will Zambia export and import agricultural and/or food commodities as part of a connected system of regional and/or international trade? • Will domestic markets function effectively such that supply, and demand dynamics are responsive? • How will supply and demand dynamics affect price stability and affordability of food and agricultural inputs?	2
National economic growth	• Will trends in national economic growth continue? • Can economic growth stimulate investment in agriculture and the food system?	3
Governance	• Will regional alliances be strengthened, and food regulation and trade continue to be harmonized? • What degree of political voice will be afforded to stakeholders from across food value chains, both nationally and internationally?	4
Technology adoption	• To what extent will new innovations in agricultural production be adopted and transform production? • Who will be in a position to access and benefit from technological developments?	5
Shifts in global geopolitical power	• How will geopolitics and international relations play out? • How will changes in these dynamics affect international agendas and investments, markets and prices?	
Educational attainment	• Will levels of education attainment and the acquisition of relevant skills for agriculture and business improve? • Can education stimulate novel and innovative agricultural business?	
Gender equality	• Will gender inequalities in land tenure, labour burdens and market access persist? • What will greater equality mean in relation to agricultural productivity, food access and nutrition?	
Land tenure	• Can land rights and ownership for rural populations become more secure? • Will foreign investment and large land acquisitions displace or disinherit rural households? • What implications will land acquisitions and changes in tenure have for poverty and food access amongst the most marginalized?	
Dietary change	• How will the nutrition transition play out in Zambia? • Will traditional diets and foods be preserved, or will western diets and processed foods be adopted? • How will the nature of malnutrition evolve among different sections of society?	

Whilst all of the trends considered above are clearly important in determining whether or not Zambia's food system in 2050 will be sustainable, productive and climate smart, they vary in terms of their uncertainty. For example, whilst there may be some uncertainty about the extent of population growth and urbanization that will occur, there is little doubt that both will increase significantly. However, climate change impacts on agricultural production are highly uncertain.

CONSTRUCTION OF THE SCENARIOS AND KEY CONSIDERATIONS FOR THE NARRATIVES

In developing a narrative of what each of these scenarios looks like, particular attention was paid to the following questions:

- What are the implications of the scenario for agriculture (and its technologies), crops and farming systems, trade, nutrition, employment, food prices, sustainability, economic growth?
- What might be the implications for different stakeholders and who are the likely winners and losers?
- How might such a world come about between now and 2050?

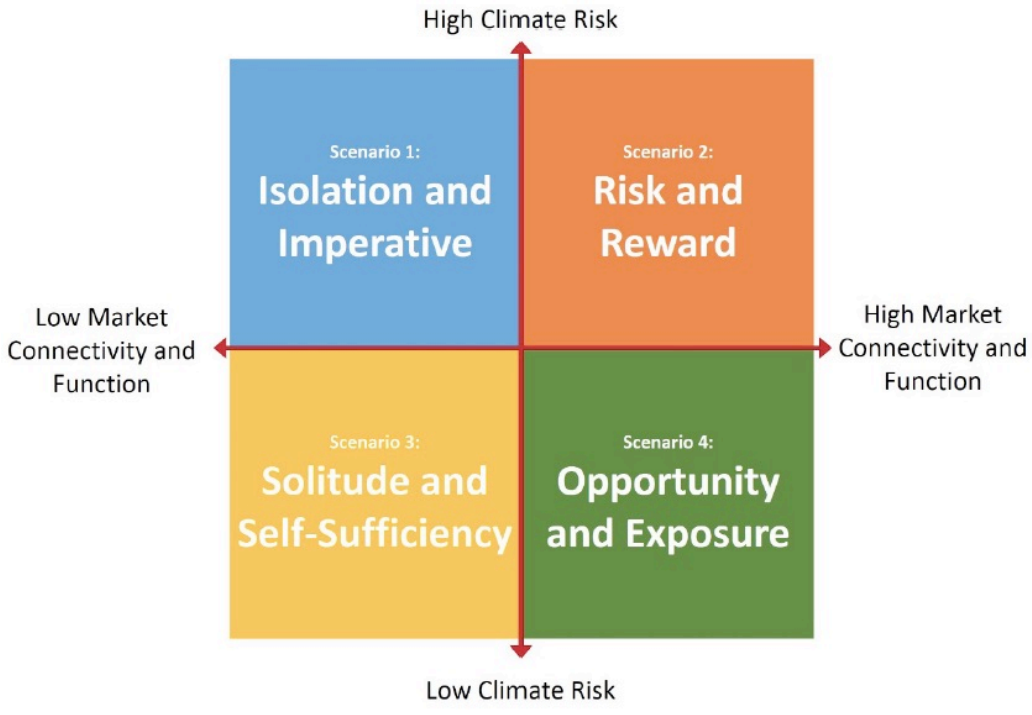
Based on the ranked importance of uncertain trends presented above, it was determined that the most important uncertainties for future scenarios in Zambia are:

(1) market connectivity and function, and

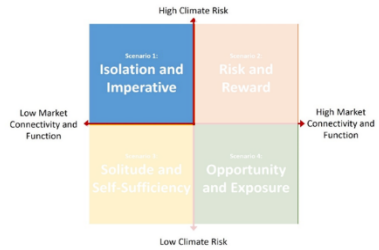
(2) climate change risk.

