



# Malawi's Agriculture and Food System: A Scenarios Analysis

**Report on the GCRF-AFRICAP Participatory Scenarios Workshop**

**Venue:** Sunbird Capital Hotel, Lilongwe, Malawi

**Date:** Thursday 15 November 2018

## **Executive Summary**

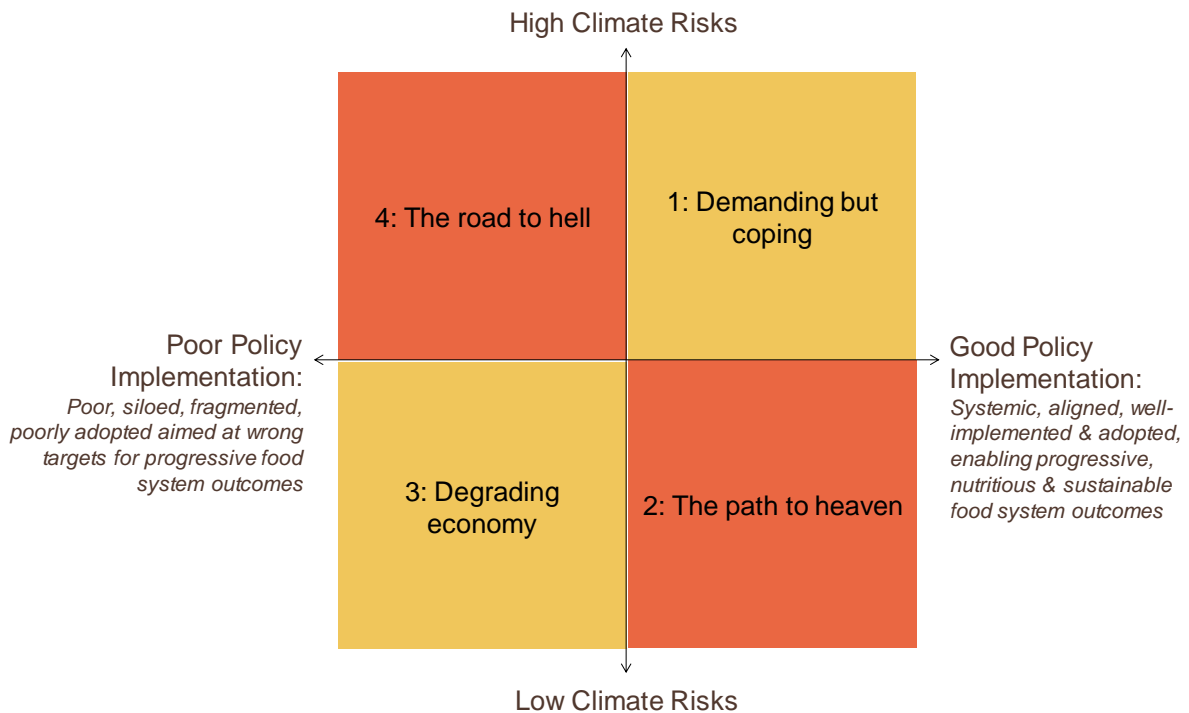
The evolution of Malawi's food system is critical to the country's development prospects over the coming decades. The population remains predominantly rural, rates of malnutrition are high and the agricultural sector provides a critical source of employment, income and export revenue. However, considerable uncertainty surrounds the food system's future. Trends including demographics, climate change, environmental degradation, the development trajectories for domestic and international markets, rates of technological development and adoption, dietary patterns and social developments including the integration of a growing youth population into the job market and access to education and resources for women, all have important implications.

Taken together, these trends present huge uncertainty surrounding how Malawi's food system will evolve between now and 2050. Any national forecast of such a complex system over such a long time frame will certainly be wrong, and planning purely on the basis that 'expected' outcomes will materialize is likely to result in poor decisions. Instead, plans to develop Malawi's agriculture and food system should explicitly recognize this uncertainty. Decision-makers need 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.

To help this process of planning a more resilient future, a scenario exercise for Malawi's food system was conducted with a selected group of c. 60 stakeholders from government, academia, civil society and the agriculture sector. Through discussion, two critical driving forces, with *high uncertainty* regarding their outcomes, were selected from a shortlist of pertinent trends affecting the food system. These two critical uncertainties were used to create axes for a 2x2 matrix that frames four potential futures reflecting more and less progressive outcome for each critical uncertainty. 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.

## **The Scenarios**

The two selected critical uncertainties were (1) the degree of climate risks and (2) the coherence and quality of policy implementation for food systems outcomes. The range of potential outcomes for each critical driver were plotted on two orthogonal axes, to derive four plausible scenarios illustrated below.



Of these two critical drivers of change in food system outcomes, Malawian policy-makers have considerably more agency in determining the quality and coherence of policy implementation than they do over climate risks. Thus, in order to avoid the worst outcomes of the ‘Degrading Economy’ and ‘Road to Hell’ scenarios and in order to ensure resilience of the food system in the presence of extreme (or more moderate or benign) climate risks getting policy implementation right will be key to ensuring positive, more resilient, food system outcomes. From a food and nutrition security policy planning perspective, decisions that Malawi should be taking today should lean towards planning for the worst case. One key route to plan such decisions relates to ensuring that the National Resilience Strategy Implementation Plan, currently being developed through national consultations, addresses climate risk more explicitly as a major concern and that this also captures cross-sectoral policy effectiveness and implementation. Key immediate actions could include greater empowerment of the Department for Environmental Affairs (who are responsible for cross-sectoral co-ordination) and the National Resilience Strategy Task Force, ensuring its active role in guiding sectoral planning. It is also vital that long-term planning (enabled through the National Planning Commission under the auspices of the Ministry of Economic Planning & Finance) consider the dual risks on food system resilience of increasing climate risks and poor implementation of cross-sectoral policies.

