Systems Analysis and Sectoral Linkages Impacting Climate Resilient Development in the SADC Region
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ABOUT THE SADC FUTURES PROJECT

In these highly uncertain and rapidly changing times, the SADC region, like many regions in Africa, remains fundamentally dependent on a resilient agricultural system and natural resource base. Climate change still poses the greatest threat to the agricultural system and therefore technical capacity is needed to address these future impacts and adapt plans, policies and programs. Taking into account alternative futures, the SADC Futures project has produced tailored supporting materials and documents as part of a wider approach for foresight training in the region. These documents and the associated foresight framework aim to equip users to practically apply the range of foresight tools and methods for innovative strategic planning and policy formulation for climate resilience.

This SADC Futures Project is a joint initiative of the SADC Secretariat’s Food, Agriculture and Natural Resources (FANR) Directorate, the Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), the International Livestock Research Institute (ILRI) through the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and German Development Cooperation facilitated through the SADC / Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH ‘Adaptation to Climate Change in Rural Areas’ program (ACCRA), funded by the German Federal Ministry for Economic Cooperation and Development (BMZ).
SADC FUTURES FORESIGHT FRAMEWORK

**Input**
Understanding our context

**Analysis**
What is happening?

**Interpretation**
Why is it happening?

**Plan**
What do we want to experience in the future? What might get in our way? What might we do to get there?

**Prospection**
What might happen that we have not thought about?

**Reflection**
What might we want to do differently?

**Strategy**
What will we do differently?
Data, evidence, knowledge and creativity

Stakeholder engagement and participation

**INPUT**
- Context
  - Scope
    - Theme or key topic
    - Geopolitical boundary
    - Structures & policies
    - Timeline
    - Stakeholder Mapping

**ANALYSIS**
- What is happening?
  - Trend Analysis
    - Horizon Scanning
  - Evidence

**INTERPRETATION**
- Why is it happening?
  - Systems Mapping
    - Cross sectoral and multi-stakeholder approaches

**PLAN**
- What do we want to experience in the future? What might get in our way?
  - Visioning
  - Causal Analysis
  - Stakeholder Analysis

**PROSPECTION**
- What might happen that we have not thought about?
  - Developing Scenarios
    - Identify drivers and critical uncertainties
    - Develop plausible future scenarios

**REFLECTION**
- What might we want to do differently?
  - Scenario Implications
  - Transformation Elements
  - Transformational Change

**STRATEGY**
- What will we do differently?
  - Transforming Climate Resilient Pathways

**Trend Analysis**
- Evidence

**Horizon Scanning**
- Stakeholder Mapping
ABOUT THE SADC FUTURES KNOWLEDGE SERIES

To expand on the foresight and futures capacity building the project has produced a series of accompanying knowledge products and sources. The knowledge series mapped to the SADC Futures foresight framework is shown below.

These can all be found on the SADC Futures webpage https://bit.ly/SADCFuturesForesight.
<table>
<thead>
<tr>
<th>ACRONYMS AND ABBREVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACCRA</strong></td>
</tr>
<tr>
<td><strong>ACP-EU</strong></td>
</tr>
<tr>
<td><strong>BMZ</strong></td>
</tr>
<tr>
<td><strong>CA</strong></td>
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<tr>
<td><strong>CAADP</strong></td>
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<tr>
<td><strong>CCAFS</strong></td>
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<tr>
<td><strong>CCARDESA</strong></td>
</tr>
<tr>
<td><strong>CGIAR</strong></td>
</tr>
<tr>
<td><strong>CI</strong></td>
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<tr>
<td><strong>COMESA</strong></td>
</tr>
<tr>
<td><strong>COVID-19</strong></td>
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<td><strong>CSA</strong></td>
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<td><strong>DfID</strong></td>
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<tr>
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<td><strong>EAC</strong></td>
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<td><strong>ECOWAS</strong></td>
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<td><strong>EPA</strong></td>
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<td><strong>GCCA+</strong></td>
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<td><strong>GCF</strong></td>
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<td><strong>GDP</strong></td>
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<tr>
<td><strong>ICT</strong></td>
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<tr>
<td><strong>ILRI</strong></td>
</tr>
<tr>
<td><strong>MAD</strong></td>
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<tr>
<td><strong>NEPAD</strong></td>
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<td><strong>NGO</strong></td>
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<td><strong>NMHS</strong></td>
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<td><strong>RETOSA</strong></td>
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<tr>
<td><strong>RISDP</strong></td>
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<td><strong>SACCO</strong></td>
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<td><strong>SACREEE</strong></td>
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<tr>
<td><strong>SADC</strong></td>
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<tr>
<td><strong>SAPP</strong></td>
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<tr>
<td><strong>SDG</strong></td>
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<tr>
<td><strong>SISR</strong></td>
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<tr>
<td><strong>STAP</strong></td>
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SYSTEMS MAPPING APPLIED TO THE SADC REGION IN THE CONTEXT OF CLIMATE RESILIENT AGRICULTURAL DEVELOPMENT

**Economic**
- Gross Domestic Product (GDP) growth
- Wealth distribution
- Income, main income earners
- Employment
- Sectoral distribution (including high value commodities)

**Finance**
- Access to finance
- Rural financing
- Credit loans for agriculture
- Agriculture subsidies

**Infrastructure**
- Roads
- Dams
- Ports (trends, plans, status)
- Export zones
- Industrialisation trends/plans

**Health**
- Nutrition sensitive priorities
- Diet transitions
- Preferential foods

**Markets**
- Key commodity markets
- Access to rural market systems

**Trade**
- Trade agreements, arrangements and flows

**Population Demographics**
- Migration
- Growth
- Age
- Urbanisation

**Investment**
- Investment corridors
- Government/private sector investment plans
- Adaptation investors
- Identified investment priorities