The key uncertainties can be used to describe four plausible futures that are very different, defined by combinations of market and climate risks.

Figure 2: Four Scenarios for the future of Zambia`s agricultural and food system



SCENARIO 1: ISOLATION AND IMPERATIVE (HIGH CLIMATE RISK, LOW MARKET CONNECTIVITY AND FUNCTION)



This future sees Zambia`s agricultural and food markets functioning poorly, characterized by unstable supply and fluctuating market prices and without significant increases in import and export trade.

In this scenario the following is taking place:

- Agricultural and food markets poorly functioning, unstable supply and fluctuating market prices, stagnation in import and export trade
- High climate risks with increased temperatures, more extreme and less predictable rainfall patterns, increased risks of droughts and floods, outbreaks of pests and diseases, environmental degradation; opportunities for tech companies to deliver adaptation tools
- Farmers change crops and perhaps shut their operations, destruction of infrastructure and problems with energy supply affect trade
- Crop failure, markets decrease and reduced volumes in agricultural exports, post-harvest losses,
- Less commercial farming creates an opportunity for small scale farmers to move to mid-level commercial farming; decrease in farming population and increased unemployment
- Scenario with potential to pressurise policy makers to design policies that reflect changing farming trends and climate risks

Winners:	High-tech companies and agricultural research and innovation centres, small holder farmers (who can move into mid-level commercial farming)
Losers:	Farmers (small holders and commercial), consumers

SCENARIO 2: RISK AND REWARD (HIGH CLIMATE RISK, HIGH MARKET CONNECTIVITY AND FUNCTION)

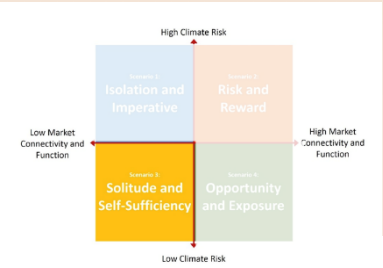
In this scenario, Zambia's food system is highly connected, and markets are well-functioning, but climate risks are high.

In this scenario the following is taking place:

- Food system highly connected, markets well-functioning but climate risks are high
- Warmer conditions and more extreme rainfall patterns, more frequent floods and droughts and higher incidences of pest and disease outbreaks
- Climate risks are greater than were anticipated in 2019 and climate change policies have failed to deliver on effective adaptation and mitigation tools
- Agricultural production is dominated by crops in which Zambia has a competitive advantage in the regional and global market
- Private sector benefits from high market connectivity: food system dominated by larger agribusinesses
- Smallholder farming is either minimally viable or unviable in a market that favours technical expertise
- Consolidation and mechanisation of farming results in lower employment opportunities in rural settings and continued rural-to-urban migration

Winners:	Private sector/commercial farmers, technology developers
Losers:	Smallholder farmers, rural economies

SCENARIO 3: SOLITUDE AND SELF-SUFFICIENCY (LOW CLIMATE RISK, LOW MARKET CONNECTIVITY AND FUNCTION)



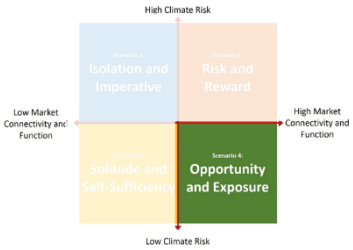
In this scenario, climate risk is low but Zambian markets are functioning poorly; prices are volatile, demand and supply are unsynchronized, and consumers lack access to goods.

In this scenario the following is taking place:

- Climate risks are low as a result of implementation of adaptation and mitigation actions at national level and global action towards achieving Paris-compliance is effective and timely
- Markets are functioning poorly at national and regional level; low agri-food exports; prices are volatile, demand and supply are unsynchronized, and consumers lack access to goods
- Limited market impetus for increased agricultural production contrasting with a growing population with shifting dietary preferences
- Economic stagnation principally caused by reduction in exports and reduction in foreign direct investment
- Reduced FDI in domestic infrastructure creates problems with food distribution; logistical challenges hamper the movement of commodities from areas of surplus to areas of deficit
- Emergence of local forms of self-sufficiency based on small-scale, resource-efficient production and relatively low levels of consumption

Winners:	Agricultural innovators specifically crop breeders, commercial farmers able to access improved and diversified seeds
Losers:	Smallholder farmers unable to access new innovations (improved crops)

SCENARIO 4: OPPORTUNITY AND EXPOSURE (LOW CLIMATE RISK, HIGH MARKET CONNECTIVITY AND FUNCTION)



In this scenario, climate risk is low, and Zambia has developed well-functioning markets in which supply is highly responsive to demand and consumers are able to meet their needs.