## **Malawi's Food System Policy Landscape**

Malawi's national long-term development perspective, Vision 2020, which was developed in 1998 considered climate change as 'a small environmental concern'<sup>1</sup> and did not highlight it as a serious threat to its broader development ambitions including for the agriculture sector, food and nutrition security and poverty alleviation. However, ensuing sectoral policies acknowledged the threats posed by climate change to the agriculture sector, highlighting the needs for adaptation and mitigation actions and established linkages with food security and nutrition and environmental sustainability. Both the 2006 and 2015 National Adaptation Programme of Action (NAPA) and Nationally Appropriate Mitigation Actions (NAMAs) respectively identify agriculture as one of the sectors requiring climate adaptation plans and mitigation actions to reduce GHGs emissions from the sector. The 2016 National Agricultural Policy (NAP) sets itself a goal to drive significant agricultural transformation, which should lead to increased agricultural exports, expanded incomes for farming households and improved food and nutrition security. Sustainable agricultural production and productivity and food and nutrition security are among the priority areas earmarked by the 2016 NAP, which aims to achieve these aims (in part) by increasing investment in adoption of climate smart agriculture and sustainable land and water management.

The policy landscape more broadly has also gradually increased signalling of the actions that can be taken to address the problems emanating from climate risks. For example, the 2016 National Climate Change Management Policy, which is meant to act as a mechanism for harmonising and coordinating climate change initiatives and programmes, underlines the importance of technological developments and transfers in realising food and agriculture adaptation and mitigation, emphasising the role of climate-smart technology investment and adoption. Other more recent, policy processes such as the 2017 Malawi Growth and Development Strategy III (MGDS III), the 2017 Strategic Programme for Climate Resilience, and National Resilience Strategy (NRS) currently under development together with its Implementation Plan have all linked agricultural development/transformation and productivity outcomes, food and nutrition outcomes and climate change and broader environmental sustainability outcomes. However, the NRS, despite being a major policy process intended to instil resilience in many aspects of Malawi's growth ambitions and its population's welfare, doesn't give much prominence to climate change as a major threat to Malawi's development, despite major humanitarian disasters associated with climate change that have affected the country in recent years.<sup>2</sup> Failure to recognise climate change as a major risk to development ambitions and the absence of long-term adaptive strategies, will

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<sup>1</sup> It did however stress that this small concern could become a serious problem if it goes unchecked.

<sup>2</sup> For example, floods that affected Malawi, Mozambique and Madagascar in January 2015 and which caused significant damages to property, infrastructure and agriculture. (Rapolaki, R.S. & Reason, C.J.C., Tropical storm Chedza and associated floods over south-eastern Africa, *Nat Hazards* (2018) 93:189–217, accessible at: <https://link.springer.com/article/10.1007%2Fs11069-018-3295-y#citeas>)

jeopardise the delivery of MGDS III outcomes under priority area 6.2 “agriculture and climate change”.<sup>3</sup>

Despite this slow but important shift in the policy arena and the multiplicity of policies developed,<sup>4</sup> there is not yet a comprehensive approach in the agriculture and food system policy-making in Malawi that considers a range of driving forces which have the ability to affect food production and availability, social and economic development, and environmental sustainability. For example, while envisaging increases in agricultural productivity and food production, the impacts, and conflicts, that such agricultural developments are likely to have on broader water use and energy demand still need to be considered more holistically.

Achieving a food and nutritionally secure and resilient Malawi, in which a healthy population is able to drive Malawi’s future stability and economic prosperity, requires comprehensive and integrated planning and policymaking. This will necessitate a shift from business-as-usual disjointed sectoral policymaking approaches that are reactive to immediate problems, towards the adoption of a holistic and forward-looking ‘food system approach’. This would take into account all activities and actors involved in food production, processing, transportation and consumption of food; the general economic climate; and role of the food system in economic development and employment, environmental sustainability, health and nutritional outcomes. It would consider the effectiveness (or lack of it) of current governance systems and political climate in delivering against these holistic objectives.

## **Key Trends**

This section provides an overview of the main driving forces of the food system and their projected trends and impacts on agriculture and food systems in Malawi over the coming years to 2050. The drivers relate to several domains: (a) economic development, (b) demographic changes and urbanisation; (c) food and nutrition security and diets; (d) agricultural footprint and environmental sustainability; (e) climate change and (f) agriculture and food systems technologies.

### **a) Economic development**

In assessing Malawi’s current economic situation and the role that agriculture may play in its evolution over the next 30 years, a number of open questions are worth bearing in mind. These relate to whether continued reliance on agriculture-led growth can be sustained in Malawi; where non-farm, especially urban, economic growth will come from in the next 30 years; and the implications any of these dynamics may have on job creation and inequality. Other open questions relate to the shape of agricultural investment over the next 30 years

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<sup>3</sup> Under MGDS III priority area 6.2 the following outcomes, among others, are planned: Increased agricultural production and productivity; increased land under irrigation; increased agricultural diversification; improved nutrition and food security; increased agriculture market development, agroprocessing and value addition; improved weather and climate monitoring, prediction, information and knowledge management systems

<sup>4</sup> These demonstrate that Malawi is committed to addressing problems of famine and food insecurity today, especially as they relate to climate shocks

and the implications for rural poverty reduction, farm sizes, resource-use and total factor productivity.

Malawi's economy is predominantly agricultural, with the agriculture sector accounting for approximately 1/3 of GDP and 80-90% of the Malawi's export revenues with tobacco accounting for more than half of total exports.<sup>5</sup> However Malawi has policy ambitions:

- To have a technologically-driven economy by 2020 while providing an enabling framework for addressing climate change and other environmental challenges (Vision 2020)
- To increase economic growth by focusing on key priority areas such as agriculture and climate management, education and skills development, energy and industrial development, transport and ICT infrastructure development and health and population management (MGDS III) and;
- To diversify its agriculture/crop production sector away from maize and tobacco to other food and cash crops (MGDS II, Draft NRS).