**Socio-cultural**
- Pastoralist, chiefdoms structures
- Community-led initiatives
- Women, youth and marginalised groups in agriculture

**Innovation and Technology**
- Weather data systems
- Access/distribution

**Insurance and Risk**
- Reducing agriculture risk
- Social safety nets
- Input insurance

**Tourism**
- Growth
- Trends
- Employment contribution
- Demand and sourcing
- Development plans

**Agriculture**
- Commercial and smallholder farmers
- Employment
- Production systems
- Livestock and fisheries
- Crop production
- GDP contribution
- Access to inputs
- Food storage
- Value addition
- Market access
- Extension services

**Natural Capital**
- Water
- Soil
- Forestry
- Soil and water conservation initiatives
- Crop failures
- Degradation
- Germination

**Energy**
- Access
- Electrification
- Demand growth
- Access to off grid solar technology

**Communications & Technology**
- Access
- Cell phone usage (radio communities)
- Digital Information and Communications Technology (ICT) in extension

**Climate Information**
- Weather data systems
- Access/distribution

**Access**
- Cell phone usage (radio communities)
- Digital Information and Communications Technology (ICT) in extension

**Access**
- Access
- Electrification
- Demand growth
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**Energy**
- Access
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**Socio-cultural**
- Pastoralist, chiefdoms structures
- Community-led initiatives
- Women, youth and marginalised groups in agriculture
Population Demographics

Population age

By 2070, Sub-Saharan Africa will have a working-age population of 1.8 billion, more than the United States, India, and China combined. [4]

In 2015, Angola, Zambia and the Democratic Republic of Congo (DRC) fell within the top 10 youngest countries in the world (all of which were in Africa). Their median ages were:

- Angola: 16.1 years
- Zambia: 16.9 years
- DRC: 16.9 years
- Botswana: 17.1 years
- Eswatini: 17.5 years
- Namibia: 18.0 years
- South Africa: 21.7 years

Between now and 2050, the working-age population in Botswana, Eswatini, Lesotho, Namibia and South Africa will increase as follows:

- Namibia: 53%
- Botswana: 29%
- Lesotho: 43%
- Eswatini: 36%

In 2015, Angola, Zambia and the Democratic Republic of Congo (DRC) fell within the top 10 youngest countries in the world (all of which were in Africa). Their median ages were:

- Angola: 16.1 years
- Zambia: 16.9 years
- DRC: 16.9 years

The average life expectancy of the region has increased from 2008 to 2018. [1]

Longevity

Throughout Africa, mortality has been reduced through improvements in nutrition, sanitation, and measures to combat malaria and other tropical diseases. [4]

Infant mortality has fallen by 29% in the last decade. In Botswana, infant mortality has dropped by 46%. [4]

The average life expectancy of the SADC region has increased from 52.3 years in 2008 to 61.0 years in 2018. [1]

Migration

In 2017 the SADC region recorded about 7.5 million migrants, excluding irregular migrants and not accounting for circular migration, with South Africa alone accounting for more than 4 million migrants according to the United Nations.

Of all African migrants in SADC, 75% are from within the region. Also, migration in SADC is mostly temporary and circular, and regionally centred. [2]

Drivers of migration patterns

Migration push factors include:

- high income inequality
- high poverty rate
- high population growth rate
- political and social instability
- high refugee rate
- poor healthcare and education systems. [6]

Impact on agriculture

Migrants add to population growth in countries with relative political stability and promising economies. This can bring in new skills and contribute to GDP.

Migrants add to population growth in recipient countries putting pressure on natural resources, infrastructure and public services e.g. health care, housing and education.

SADC region is characterised by semi-skilled and unskilled migration channelled at the bigger economies resulting in heightened tensions and xenophobia. [8]
Population growth

More than half of global population growth between now and 2050 is expected to occur in Africa. The population of Sub-Saharan Africa is projected to double by 2050. [56]

The estimated population of the SADC region increased to 345.2 million in 2018, from 336.9 million in 2017, representing a 2.5% annual population growth rate. [1] The largest proportion of the SADC population is found in: 

- DRC (26.6%)
- South Africa (16.7%)
- Tanzania (15.7%)

Demographics of SADC countries are varied. For e.g.:

- Fertility is rising in the Seychelles;
- In Mozambique and DRC the fertility is high (~6 children/woman) but stable, falling by less than 1% per year;
- In Malawi, fertility is high but falling very rapidly, 2.5% per year or more; and
- In Mauritius, fertility has fallen to replacement levels (2.1) or below. [4]

Africa has not yet experienced the same increases in education, income, and other indices of modernisation that were found to reduce fertility rates in Asia and South America. [4]

Secondary education of women in Africa has been found to be key in reducing fertility rates. [4]

Urbanisation

Southern Africa is one of the most rapidly urbanising regions in the world. Some SADC countries are highly urbanised, with urban populations around 60% of their total (South Africa, Angola, Botswana). However, some SADC countries are barely urbanised at all, with urban populations comprising less than 20% of their total, such as Malawi. [4]

More than half of the overall regional population already live in urban areas, a figure projected to rise to three-quarters by 2050 [5]. The DRC is projected to have 100 million new urban residents by 2050 and Tanzania 75 million. [4]