In this scenario the following is taking place:

- Climate risk is low and well-functioning markets have been developed in which supply is highly responsive to demand and consumers are able to meet their needs
- Agricultural production focusses on crops in which Zambia has a comparative advantage such as maize; but there is need for more impetus on agricultural diversification policy
- Flipside of greater market connectivity and enhanced production and export of maize by the private sector is the worsening of inequalities in the agricultural sector between commercial and smallholder farmers
- Increased export trade has increased non-farm employment opportunities across supply chains, including in processing and transport
- Flipside of the low risk and stable climatic conditions: there is some degree of complacency concerning the impacts of climate change on the agri-sector, which leaves Zambia unprepared for any unexpected climatic shocks

Winners:	Large-scale farmers and the private sector (because of abilities to access investment opportunities, high tech agricultural production tools), technology developers
Losers:	Local consumers (lose on diversified agri products because focus is on maize production for export), smallholder farmers and crop breeding community (loss of indigenous knowledge of indigenous nutritious food)

IMPLICATIONS OF THE SCENARIOS

The descriptions of the four scenarios have exposed the magnitude of uncertainty as to how the food and agricultural system of Zambia will evolve over the next decades leading to 2050 and beyond. Successful development of the food system in Zambia requires coordinated thinking about the way climate change will impact domestically and internationally, through trade's sensitivity to climate impacts elsewhere. Furthermore, it requires coordinated investment in the agri-food sector and its supporting infrastructure, and a deliberative linkage between domestic production, imported food and nutrition. Some of the implications, arising from discussions at the scenarios workshop, include:

1) **Diversifying agricultural production and production practices brings benefits both in terms of climate adaptation and the creation of new market opportunities**, as well as offering potential benefits for improved nutrition and greater dietary diversity. Steps have already been taken to delink subsidies from maize production. This is important, as such subsidies may inhibit diversification and distort competitive advantage in other crops, particularly in a context of more connected markets. Alongside diversification, there is a need to invest in strengthening the resilience of production systems to stresses through land management practices that conserve soils and address environmental degradation. An overly technocratic approach, based on narrow assumptions about the performance and suitability of 'silver bullet' practices is likely to compromise resilience and bring livelihood changes.

2) **Robust and well-functioning land tenure systems will be important in contexts that might see more investment in agriculture and land**. Poor land administration regulations can leave small rural landowners particularly vulnerable to displacement and negative livelihood outcomes. Access to food and markets is important to all, whether these markets are domestic or international, and investing in infrastructure that promotes this access is important, although care should be taken to make sure these investments are also equitable. Representation and participation in land, agriculture and market governance, particularly of those typically underrepresented, will be important for ensuring equity.

3) **Integrated planning across sectors is key.** The agriculture and food system in Zambia are intrinsically linked to water, energy and health sectors. Integrated planning across these sectors is important for avoiding contradictory plans or over-allocations of water, for example. In contexts of uncertainty (e.g. about future water availability) building contingency into sectoral strategies will be particularly important in strengthening long-term resilience.

4) **Through its participation in international climate agreements and the African Group, Zambia can continue to push for global climate action and justice**. It is clear that across the scenarios, high climate risk brings little benefit, so efforts to limit warming are important, but the extent to which Zambian national activity can influence this is limited given that it accounts for approximately 0.1% of global emissions.

5) **A skilled entrepreneurial and innovative agricultural labour force can drive adaptation and facilitate diversification of the agricultural sector**. Emphasizing agricultural and business skills within the national curriculum and promoting agriculture and business programmes within further education can contribute towards building the required skills base.

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About the Agricultural and Food-system Resilience: Increasing Capacity and Advising Policy (AFRICAP) Programme
The Agricultural and Food-system Resilience: Increasing Capacity and Advising Policy (AFRICAP) programme is a four-year research programme focused on improving evidence-based policy making to develop sustainable, productive, agricultural systems, resilient to climate change. The programme is being implemented in Malawi, South Africa, Tanzania, Zambia, and the UK led by the University of Leeds, a leading Russell Group university in the north of England, in partnership with the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), a pan-African multi-stakeholder policy network. The programme is funded by the UK Government from the Global Challenges Research Fund (GCRF), which aims to support research that addresses critical problems in developing countries across the world. It is administered by the UK's Biotechnology and Biological Sciences Research Council (BBSRC) - UK Research and Innovation (UKRI).

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