According to the IMF, Malawi is one of the poorest countries in the world, with 51% of its population living below the poverty line of US\$1.90 per person per day and 25% described as living in extreme poverty (IMF, 2017)<sup>6</sup>. This IMF Economic Development Document for Malawi identifies agriculture as the backbone of the country's economy; its performance has significant implications on job creation and overall growth and poverty reduction, especially in rural areas. Indeed, 2/3 of the country's population are currently reported to be employed in the agriculture sector with smallholder farmers representing about 70% of total agriculture GDP.<sup>7</sup> Poor performance of the agriculture sector is therefore among the drivers of poverty, alongside volatile economic growth, population growth and limited opportunities for non-agricultural income generating activities.<sup>8</sup> Energy shortages are a major hindrance to Malawi's economic growth, with only about 10% of the total population having access to electricity.<sup>9</sup>

Looking ahead, the average annual growth is forecasted to exceed 6.5% by 2023,<sup>10</sup> and the proportion of workforce engaged in the agriculture sector is projected to remain high despite the possibility of a decline due to rural-to-urban population migration.<sup>11</sup> The country's future economic performance is projected to be significantly affected by climate change, and weather patterns are expected to remain a key part of the economic cycle; negative impacts of bad weather are likely to exacerbate other hindrances such as low technological development and adoption, high population growth rates, and environmental degradation.

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<sup>5</sup> <https://www.cia.gov/library/publications/the-world-factbook/geos/mi.html>

<sup>6</sup> IMF, Malawi: Economic Development Document, International Monetary Fund, 2017, Pp16

<sup>7</sup> <https://www.fanrpan.org/publication/fanrpan-climate-smart-agriculture-policy-briefs-malawi>

<sup>8</sup> <http://www.worldbank.org/en/country/malawi/overview>

<sup>9</sup> <http://www.worldbank.org/en/country/malawi/overview>

<sup>10</sup> <https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/>

<sup>11</sup> United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, custom data acquired via website.

## **b) Demographic changes and urbanisation**

Demographic trends including urban and rural population changes, births and infant mortality rates will have a significant bearing on agricultural production, food systems, and food security outcomes over the coming decades. Key open questions guiding examination of this driver relate to whether urbanisation and population growth will be as rapid as expected and what the implications for agriculture and food security might be. Further uncertainties relate to whether population growth will be accompanied by increased and secure employment opportunities, whether such employment is likely to be found within or beyond the food system, and what the implications of a burgeoning youth population may be for rural or urban employment prospects.

Estimated at 11 million people in 2000, comprised of about 5.8 million females and 5.6 males, the total population of Malawi grew to 19 million people in 2018 and is expected to reach 27 million by 2030, 42 million by 2050, and 76 million by 2100.<sup>12</sup> Based on these trends, the total population of Malawi in 2050 could be close to four times its size in 2000. A number of factors could contribute to this population boom including decreasing infant mortality rates - projected to fall from 115 per 1000 live births in 2000 to 38 per 1000 live births in 2050.<sup>13</sup> A decline in infant mortality is suggestive of an improving health care system including better overall maternal and infant health. It could also potentially indicate better nutrition for pregnant women, which is critical for maternal and infant health. Dramatic population growth is projected despite an expected decrease in birth rates – expected to fall from 45 live births per 1000 people in 2000 to about 25/1000 by 2050.<sup>14</sup> By 2050 around 32% of Malawi's population is expected to be urban, representing, proportionally, a near doubling from 17% urban today.<sup>15</sup> The increase in urban population will add challenges to cities like Lilongwe in terms of water supply and sanitation, employment and food availability for urban dwellers.

## **c) Food and nutritional security and dietary trends**

Several critical but open questions are worth considering in relation to current and future food and nutritional security situations in Malawi. These include whether recent increases in undernourishment will persist as the population increases and whether, in the context of demographic changes and increases in protein supply, Malawi will become more dependent on food imports.

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<sup>12</sup> United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, custom data acquired via website.

<sup>13</sup> United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, custom data acquired via website.

<sup>14</sup> United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, custom data acquired via website.

<sup>15</sup> United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, custom data acquired via website.

The latest available data suggest that 26 % of Malawians (4.8 million people) are currently undernourished with 35 % of children under five stunted.<sup>16</sup> Reflecting the growing double challenge of malnutrition in developing countries, overweight and obesity in children and adults is already noticeable with 5% of children moderately or severely overweight in 2015 and 5% of adults reported obese in 2016.<sup>17</sup> Micronutrient deficiencies in both adults and children are expected to remain significant in the coming decades, with undernourishment likely remaining a more significant factor than obesity; 17 and 6 % of the 2030 and 2060 populations, respectively, are expected to be malnourished.<sup>18</sup> Nonetheless, the level of obesity is likely to increase from 3 % in 2030 to 6 % in 2060.<sup>19</sup> Thus, by 2060, malnourishment and obesity are expected to afflict similar proportions of the population, perhaps suggesting that policy-making and practical initiatives aimed at these nutrition challenges should receive similar level of attention from policy makers and development practitioners.

There is growing evidence that weather patterns and food security are closely linked in Malawi, and are expected to remain so until 2050. Over this time horizon, population growth in Malawi could potentially outstrip Malawi's domestic food production capacity. The 2016 National Agricultural Policy of Malawi alludes to this trend, stressing that 'Agricultural production and productivity in Malawi has not increased to meet the growing domestic demand and available export opportunities' (NAP 2016, P4). Among other constraints to the limited production and productivity outlined in the NAP are inadequate access, control and utilisation of productive assets such as water and land by women and youths.

#### **d) Agricultural footprint and environmental sustainability**

Key questions regarding the future environmental impacts of Malawian agriculture relate to whether possible changes in demand and the environmental conditions could result in sustainable intensification of agriculture or whether they would lead to further land use and agricultural expansion.