Impact of population growth and rapid urbanisation on agriculture

- The World Bank estimates that the large working-age population could generate 11-15% GDP growth between 2011 and 2030. [3]
- The growth of the informal sector in SADC will be important for employment generation, food security and poverty alleviation and will be critical to local economies. Although the individual incomes of informal workers are often low, cumulatively their activities contribute significantly to GDP. E.g. in Zambia, the informal economy currently contributes ~24% to GDP.
- The growing human population will increase the demand for food, for both people and feed for livestock. This implies a need for growth in the agriculture sector. There is an opportunity/need to promote and roll out climate smart agriculture initiatives as the demand for food increases.
- An increase in human population and the subsequent increase in demand for land will also present an opportunity to promote improved agricultural techniques for intensification as opposed to further expansion into natural areas. Sustainable farming methods and technology can be implemented to improve yields and realise better returns from small land allocations.
- If the agricultural sector is developed to include more profitable high-value farming and animal husbandry in conjunction with improved transport networks and intra-African trade, projected urbanisation rates may not be realised as people will be attracted to the rural areas for employment opportunities. This is provided mechanisation does not replace traditional labour. [4]
- Construction and service jobs may grow in parallel with urbanisation as expanding cities create their own demand. [4]
- A growth in the informal sector such as trading will potentially expand the market for agricultural produce from smallholder farms.

- The growing human population will increase the demand for food, for both people and feed for livestock. If current, inefficient agricultural practises are continued, the area of land under farming will expand and degrade surrounding natural resources. This will likely have devastating impacts on biodiversity and the ecological goods and services on which the most vulnerable sectors of society depend.
- Additionally, land clearance for the expansion of residential and agricultural areas to meet the needs of a growing population will contribute to carbon emissions and climate change and in doing so, create a negative feedback loop affecting food security.
- As cities are overwhelmed with migrants, transport, housing, electricity and sanitation infrastructure will be found lacking, resulting in vast slums of substandard housing, rutted roads and squatters. [4]
- The slums could contribute to urban sprawl and potentially the loss of arable land, contributing to urban food insecurity.
- A high percentage of the working-age population engaged in informal activities will prevent developing countries from achieving formal economic growth—linked to an inability to collect taxes and other necessary domestic resources required for reinvestment and prospects for future government-funded urbanisation projects will diminish. [7]
- SADC youth are unlikely to have the skills to compete with workers in south Asia or north Africa. They are thus likely to be restricted to agriculture and the informal labour market, low-productivity and low-income work. [4]
- Growth of low-productivity sectors and the informal economy will lead to a weakened tax base. Informalisation discourages investors and weakens competitiveness. It also blocks informal enterprises, like smallholder farmers, from finance markets, technology, and education.
The stunting prevalence (being too short for your age) is above 30% - classified as very high - in 10 of the 16 SADC Member States. Reduction in stunting is occurring too slowly to meet the World Health Assembly (WHA) 2025 or the Sustainable Development Goals (SDGs) 2030 targets. [9]

Drivers and Trends of Nutrition

Food insecurity is a result of low investment in the agricultural sector, poverty, climate extremes and price volatility. Available food is not necessarily nutritious, resulting in micronutrient deficiencies (iron, iodine, folate, vitamin A, and zinc) and, in turn, high numbers of children and other vulnerable populations suffering from malnutrition. [9]

The ‘double burden’ of malnutrition – the concurrence of undernutrition and overweight/obesity – is also a growing challenge in the region, with the prevalence of overweight people in four Member States (Botswana 11.2%, Comoros 10.6%, Seychelles 10.2% and South Africa 13.3%) revealing an emerging problem. [9]

The malnutrition situation results from persistent drought conditions compounded by floods, pests, conflict (in DRC and northern Mozambique), economic challenges, poverty, and chronic structural issues. [9]

Food purchase is critical in urban areas (and becoming more so in rural areas), in most countries food prices are rising faster than inflation, with serious consequences for household food security amongst the poorer sectors of society. [16]

Urban food insecurity is often overlooked. [16]
Impact of food security and nutrition on agriculture

- **Food security and nutrition can be used as major drivers for the promotion of sustainable agricultural systems.** Utilising climate-smart/conservation agriculture approaches can boost agricultural yields on cultivated land and restored degraded lands. Halting and reversing land degradation and deforestation will be critical in meeting the region’s food security needs.

- **Investing in climate smart agriculture should also assist with the stabilisation of food prices** by ensuring crops are more resilient to the changing weather patterns.

- **Promoting climate smart agriculture could present opportunities for introducing more varied crop/vegetable production for improved nutrition.** Furthermore, introducing climate resilient fruit and vegetables and livestock will reduce dependence, and thus pressure, on natural resource harvesting for nutrition supplementation.

- **The expansion of agriculture production into surrounding natural areas to meet the food requirements of a growing human population will increase pressure on resources, leading to deforestation and degradation of land and water systems.** This in turn will contribute to carbon emissions and climate change.

- **Poor nutrition in the region results in poor cognitive development, leading to reduced educational performance and eventually poor labour market outcomes, i.e. lower productivity, lower earnings.** This in turn impacts the productivity of agricultural systems, the ability of smallholder farmers to adopt sustainable approaches and adapt to climate change, as well as the ability of rural households to diversify incomes away from subsistence farming and thereby decrease their reliance on natural resources.