Agriculture in Malawi is dominated by smallholder farmers and estate farms. Smallholders are mainly involved in growing food crops (e.g. maize, rice, cassava, sweet and Irish potatoes and legumes) for household subsistence as well as producing some cash crops such as tea, tobacco, sugarcane and coffee.<sup>20</sup> Estate farms are however largely involved in the production of high-value cash crops, which contribute significantly to the agricultural exports of Malawi.<sup>21</sup> The agriculture sector in Malawi is very vulnerable to climate change, not least because of its high reliance on rains, despite the significant irrigation potential the country has.<sup>22</sup> Broader environment issues also affect Malawi's overall growth and development, particularly the

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<sup>16</sup> <http://www.fao.org/faostat/en/#data/FS>

<sup>17</sup> <http://www.fao.org/faostat/en/#data/FS>

<sup>18</sup> [http://www.ifs.du.edu/ifs/frm\\_CountryProfile.aspx?Country=MW](http://www.ifs.du.edu/ifs/frm_CountryProfile.aspx?Country=MW)

<sup>19</sup> [http://www.ifs.du.edu/ifs/frm\\_CountryProfile.aspx?Country=MW](http://www.ifs.du.edu/ifs/frm_CountryProfile.aspx?Country=MW)

<sup>20</sup> <https://www.fanrpan.org/publication/fanrpan-climate-smart-agriculture-policy-briefs-malawi>

<sup>21</sup> <https://www.fanrpan.org/publication/fanrpan-climate-smart-agriculture-policy-briefs-malawi>

<sup>22</sup> <https://www.fanrpan.org/publication/fanrpan-climate-smart-agriculture-policy-briefs-malawi>



agriculture sector, and are in many cases exacerbated by climate change. These include deforestation, land degradation, water pollution from agricultural runoff, sewage and industrial wastes, and siltation of fish spawning grounds.<sup>23</sup>

Looking ahead to the next 30 years, the negative effects of climate change – including extreme high temperatures and changing precipitation patterns – are likely to increase the vulnerability of Malawi’s agriculture and will therefore affect food security and economic growth.<sup>24</sup> In addition, population growth and higher population densities could exacerbate the current environmental threats to Malawian agriculture by increasing pressures on natural resources such as land, water and forest resources.

In terms of ensuring and maintaining sustainable levels of agricultural productivity to meet food demand from the growing population, Malawi will find this very challenging towards 2050 if environmental conditions and land degradation result in unproductive and exploitative farming practices and an unsustainable agricultural sector. These environmental challenges could be mitigated to some degree by wider adoption of climate-smart and sustainable intensification agricultural practices, for example through the expansion of sustainable irrigation, crop rotation and agroforestry, whilst diversifying crop production to include a wide range of nutritious foods.

#### **e) Climate change**

Climate change and agriculture are linked: there is growing evidence that climatic changes and shocks are affecting farming systems, while agriculture is also a principal contributor to GHG emissions. Questions about how these relationships will further develop and affect food security towards 2050 include those relating to how climatic changes and shocks will affect agriculture, especially food production; what the implications of climate change will be for the quality, quantity and reliability of domestic food supply; and how investments in adaptation measures will affect the resilience of agriculture and the food system in Malawi.

The most obvious effects of climatic changes in the present and recent past include moderate increases in drying spells in northern and southern parts of Malawi between 1981 and 2016. These drying trends are in contrast to small wetting trends in the central parts of Malawi during the same period. Very wet years (1989 and 1997) and dry years (1992 2005 - the driest on record, and 2008) have also been recorded as well as an apparent overall warming trend in annual temperature.<sup>25</sup>

Looking ahead over the next thirty years and beyond, patterns of rainfall are highly uncertain with very small decreases in rainfall of around -2 to -4 % by 2040 anticipated.<sup>26</sup> Changes in rainfall are however projected to be significant by 2090s with annual rainfall thought likely to

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<sup>23</sup> <https://www.cia.gov/library/publications/the-world-factbook/geos/mi.html>

<sup>24</sup> <http://www.futureclimateafrica.org/resource/future-climate-projections-for-malawi/>

<sup>25</sup> [http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772\\_malawi\\_climatebrief\\_v6.pdf](http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772_malawi_climatebrief_v6.pdf)

<sup>26</sup> [http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772\\_malawi\\_climatebrief\\_v6.pdf](http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772_malawi_climatebrief_v6.pdf)

decrease markedly throughout Malawi, by around 14 %.<sup>27</sup> There is a growing consensus on continued future warming throughout Malawi. Some projections suggest an even distribution of warming in Malawi ranging from 0.5 to 1.5°C by 2040. By 2090s, projected warming will be in the range of 2.3 to 6.3°C, evenly distributed across the country, with high likelihoods of longer dry spells and of intense rainfall events with the possibility of increases in the number and extent of flooding events.<sup>28</sup>

### **Malawian Climate Projections**

Based on an analysis of 34 Global Climate Models (GCMs) and in an endeavour to contribute to forward looking policy planning and decision-making, the UMFALA team of the Future Climate for Africa (FCFA) delivered the following projections on the future trends of warming and rainfall in Malawi. Out of the 34 models, 13 (38%) project reductions in annual rainfall for the 2030s – and the rest (62%) project wetter conditions. Twenty models (58%) project drying by the 2070s. The size of change in annual mean rainfall is generally modest, from a -8% drying to a +20% wetting. Nineteen models project changes less than +/-5% for the 2030s. The changes are larger by the 2070s; a range of -17% decrease to +27% increase and only 12 models produce changes less than +/-5%.<sup>29</sup>

### **f) Agriculture and food system technologies**

Accounting for current and future roles of technological innovations in food systems, especially in agricultural productivity and production, is important in the development and implementation of food security and nutrition plans. A number of technology-related questions are pertinent:

- How will the benefits of technological advancement be distributed in the future, and will intellectual property rights associated with any given technology be consolidated in the hands of a few actors or open-sourced?
- Will technologies increase or decrease existing and emergent inequalities?
- Will any disruptive or breakthrough technologies emerge with the potential to be ‘game changers’ in Malawian agriculture or broader food systems, and how might different stakeholders be affected?

Currently in Malawi infrastructural development and technological adoption are very low,<sup>30</sup> and only minimal value addition occurs on-farm as most farmers sell raw materials/produce. Despite the potential of breakthrough technologies such as CRISPR gene-editing, immutable blockchain ledgers for supply-chain transparency, and artificial intelligence applications to extension services, there is very little current adoption of these, or other, technological advances to Malawian agriculture or food systems. Nonetheless, from a policy perspective, the Government of Malawi is committed to ensuring food and nutrition security by various means, including through the “promotion of access to ethically sound, safe and acceptable advanced technological means in food production, processing and distribution that advocate

<sup>27</sup> [http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772\\_malawi\\_climatebrief\\_v6.pdf](http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772_malawi_climatebrief_v6.pdf)

<sup>28</sup> [http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772\\_malawi\\_climatebrief\\_v6.pdf](http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772_malawi_climatebrief_v6.pdf)

<sup>29</sup> [http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772\\_malawi\\_climatebrief\\_v6.pdf](http://www.futureclimateafrica.org/wp-content/uploads/2017/10/2772_malawi_climatebrief_v6.pdf)

<sup>30</sup> <https://www.cia.gov/library/publications/the-world-factbook/geos/mi.html>

the use of the most effective and appropriate seed varieties, fertilizers, pesticides and other agricultural technologies that are sustainable and environmentally friendly” (Food and Nutrition Bill 2017, P.9). Additionally, the 2016 Climate Change Management Policy envisions application of technological innovations and technology transfer as central to enhancing agricultural resilience and emissions reductions. The onus is therefore on the government and development partners to turn these kinds of policy pronouncements into reality as part of efforts to increase sustainable food and nutrition security in Malawi. New technologies may well be developed outside Malawi in the coming years that have promise for adoption within a Malawian context, but there are considerable uncertainties as to how such technologies will evolve over time, and/or be adopted domestically.

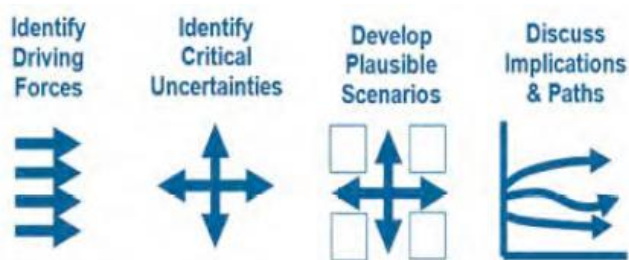
The extent to which Malawi will be able to absorb and take advantage of emerging technologies in pursuit of agricultural and food system transformation will depend on a host of factors including the costs of such technologies and associated intellectual property rights. To the extent that these prohibit widespread adoption this may even exacerbate inequalities in the food system. However, if new technologies are readily available and are adopted and adapted with great sensitivity and relevance to Malawian circumstances this could lead to transformative impacts on resource use, productivity, livelihoods, food security and nutritional outcomes.

### **The Scenarios Approach**

There is considerable uncertainty surrounding how Malawi’s food system will evolve between now and 2050. Any ‘best estimate’ forecast of such a complex system over such a long time frame will be wrong. Accordingly, plans to develop Malawi’s agriculture and food system should recognize this uncertainty. Decision-makers should explore how choices and events might shape different futures and identify strategies that are resilient to uncertainty: no-regret options which would 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 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 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 1 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.

**Figure 1: The Steps in a Scenarios Exercise**



### Identifying the most critical uncertainties

Whilst all of the trends considered above are clearly important in determining whether or not Malawi’s food system in 2050 will be sustainable, productive and climate smart, they vary in terms of their uncertainty. For example, whilst temperature and rainfall changes due to climate change are both important, there is considerably more uncertainty about the latter. And 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 and that plans should be made on this basis.

Participants identified and discussed the following long-list of important uncertainties for Malawi:

Uncertain trends	ranking
<ul style="list-style-type: none"> <li>- Climate risks               <ul style="list-style-type: none"> <li>o Rainfall and temperatures/changing weather patterns in Malawi/natural disasters/dry spells and flooding</li> <li>o Adaptation to climate change</li> <li>o Environmental and land degradation, deforestation, pollution</li> <li>o Water availability</li> <li>o Pests and diseases</li> </ul> </li> </ul>	1 <sup>st</sup>
<ul style="list-style-type: none"> <li>- Effective policy implementation for food systems outcomes as impacting on e.g.               <ul style="list-style-type: none"> <li>o Technology direction of travels/level of adoption</li> <li>o Food security</li> <li>o Priorities in agriculture</li> <li>o Infrastructural development</li> </ul> </li> </ul>	2 <sup>nd</sup>
- Rates of migration	
- Inequality of income and gender	
- Crops/role of smallholder farmers/livestock- improved production systems	
- Proportion of agriculture to the broader national economy	
- Land tenure fragmentation	
- Corruption	
- Local and international markets	
- Extent of urbanization	

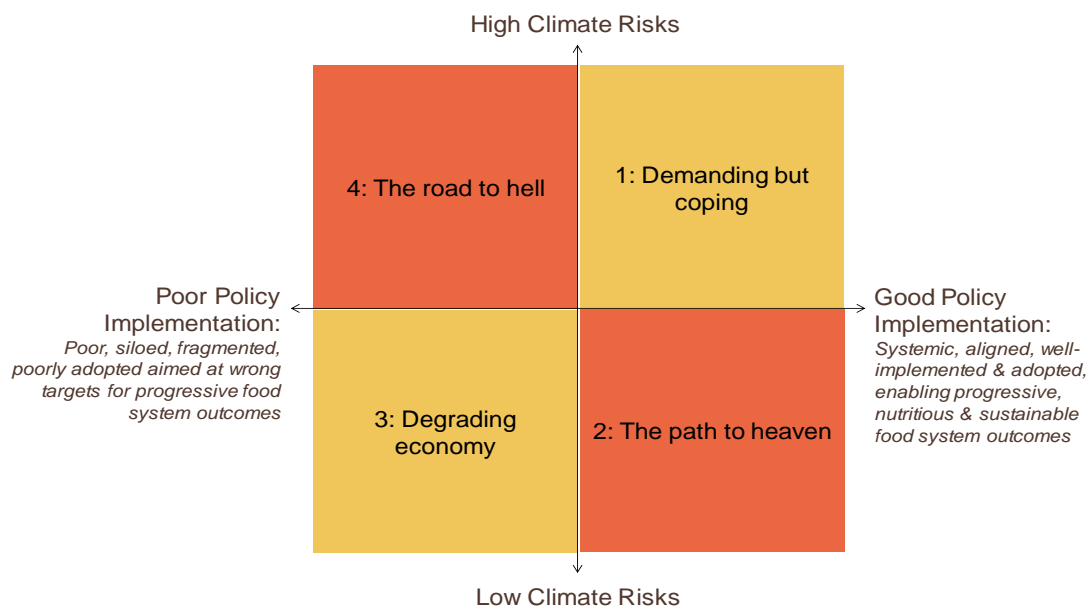
- Energy supply	
- Speed of societal/cultural change	
- Global change in relation to e.g. <ul style="list-style-type: none"> <li>○ Politics and markets</li> <li>○ Macroeconomics and global inequality</li> </ul>	
- Emergence of middle classes in farming	
- Impact of inward foreign investment	
- Economic growth (trade/formal and informal sectors/industrialization)	
- Infrastructure investment in transport, irrigation and impacts on imports/exports	
- Food demand and preferences	
- Food security and nutrition	
- Technological development and adoption	

From this long-list of uncertain trends the assembled stakeholders ranked the following top two as the most critical uncertainties to construct the scenarios matrix:

- Climate risks
- Effective policy implementation for food systems outcomes

Land degradation and global trends and market dynamics were close runners up. This resulted in the scenario matrix below.