- **Trade policies have improved the access of the SADC population to affordable, highly processed, non-nutritious foods.** As seen with populations in developed countries, this is likely to contribute to growing numbers of overweight and obese people, ultimately exerting pressure on state welfare systems. However, this healthcare challenge, as it applies to the SADC region’s developing countries, will be magnified by the low levels of education, cultural beliefs and low-income levels.
Education

United Nations Educational, Scientific and Cultural Organisation (UNESCO) recommends that countries invest 6% or more of their GDP to education. In 2018, GDP contributions to education were: [10]

The lowest literacy rates globally are observed in Sub-Saharan Africa and in Southern Asia. [11] SADC consistently outperforms Sub-Saharan Africa as a whole, though it still trails other regions of the world. [11]

Exceptions to the improved literacy rates are women in Malawi, Mozambique and Angola, men and women in the Comoros, and the elderly (>65 years old) across the entire region. [11]

Drivers and trends

- Over the last 50 years, enrolment in education has increased at every level for both genders within the SADC region. [12]
- From 1960 to 2010, enrolment rates in primary education increased at an average annual rate of 1.5%, with female enrolment increasing slightly faster at 1.6%. [12]
- Spending on education approaches that of high-income economies and is well above the amount spent by developing countries and regions on average. [12]
- Despite these improvements, SADC is unlikely to attain the current global average of 30% tertiary participation within the next decade. [12]

In 9 SADC countries, more than 20% of children aged between 7 and 14 years old are unable to attend school because they are forced to work. [10]

In 7 SADC countries, more than 10% of girls aged between 15 and 19 years old have given birth. This prevents secondary school attendance. [10]
Environmental awareness

The importance of environmental education was recognised by SADC when in 1993 the Ministers of Environment established a regional environmental education programme. Since it started operating in 1997, the SADC regional environmental education programme (REEP) has been working to enable environmental education practitioners in the SADC region to strengthen environmental education processes for equitable and sustainable environmental management choices.

IMPACT ON AGRICULTURE

- **Improved environmental awareness** in rural populations will encourage the use of environmentally sustainable agriculture practises. A good understanding and successful adoption of improved, sustainable farming methods should increase revenue generation and system resilience, subsequently attracting funding from lending institutions.

- **Low levels of environmental awareness** in an ever-growing regional population will likely result in the continued and expanded use of low-productivity agriculture systems which are vulnerable to changing weather patterns. This will lead to further environmental degradation, food insecurity and impoverishment.

- Furthermore, a growing population with low levels of environmental awareness will continue to overharvest and abuse natural resources. This will in turn impact on agriculture as environmental goods and services such as freshwater, fertile soils, flood buffering wetlands, pollinators, natural predators (for pest control) etc. are affected.

**Overall impact of education on agriculture**

- **Improved education levels will enhance the abilities of the SADC population to implement sustainable and climate-smart agricultural systems.**

- **Improved levels of education increase employment opportunities thereby diversifying livelihoods away from low-productivity agriculture and reducing household dependence/impact on natural resources.**

- **Improved levels of education in women will allow them to generate their own incomes through formal employment thereby fostering independence and reducing vulnerability.**

- **A growing human population with low levels of education will prove disastrous in terms of poverty levels, food security and environmental sustainability.**

- **Low levels of education will limit the ability of people to access and/or participate in sustainable agriculture projects, initiatives and funding opportunities and create/capitalise on initiatives.**
Stable economic growth will build investor confidence, hopefully reigniting private sector interest in the agriculture sector. As the region’s largest employer and main source of livelihood for households, improving productivity in agriculture will have positive impacts on food security, vulnerability and resilience.

Additionally, investment in improved agriculture technology will limit the impact of the sector on environmental degradation and climate change.

In remote rural areas lacking economic infrastructure, smallholder farmers are unable to expand and upgrade their inputs, production processes and end markets. A lack of economic diversification at the village level means continued pressure on natural resources for livelihoods.

With slowed economic growth in South Africa and the recent downgrade of the country’s credit ratings to ‘junk status’, compounded by high unemployment levels (30%) and uncertainties related to the Covid-19 pandemic, it is unsurprising that economists are predicting a recession in 2020. This is likely to have repercussions on the economies of other Member States. Struggling economies, high levels of unemployment and a lack of investor confidence will negatively impact the agriculture sector as funding becomes limited and labour wages potentially dip.

Economic growth rate

The SADC region registered an estimated average economic growth rate of 1.8% in 2018 compared to 2.1% in 2017. [1]

At a country-specific level, the Seychelles registered an overall economic growth rate of 7.9% followed by Tanzania (7.0%) whilst Angola and Namibia registered negative growth for the second consecutive year respectively -1.1% and -0.1% in 2018. [1]

Economic growth projection

The Southern African economy is projected to grow slower than others in the continent— at 2.8% in 2020. This is attributed to high inflation, increasing government debt, and slow growth in South Africa, which contributes about two-thirds of the region’s GDP. [14]

South Africa’s economic growth has slowed in recent years. The country’s credit ratings have been devalued to ‘junk status’, the Rand has hit an all-time low and subsequently economists are predicting a recession in 2020. The situation is further complicated by uncertainty surrounding the Covid-19 pandemic.

With the share of the private sector in GDP at >70% in most countries, no regional integration will be sustainable without active private participation. [14]
Since 2008, GDP per capita in the SADC region increased from USD 1,912 to reach its highest level of USD 2,454 in 2011. GDP per capita stood at USD 2,081 in 2018, representing a significant nominal increase of 0.7% compared to USD 2,068 in 2017. [1]

At a country level, Seychelles had the highest GDP per capita (USD 16,348) in 2018 whilst Malawi had the lowest at USD 410. [1]

IMPACT ON AGRICULTURE
Growing GDP per capita will allow for purchasing of improved agriculture inputs such as climate resilient seed, machinery, fertiliser and livestock genetics. More efficient agriculture production will retain soil quality and reduce the need for expansion into natural areas.

The share of the manufacturing sector to overall GDP for the SADC region in 2018 stood at 11.9%, against 11.2% in 2017. With regards to the manufacturing sector, Zimbabwe and Tanzania recorded significant growth rates of 12.1% and 8.3% in 2018 whilst DRC manufacturing sector declined by 0.8%. [1]

South Africa has historically contributed more to the total GDP in SADC than other Member States. However, the contribution of the sector to national GDP is low, e.g. in 2018 its contribution was 2.5%. [14] Angola has, since 2013, generally been producing and contributing more than South Africa and in 2018 was the region’s top producer. Agriculture contributed 7.3% to Angola’s national GDP in 2018. [14]

The agricultural sector has a pivotal role in employment in Sub-Saharan Africa, employing more than half of the total workforce. While its importance to the rural population is well documented, recent surveys suggest that agriculture is also the primary source of livelihood for 10% to 25% of urban households. National census data indicates that the number of people employed primarily in agriculture has increased over time. [16] Slowed economic growth will be reflected in the agriculture sector as development/expansion projects are put on hold. This will likely translate to a loss of employment potential.