**Figure 2: Malawi Food System Scenario Matrix**



To explore possible agricultural and food system futures in Malawi, each scenario (quadrant) was considered in turn using the following guiding questions:

- What are the implications for 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 likely to be the winners and losers?
- How might such a world come about between now and 2050?

The four scenarios are explored below, starting in the top right quadrant.

### **Scenario 1: Demanding but Coping**

#### ***(High climate risks, good policy implementation)***

Under this future the Malawian agriculture sector and the food system are subjected to high climate risks, which manifest as unpredictable weather patterns, more frequent rainfall and longer spells of high temperatures. These are all adversely affecting cultivated land and soils are rapidly degrading, in many cases being so unproductive as to be able to yield marketable produce. The changing climate is also resulting in a much higher incidence of pests and diseases affecting crops and livestock (including some not previously seen in Malawi). It has also contributed to significant land degradation, deforestation, air pollution and drying-up of water resources. Malawi's infrastructure, which has undergone significant developments in recent decades is also struggling to cope with climatic extremes. Some rural roads facilitating market access for producers and connecting them with recently developed agro-processing units suffer from buckling and melting during prolonged heatwaves; irrigation channels often run as a result of increased evapotranspiration; and storage facilities are reaching the limits of their abilities to keep perishable produce fresh under a greater range of extreme weather conditions. As a result, even for those crops and areas of Malawi where production is able to meet the increasing demand, getting this produce to domestic and international markets without spoiling or incurring significant losses is an increasing challenge.

Despite the considerable challenges from the natural environment, Malawi's sustainable development policies have been sensitively and coherently developed, are evidence-based, future-proofed, and are mutually supportive in implementation.

Policies that in 2018 already had provisions for increasing the resilience of the food system to climate change have been successfully implemented and built upon, including diversifying agricultural production and economic activity more broadly. Different central and regional government departments are not working in isolation or protecting vested self-interests but are rather coordinating effectively and fostering cross-ministerial and cross-sectoral strategic alignment. For example, agricultural production incentives and priorities are supportive of better nutrition and health outcomes, and co-ordinated water-use planning recognises and manages the demands from irrigation, industry, and renewable energy users.

The vast majority of Malawians are supportive of the approach being taken, not least because the different needs, roles, and contributions of women and youths in relation to agriculture and other parts of the food system are well-recognised and supported. Nepotistic influences

over policy processes have largely been eradicated, as has the pronouncement of short-term, misaligned commitments made to curry political favour from the electorate ahead of elections. The Malawian government has done a good job of working with international donors and development partners and has convinced them to align their strategic priorities and investments with Malawi's own articulation of its development priorities, creating an enabling and coherent policy environment.

In many instances, the success of these well-aligned and progressive policies is dependent on the extent to which they are supportive of climate-smart practices. Among many other factors in this demanding environment this has often depended on how more advanced agricultural and food systems technologies have been introduced, supported, and adopted. Precision irrigation, new local agro-processing and value-addition possibilities, breeding of locally-appropriate climate-intelligent crop varieties, and improved hyper-local weather forecast technologies across daily, monthly, and seasonal time horizons to aid decision-support have all proved worthwhile and improved the climate-resilience of food and farming practices.

Concerns have been expressed that without active development of economic opportunities elsewhere, population growth within the agricultural labour-force could significantly intensify unsustainable practices. As a result investments in diversifying Malawi's economy and decoupling employment from the natural environment has created new service-sector employment opportunities outside agriculture. Recognising that a relatively smaller agricultural workforce does not necessarily translate into lower-intensity resource use, mechanisation, input-use, dietary demands, and production support systems are all governed by a well-aligned policy framework that is also designed to reduce the pressures on the natural environment whilst supporting nutritious food production.

In the context of heightened climate risks and frequent extreme events, and the prominent role of technology for enhancing food system resilience to these some smallholder farmers still heavily dependent on rain-fed maize have found themselves relatively and absolutely worse-off, unable to adapt to the changing climatic and economic conditions. Those insurance companies that have poorly calibrated their risk exposure through ill-designed weather insurance are also struggling to cope. Nonetheless, for the very poor and vulnerable in Malawian society, social safety nets are by-and-large functioning well and donor and humanitarian support through food aid and farm input support are meeting a need without distorting local markets.

## **Scenario 2: The Path to Heaven**

### ***(Low climate risks, good policy implementation)***

Under this scenario the climatic risks to Malawi's food and agricultural systems are lower than might otherwise have been anticipated, though they are nonetheless more significant than they were in the late 2010s: the climate has warmed and the risks of drought have increased, but these have not yet proven to be catastrophic. Rainfall patterns are certainly more

changeable than older generations have been used to, but farmers have generally been able to manage this uncertainty with regard to planting plans, and improved irrigation infrastructure has aided water availability at key times of the year.