IMPACT ON AGRICULTURE
Most employment in the region was provided by the agriculture sector during 2010–2018. The highest rate was in Malawi (85%), followed by Mozambique (75%) and Madagascar (73%). The fact that agriculture contributes the second largest share of GDP in these three countries suggests low productivity. [14]
According to the African Development Bank, Southern Africa’s current account deficit worsened from an average of 2.1% GDP in 2017 to 2.9% in 2018. The weak economic performance of South Africa slowed export growth in Southern African countries, while stronger import growth and exchange rate deteriorations affected non-resource intensive countries.

**TRADE AGREEMENTS**

SADC trade agreements include World Trade Organisation (WTO), the African Caribbean and Pacific Group of States- European Union (ACP-EU) Cotonou Agreement, the SADC Free Trade Area, Common Market for Eastern and Southern Africa (COMESA) and several bi- and multilateral trade agreements. The African Continental Free Trade Area (2018) is intended to lower tariffs and barriers to trade thereby increasing intra-continental trade.

**Agricultural products** are a major component of trade in the region, with 31% of total agricultural imports of SADC countries coming from other SADC countries. [19]

**South Africa** acts as a trade hub in the region, with the largest economy: two thirds of total SADC trade are with South Africa. [18]

South Africa also has the most diversified production base in the region, with a strong domestic food processing sector, while many of the other SADC countries are dependent on a limited number of primary commodity exports (namely mineral, agricultural, or petroleum-based commodities). [18]

South Africa has received the most foreign direct investment (FDI) in the region. [18]

South Africa has a Bilateral Trade Agreement with the European Union (EU).

**IMPACT OF TRADE ON AGRICULTURE**

The urgent need to decrease the trade deficits of Member States, and become food self-sufficient, may drive greater Government investment and support for more efficient and diversified agricultural production, as well as for upgrading agricultural value chains for greater value addition.

Boosting agricultural trade in the SADC region can make a major contribution to food security by consolidating “natural” marketing channels from food surplus to food deficit regions, and a significant contribution to wider economic development by allowing the exploitation of economies of scale, thereby promoting investment and improving competitiveness. [21]

South Africa is expected to fall into recession in 2020. As the trade hub of the region, this could have serious repercussions for inter-regional agriculture trade going forward.

Continued reliance on food imports and food aid for some Member States, especially for staple foods like maize, does not bode well for sustainable food systems in SADC. Particularly with the added complication of climate shocks e.g. floods, droughts and erratic rainfall, affecting food production.

**PRIVATE SECTOR INVOLVEMENT**

The United Kingdom’s Food Retail Industry Challenge Fund (FRICH) supports 25 projects for farmers in over a dozen African countries by bringing their produce to European markets. FRICH supports projects in the following SADC countries: DRC Malawi, Namibia and Zimbabwe. The main produce exported is coffee, tea, juice, beef, fish, flowers and palm oil. [20]

In addition, innovative out grower programmes, under which farmers are integrated into value chains through processing companies and other inclusive models of agricultural development, should be encouraged. For example, in Malawi and Zambia, contracted farmers produce sugarcane for a multinational South African company that exports to Europe. [20]

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**DRIVERS AND TRENDS**

- Even though a significant percentage of the world’s arable land is in Africa, the continent is a net food importer, and this is expected to grow from USD 35 billion in 2015 to over USD 110 billion by 2025. [21]
- Current account deficits are a common scenario in SADC countries. [22] An overreliance on imports is expected to continue.
- Major constraints to expanding exports include lack of financing, lack of production capacity, high costs of transport, and high cost of doing business.
- SADC has taken a proactive approach to regional trade liberalization, with a strong regional agenda to pursue liberalization. [18] Intra- and extra-regional liberalization has been reflected by the SADC region more broadly. In addition to instituting a regional Free Trade Area in 2008, all SADC members are also members of the WTO and have implemented extra-regional liberalization measures in line with WTO commitments.
- Intra-regional trade is seen as being particularly important in sustaining value-added processing activities in the agro-food sector in the SADC region. [21]

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For 2011-2019, Botswana was the only SADC country that consistently experienced positive current account.

Mozambique recorded the largest current account deficit with large imports of capital goods and services related to natural gas megaprojects.

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SADC infrastructure sub-sectors include energy, transport, information and communications technology (ICT), meteorology, water and transfrontier conservation areas (TFCAs).

The region adopted the SADC Industrialisation Strategy and Roadmap in 2015 and in the process prioritised infrastructure as a key enabler that catalyses industrialisation.

The transport sector is a key pillar for regional economic development, being largely responsible for the movement of people, goods, and services.

### Infrastructure projects

Many infrastructure development projects are listed on the SADC Short Term Action Plan (STAP) or as national projects. These include, but are not limited to [23]:

#### IN THE TRANSPORT SECTOR

- Road projects in Botswana, Zambia, Zimbabwe, Angola, Madagascar, Tanzania, Malawi and DRC.
- Kazungula Bridge construction linking Botswana, Zimbabwe and Zambia.
- Railway projects in Tanzania, Zambia, DRC, Zimbabwe, Botswana and South Africa.
- Ports in the Seychelles, DRC and Zambia.
- A container terminal in Namibia.
- A dry port in Zambia.
- Port expansion in Durban.

#### IN THE ENERGY SECTOR

STAP includes 16 energy projects with a total estimated value of USD 12.27 billion. These regional energy projects have fallen behind schedule, with 67% still at the feasibility stage. They include:

- A Backbone Transmission Line in Madagascar.
- Hydropower projects in Zimbabwe, Zambia, DRC, Tanzania and Malawi.
- A natural gas extraction project in Namibia.
- Power stations in Zimbabwe.
- A container terminal in Namibia.
- A dry port in Zambia.
- Port expansion in Durban.

#### IN THE WATER SECTOR

Eight STAP projects, worth USD 13.48 billion have been designed to expand the region’s water infrastructure. These projects include:

- Water supply projects in Eswatini, Mozambique, Lesotho, Tanzania, Malawi, Zimbabwe, Zambia, DRC, South Africa, Angola and Namibia.
- Wastewater treatment in Madagascar.

#### ICT SECTOR

SADC ICT projects include, but are not limited to:

- Digital Terrestrial Television Migration Support to all SADC Member States.
- Optical fibre for all SADC Member States.
- Regional/National Internet Exchange Points (NIXPs/RIXPs) all SADC Member States.
- SADC Regional and National Integrated Broadband Infrastructure in all Member States.
- Implementation of Postal Code Addressing Systems in all Member States.
- Extension of National Postal Branch Networks to more locations, especially rural areas in all Member States.
- Development of ICT Equipment Manufacturing, Software and Applications in all Member States.
Impact of infrastructure on agriculture

- Improvements in regional transport infrastructure could improve market accessibility for agriculture produce. This could provide access to both regional and global markets as transport networks link countries to ports for shipping. One stop borders and improved road and rail access will also facilitate the importation of critical agriculture inputs such as fertiliser and seed.

- Improved transport infrastructure will reduce the costs associated with taking goods to market and for the purchase and shipment of agricultural inputs.

- The successful roll out of ICT infrastructure will enable farmers to access valuable information on improved/climate-smart technology, methods, inputs and livestock breeds. Improved communication channels will also allow farmers to access information related to climate change. This will allow them to make better informed decisions regarding planting and harvesting times etc.

- Improved access to electricity through new energy infrastructure will be crucial to the future of farming in the SADC region. Electricity is essential for farming operations, particularly on commercial farms, such as irrigation, milking and maintaining cold chain temperatures. Improved energy infrastructure and associated supply could potentially bring down tariffs.

- New water storage and transfer infrastructure will provide farmers access to vital water sources for irrigation and watering livestock. This will be particularly important in the arid and semi-arid areas of the region that are more prone to the effects of climate change.

- Sustainable agricultural systems cannot be achieved without economic and social infrastructure. Poor infrastructure and high infrastructure costs prevent access to affordable inputs, education and technology, markets, and links up and down the value chain.

- Many smallholder farmers in the region lack access to paved roads and reliable railway services and therefore markets. This prevents them from realising local, regional and global market opportunities that could assist in escaping the low-productivity trap.

- A lack of access to ICT services will prevent farmers from accessing information on important developments in agriculture technology, methods, inputs and livestock seed genetics. They would also be prevented from accessing information on climate change and weather patterns rendering them vulnerable to shock events such as flooding, hail and drought.

- Africa’s rural communities pay 60 to 80 times more per unit for energy than urban populations in the industrialised North. Electricity is essential for a number of farm operations. Poor/unreliable electricity supply results in revenue losses due to an inability to irrigate, milk cattle or maintain required cool chain temperatures. Back-up energy supply using generators is very costly and would likely be unaffordable to most smallholders.

- A lack of water storage and transfer infrastructure will prove detrimental to farmers in the arid and semi-arid areas of the region that are more prone to the effects of drought, which is predicted to worsen in the future.

- Extreme weather events such as cyclones and flooding can damage regional infrastructure such as roads, railways, ports and bridges. This in turn will affect farmers’ access to markets and agriculture inputs.
The Green Climate Fund (GCF) is the world’s largest dedicated fund assisting developing countries in reducing their greenhouse gas emissions and enhancing their ability to respond to climate change. It was established by the United Nations Framework Convention on Climate Change (UNFCCC) in 2010. The fund focuses on those highly vulnerable to climate change such as the Least Developed Countries, Small Island Developing States and African States.

Development partners such as the Department for International Development (DFID), Norway and the European Commission, among others are increasingly implementing Climate-Smart Agriculture projects at national and community levels. For example, the FAO with support from the European Commission has rolled out three-year projects in Malawi and Zambia to assist with research, policy development and finance for climate change initiatives. [26]

In 2011, Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC) and SADC launched a joint 5-year programme on Climate Change Adaptation and Mitigation known as the Tripartite Programme on Climate-Smart Agriculture. The focus of the programme was to increase investment in climate resilient and climate-smart agriculture and its linkages to forestry, land-use and energy practices by 2016. The programme received USD 20 million from the Royal Government of Norway, the EU Commission and the United Kingdom’s (UK’s) DFID.

In 2019, the European Union launched an Intra African, Caribbean and Pacific (ACP) Global Climate Change Alliance Plus (GCCA+) programme to strengthen the capacity of SADC Member States to undertake climate change adaptation and mitigation interventions. The funds for the programme are in the tune of € 8 million.

SADC has compiled a Regional Agriculture Policy Investment Plan 2017-2022, which incorporates seven financial facilities grouped under a proposed SADC Agriculture Development Fund. The purpose of the fund is to assist the Member States with investment planning for men and women who represent the bulk of small-scale farmers in the region.