The reduced risks stem from dramatic acceleration of global ambition, finance, and action to curb GHG emissions; the Paris Agreement commitment to keep warming well below 2°C above pre-industrial levels appears to be track. Despite its very limited contribution to global GHG emissions (estimated at 0.07% of global GHG emissions),<sup>31</sup> Malawi has been proactive in mitigating its own emissions, including from agriculture and land use, in line with the 'common but differentiated responsibility and respective capabilities' principle established in within the UNFCCC. Supported by a well-financed Green Climate Fund and other donor contributions towards low-emission and climate-resilient development, Malawi has been able to invest in climate-smart agricultural adaptations and technologies. For example, technologies such as remote-sensing and gene-editing have been applied sensitively to local contexts and capacities and have resulted in sustainable increases in crop productivity and improved drought tolerance. The increasing use of technology in food systems more generally (both supporting on-farm production and facilitating access to relevant and timely market and meteorological information) has resulted in younger generations continuing to work in agriculture and associated activities. Effective policies have helped to ensure that these technologies are available to all farmers rather than just large-scale commercial growers. In addition to novel technologies, local agricultural knowledge has been successfully incorporated into the high-tech food system. Integrated Pest Management has been successfully incorporated and is able to provide adequate protection against continuing pest and disease pressures. Water-use efficiency has improved, resulting in the expansion of irrigation and less reliance on rain-fed agriculture. This, in part, is also facilitated by increasing power generation from solar and wind and reduced reliance on hydropower. Expanded and upgraded storage facilities have improved public health and, coupled with improved transport and processing infrastructure, have reduced post-harvest losses and are permitting greater levels of value-addition. Seasonal forecasting has been adopted as the norm among all farmers, giving them accurate and practical information on likelihoods of droughts, floods and the onset of rains.

Globally, the food system has more-or-less successfully adapted to the remaining climate risks faced in 2050 and, despite occasional production shocks, systemic impacts and food price spikes are relatively rare. Emergency response mechanisms are well-governed, market information is transparent, and global markets function well, utilising resilient infrastructure. Malawi is no exception - its land-locked status is less of a hindrance than in the past since the development of connections to reliable and efficient regional transport corridors. Malawian agricultural output is attractive to global markets, and balances regional food preferences with improved nutrition. Malawi imports what is better grown elsewhere and grows what is most efficient to do so domestically – the trade balance ensures that diets are healthy with adequate supply of both macro and micro-nutrients. As a result of an expanding Malawian

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<sup>31</sup> <http://conrema.org/2016/01/30/ghg-emissions-by-country-table-malawi-contributes-less-than-1-to-global-greenhouse-gas-emissions/>



economy, food accounts for a decreasing proportion of household expenditure, though food prices in absolute terms are likely to be higher, better reflecting production costs from sustainable farm management practices. Export incomes nationally are likely to increase through increased production and value addition of food and commodity crops.

As under the 'Demanding but Coping' scenario, Malawi's food, agriculture, and development policies have been well designed, integrated, and implemented, and are providing an enabling environment for these broad-based progressive changes. Malawian stakeholders – including farmers, other food system actors, civil society, and local government – and international development partners are broadly bought-into Malawi's development priorities, in no small part as a result of them having been developed in a participatory manner.

Small-scale farmers, alongside large-scale commercial cash-crop farmers, have benefited from the broad-based nature of the policy priorities and have become increasingly food secure, both from their own production, but also from the improved income-generating potential of their marketable surpluses. As originally envisioned by MDGS III, enhanced and more resilient productivity has reduced the thinness of food markets and the likelihood and impacts of food price spikes have been reduced.

Politicians have championed these policies and have been willing to reach robust, evidence-based conclusions when making political decisions about, for example, investment in, promotion of, and tax incentives to catalyse appropriate technological innovations for agricultural and food system development and broader infrastructural development.

Championed by outspoken and committed political leaders, there is significant attention being paid to the equity and transformative outcomes of policy choices. Land ownership reforms, among others, are proving to be gender-sensitive and titling an increasing proportion of land to women. Smallholders in general are recipients of more appropriate and better financed training, including on the appropriate use of novel technologies. As a result of these changes, a new middle class of commercially successful, previously small-scale, farmers is emerging; consequently the relative farm size and (domestic and export) market share and influence of large industrial farms is decreasing. Improved access to and availability of more diversified agricultural production is resulting in Malawians in general eating a more nutritious and sustainable diet than they have been accustomed to.

### **Scenario 3: Degrading Economy**

#### ***(Low climate risks, poor policy implementation)***

In this 'Degrading Economy' scenario, policies that govern, impinge on, and otherwise affect food and agricultural sectors in Malawi are incohesive and have been poorly designed and implemented. This is hampering progressive developments to Malawi's food system, but the worst possible outcomes from these policy deficiencies are not fully realised as, fortunately,

the risks and disruptions posed by climate change have not yet proved to be as significant as once feared.

Although Malawi remains a policy rich environment, with copious pronouncements of new policy initiatives, these are rarely fully implemented or adopted. Those policies that do come to fruition are typically developed in isolation with little collaboration or coordination between ministries and disciplines, and little engagement of relevant stakeholders. This has resulted in these different initiatives often undermining one-another and working at cross-purposes rather than being mutually reinforcing.

One example is the failure of the ambitious agricultural diversification agenda as originally encapsulated decades earlier in the Malawi Growth and Development Strategy (II and III) and in the National Resilience Strategy. Despite laudable goals to increase productivity, dietary diversity and resilient farming systems - by transitioning away from large-scale maize monoculture to more mixed cropping of maize and other foods crops, these have not be realised to any significant degree. Crop breeding and seed policies and commercial incentives continued to prioritise maize varieties and gave little consideration to how the poorest farmers would be able to access improved varieties. As a result agricultural research institutions and seed companies pursued a business-as-usual approach and domestic production has achieved little diversification. The lack of political will to develop infrastructure in the more marginalised parts of the countries has also restricted farmers' access to markets. Similarly, the tax incentives for, and lack of regulation of, fast-food and foreign FMCG companies in an effort to attract greater inward investment have undermined dietary objectives, with increasing proportions of Malawians now obtaining much of their food intake from highly palatable but nutritionally deficient convenience foods..

As a result of poor and fragmented policy implementation, the farming sector remains largely subsistence-oriented and maize production continues to dominate over other crops and livestock. Technology proliferation and uptake remains low: innovations such as improved seeds and post-harvest technologies are not widely adopted, nor are innovative irrigation technologies. These impair farmers' ability to cope with climatic changes and shocks – they are fortunate that these are not as severe and frequent as once feared, due to accelerated and ambitious international action to mitigate GHG emissions, but they remain vulnerable nonetheless.