There are several multi-national corporations that are contributing effectively to achieving sustainable agriculture. These include some of the largest players in global food value chains such as Cargill. [26]
Impact of investment on agriculture

- Access to funds will allow for purchasing of improved agriculture inputs such as climate resilient seed, machinery, fertiliser and livestock genetics. More efficient and climate-smart agriculture production will retain soil quality and improve water use efficiency thereby reducing the need for expansion into natural areas.

- Increased investment in climate-smart agriculture will improve productivity, positively impacting on food security in the region.

- Growth in the agriculture sector will result in job creation, alleviating poverty through additional income generation. Job creation in rural areas will likely lessen outward migration rates and reduce the rapid urbanisation trend currently experienced in the region.

- Additionally, investment in improved agriculture technology will limit the impact of the sector on environmental degradation and its contribution to climate change.

INVESTMENT PRIORITIES

- Mobilising resources to fund climate-smart agriculture projects is challenging. This is due to the disconnect between agriculture and climate financing sources. However, the GCF has recognised climate-smart agriculture as 1 of 4 priority areas, allowing African countries to submit proposals. [26]

- At a national level, typically a lack of knowledge and institutional cooperation results in limited budget allocations for climate-smart projects.

INVESTMENT TRENDS

- Lack of investment has traditionally been a major barrier to progress in Africa. [24] Sustainable development requires investment in the industries and services that create wealth and the infrastructure that is required to supply them.

- Investment into the SADC region has traditionally been low due to political and security issues. [25] However, policies promoting stronger Member State cooperation attracted significant FDI from 2001-2010. Countries with large resource industries such as South Africa and Angola tend to receive the most foreign investment.

- SADC transboundary investment initiatives have the potential to be realised. For example, in the Nacala Corridor, investors have developed a railway linking Malawi to Mozambique to transport coal to the ports for export. This has the added potential of stimulating local agriculture production by using this infrastructure to link smallholder farmers in Malawi, Zimbabwe and Zambia with larger commercial markets. [24]

- Sub-Saharan Africa has become the second fastest growing region in the world. To sustain this growth and optimise the potential benefit to all from it, increased investment is needed. [23] Between 2008 and 2013, USD 1 billion was spent by multilateral climate funds and the GCF will continue to channel very large amounts in the future through both public and private sector windows. [26]

- At a national level there remains a need for improved institutional cooperation as well as the need for mainstreaming climate-smart agriculture into agriculture investments and ensuring adequate fund allocation. Sustainable agriculture has been highly promoted but adoption has been constrained. This can be addressed through investment in proper technologies, farmer sensitization and awareness raising.

- Smallholder farmers in the SADC region are unlikely to be able to adopt climate smart technology without access to funding.
Access to finance

Lack of access by smallholder farmers to financial services, especially loans, is seen by most SADC countries either as a priority issue or as a matter of concern.

Access to loans, both long term (typically for land purchase and/or fixed improvements) and short term (typically for inputs for annual crops), is constrained by a lack of collateral security as well as uncertain repayment ability, compounded by the relatively small number of financial service providers. [27]

Uncertain repayment ability arises from potentially adverse factors such as climate variation, plant diseases and input/output market volatility. [27]

A lack of collateral security is usually caused by the absence of freehold or other alienable rights, such as a long-term lease on the land.

Cooperatives, government interventions, and private initiatives can help to link smallholders with other actors in the value chain and improve their access to financing.

Most formal sector lenders serve predominantly urban and large farmer clients and so have relatively few branches in rural areas.

Almost all agricultural/rural financial service providers, public and private, are poorly informed on the characteristics of small farmer client markets. Similarly, most potential small farmer and other rural clients have inadequate knowledge of the nature, benefits, requirements/costs and risks of using financial services. [27]

As smallholder farmers are remote, unit transaction costs are higher, particularly for low-value transactions. [27]

Insurance, particularly for smallholder farmers is prohibitively expensive, due mainly to the high risk of agriculture.

Cross-border trade constitutes an important market for output. Informal cross-border trade of all kinds is estimated to make up between 30% and 40% of all intra-SADC trade. Small, informal sector farmers and traders struggle with the high cost of buying/selling foreign currency for/from transactions, as well as the security risks of carrying cash. [27]

Drivers and trends

• All governments in the region have committed to making access to agricultural/rural financial services easier for all farmers, particularly smaller producers, but have not found this easy in practice and consequently have made little progress.

• The use of mobile phones in rural areas is now widespread and provides financial services delivery with reduced transaction costs. Mobile phones reduce the transaction cost of money transfer by an average of 54%. [27]

• In some Member States, directed and/or subsidised agricultural credit and/or insurance advanced by public sector institutions are pushing out private sector and non governmental organisation (NGO) financial services. These interventions have been largely unsuccessful in the past in raising agricultural production, as they often do not reach the intended beneficiaries. [27]

• Agricultural micro-insurance is also accessible using mobile phones, as are savings facilities.
Improved access to financial services will empower smallholder farmers to invest in improved/climate smart technology and inputs such as drought resistant seed and fertilisers.

Improved access to loans would enable smallholder farmers to invest in mechanisation such as irrigation equipment, tractors and harvesting machinery. Farmers selling animal or horticulture products would be able to invest in improved cold chain facilities which enhances the shelf life of produce and reduces spoiling and losses.

The rise of microfinancing and mobile technology allows banking and finance infrastructure to reach previously excluded areas and populations. Improved access to mobile phone and internet banking enables remote farmers to spend more time on their land rather than travelling to the nearest branch to make transactions. This service also saves farmers in transaction fees.

Access to insurance provides farmers with a safety net, enabling them to operate whilst navigating the uncertainty of climate change related weather patterns and extreme events.

Climate change mitigation and adaptation can be promoted as a unique entry point for accessing international funds.

The lack of documentation confirming land ownership, inadequate access to banking infrastructure and lack of knowledge/awareness of available microfinance initiatives continues to pose a challenge to smallholder access to finance.