Consequently, agriculture's contribution to Malawi's economy, and the potential for additional value-addition, has dwindled as its performance is enfeebled and the growing, youthful population are attracted to work in other more appealing non-farm sectors. There are signs that these alternative employment opportunities are not able to keep pace with demographic changes. This, coupled with the lack of agricultural opportunities, is contributing to unsustainable levels of insecure employment and unemployment – particularly for youths and women – which, in turn, is leading to a resurgence of food and nutritional insecurity and social unrest. . Malawi remains highly reliant on international donors for support and food aid, but its ability to attract foreign direct investment is being impaired by the shortcomings of trade and investment policy, the regulatory climate, and the failures to upgrade infrastructure.

Despite the unfavourable business climate and degrading economic situation, a small group of wealthy elites have been able to capitalise on the inequalities given the increasing potential for corruption opening, and a blind-eye being turned to large-scale land acquisitions and appropriation of other natural resources, including by overseas entities.

#### **Scenario 4: The Road to Hell**

##### ***(High climate risks, poor policy implementation)***

The future under the 'Road to Hell' scenario is bleak: climate risks are high and Malawian food and agriculture systems are ill-equipped to deal with them as a result of fragmented, poorly designed and ill-targeted national development policies. Malawi is teetering on the brink: the economy has collapsed, political instability is rife, and social unrest is widespread: wide segments of the population have been adversely affected by increasingly frequent and damaging climatic shocks and employment, trade, food and nutrition, environmental sustainability, and social protection policies are incoherent and ill-equipped to deal with these significant challenges.

Degradation of Malawian soils has significantly reduced fertile area and reduced yields on the land that remains under production. This productivity challenge has been exacerbated by lack of investment in agricultural research and technologies, resulting in frequent food shortages and high dependence on imports to achieve food security. Given the challenging climate facing the whole of the COMESA region, member states are frequently in competition with one-another to secure food imports and Malawi's generally unfavourable terms of trade mean that it often has to fall back on external and humanitarian assistance to feed its most impoverished people. Lack of rural farm and non-farm employment opportunities is resulting in rapid urbanisation outstripping urban infrastructural improvements and secure urban employment prospects (hampered further by the lack of investment in migrants' training and educational needs).

Although few people do well in this scenario, inequalities have widened with those most dependent on Malawi's degrading natural resources for their livelihoods faring the worst and those able to extract rents from import-dependent consumers faring the best. Politicians find that appealing to the electorate's concerns about food supply, poverty alleviation, the provision of infrastructure and agricultural technologies is an effective means of securing votes, even if they subsequently fail to deliver against these promises.

#### **Policy Implications**

The sketches of the four scenarios reveal the degree of uncertainty as to how agriculture and the food system of Malawi will evolve over the next decades. Successful development of the food system requires co-ordinated thinking about the impacts of climate change domestically and internationally, given Malawi's exposure through trade of impacts elsewhere. It also requires co-ordinated and coherent policy development and implementation in the agri-food

sector and beyond to create an enabling environment in which farmers, processors, retailers and others can sustainably and profitably deliver sufficient and nutritious food to Malawi's growing population.

In this context of high uncertainty, what are the implications for policy decisions being made today? How can these be designed to be robust across the four scenarios and to avoid the deleterious characteristics of fragmentation and poor implementation characterised by the 'Degrading Economy' and 'Road to Hell' scenarios? Several tentative conclusions emerge:

- Regardless of the magnitude of climate risks, the nature and cohesiveness of policy implementation will have profound implications in determining how successful Malawi is in realising a sustainable and climate-smart food system which delivers food and nutrition security and broad-based economic growth. Like many African countries, Malawi can be described as a policy rich country, but the implementation of these policies is the major constraint to the country's development ambitions. Some of the key policy instruments either adopted (MGDS III, the National Adaptation Plan, the National Agricultural Policy, the National Climate Change Management Policy etc.) or currently proceeding through national consultations and validation process (the NRS and its Implementation Plan) and have very detailed and strong pronouncements on increasing agricultural productivity and overall production, promoting crop diversification, ensuring food and nutrition security, enhancing reliance of the agriculture sector to climate risk, investing in agricultural research and innovations and in infrastructures etc. Failure to pursue these policy pronouncements, or to pursue them in isolation without regard to the synergies and tensions between them – individually and collectively - and a broader suite of policy instruments that also determine food system outcomes, stands to hinder progress towards the more progressive scenarios, irrespective of the climate risks that may or may not be faced.
- The current lack of coordination and cooperation between the different agencies in charge of the development and administration of various sectoral development policies must be addressed. For example, the agricultural diversification policy, considered under the National Growth and Development Strategy III, the National Resilience Strategy, and the National Agricultural Policy, is more likely to succeed if seed regulation and crop breeding policies deliver a diversity of improved, climate-resilient, and nutritious crops, reducing the current predominance of maize breeding. However breeding improved, or alternative nutrient-dense crops, would not necessarily mean adoption by farmers and consumers who are accustomed to a maize-centric diet. Raising awareness about the nutritive value of other crops and the market opportunities that can be created around these crops could also prove integral to their successful promotion.
- Concomitant with improved coordination of policy interventions, a closer working partnership between the Government of Malawi and donors is desirable. This holds the potential to better leverage national and international efforts to address the Sustainable Development Goals, particularly those pertaining to poverty alleviation

(SDG1), ending hunger in all its forms (SDG2), ensuring sustainable consumption and production patterns (SDG12) and actions to address climate change and its impacts (SDG13).

- Although two of the scenarios discussed here depict a future in which Malawi could be affected by relatively low climate risks, ongoing international efforts to achieve the 2015 Paris Agreement targets to limit global warming to well below 2°C and to pursue efforts to keep temperature increases to 1.5°C this century, suggest that concerted additional effort will be required if these targets are to be achieved. Given the scale of the challenge and the inertia in earth system processes, even relatively low climate risks are likely to be greater than the risks faced today, in absolute terms. It is imperative, therefore, that Malawi plans for significant climatic hazards in the future and seek to reduce vulnerabilities so that risks are manageable.