Smallholder farmers are unlikely to be able to adopt climate smart technology and/or commercialise their operations without access to funding or loans.

Extreme events associated with climate change e.g. droughts and flooding, will result in financial losses, from which most smallholder farmers would unlikely be able to recover without insurance pay-outs. This will lead to further impoverishment and food insecurity in the rural areas of SADC.

Financial institutions

In the SADC region there is a wide range of financial institutions serving rural clients – from non-profit or mutual profit-sharing village savings and loan associations, savings and credit co-operatives (SACCOs) and NGO-based micro-financiers to regulated for-profit micro-finance institutions to commercial banks to public sector agricultural development banks. [27]

The most widely used formal sector institutions are the savings and transmission facilities through which remittances from family members in urban areas are sent to the rural areas.

Financial institutions tend to not extend initial savings- or transmission-based relationships with rural clients into lending or insurance relationships. [27]

Micro-loans are the most common source of credit for small farmers. However, they are often unregulated and more expensive than loans from formal sources, as well as not being suited to the needs of annual crop farming (although quite well-adapted to other farming activities, such as poultry and vegetable production). Micro-loans provide only a small percentage of the agricultural sector’s credit needs. [27]
African countries have increased their agricultural trade at both global and regional levels in recent years. However, it remains low and below its potential. [20]

African countries trade with each other far less than other countries globally. Europe remains the primary destination for African agricultural exports [20].

Agriculture global and intra-regional trade growth has been experienced in recent years. Domestic markets tend to dominate the food industry of developing countries (90%-95% domestic trade). This is important for the millions of smallholders in SADC as the standards required to meet domestic markets are less demanding.

Improving access of smallholder farmers to markets at domestic, regional and international scales will contribute to increased agricultural productivity, reduced rural poverty and improved food security.

Access to secured markets would improve investor confidence in smallholder farms and liberate funds accordingly.

Smallholder farmers in the SADC region struggle to access global and regional markets due to the poor quality of physical infrastructure, inefficient customs processes and high harassments costs, inconsistent regional standards and regulations, and non-tariff trade barriers including stringent food safety and traceability requirements such as those required by the EU.

Access to agricultural trade by smallholder farmers is also affected by wider challenges such as constraints to increasing productivity, underdeveloped connections between smallholder producers and other value chain actors and increasingly frequent and extreme weather events in the context of climate change.

Unless smallholders can sell profitably on a regular basis, they will ultimately be constrained to subsistence production. Further, if low productivity prevails in rural agriculture, regional stagnation will persist. Successful agriculture transformation requires sustained growth in productivity which results from adequate market access.

**KEY COMMODITIES FROM SADC**

The most exported agricultural commodities from the region are cash crops including: [20]

- cotton
- cocoa
- coffee
- cassava
- sorghum
Governance

REGIONAL AND CONTINENTAL POLICIES/BODIES

SADC policies and programmes include: Regional Indicative Strategic Development Plan (RISDP), the Climate Change Strategy and Action Plan, the Climate Change Adaptation Strategy for the Water Sector, the Regional Water Policy, the Regional Strategic Action Plan for Integrated Water Resources Development and Management, Regional Agricultural Policy, the Regional Agricultural Investment Plan, the Multi-Country Agricultural Productivity Programme. [28]

Comprehensive African Agriculture Development Programme (CAADP) is the African Union’s continental policy framework for agricultural transformation.

The regional level institutional structures for managing water, energy and agriculture sectors are [28]:

- Food, Agriculture and Natural Resources (FANR) for development, coordination and harmonisation of agricultural policies and programmes.
- Infrastructure and Services Directorate for the development, coordination and harmonisation of energy, transport and communications, tourism and water policies, strategies, programmes and projects.
- Water Division SADC River Basin Organisations (RBOs), to oversee harmonisation of national water use policies, and moderate transboundary issues.
- Southern African Power Pool (SAPP) to enhance regional cooperation in power development and trade, and to provide non-binding regional master plans to guide electricity generation and transmission infrastructure delivery.
- SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) to promote renewable energy and energy efficiency technologies and develop sound policy, regulatory, and legal frameworks and build capacities.

CORRUPTION

SADC is one of the wealthier and more peaceful regions in Africa, but inequality threatens to destabilise it, giving rise to challenges such as corruption, crime, poverty and exclusion of youth, women, and minorities.

Transparency International discloses that most SADC countries fall within the ‘more corrupt’ category. Corruption undermines economic development by generating considerable distortions and inefficiencies. Corruption contributes to a decline in economic growth and a reduction in FDI. [58]

DRIVERS AND TRENDS

Policies. Concepts such as climate change, climate-smart agriculture and conservation agriculture have been incorporated into regional and to some extent national policies.

Decentralisation. SADC aims to improve governance through decentralisation, this refers to initiatives which entail the transfer of authority, responsibility for services, fiscal and human resources to local governance. [57] The objective is to capacitate local governance structures, as well as to increase the capacity and productivity of the public sector in general. Despite the significant progress there are still key issues that need to be addressed:

- Lack of political will or authority;
- Absence of a holistic development framework;
- Ineffective institutionalisation of local participation committees;
- Management capacity constraints and deficits;
- Fiscal crisis;
- Role of traditional authorities;
- Weak links between civil society organisations; and
- Underdemocratic behaviour by ruling regimes. [57]

IMPACT OF THE IMPLEMENTATION OF GOVERNANCE ON AGRICULTURE

The development of Member State National Adaptation Plans, National Climate Policies and National Development Plans provides an opportunity for the integration of objectives, strategies, and actions related to building sustainable and resilient food systems.

National Adaptation Plans are particularly important for guiding national action (and attracting international funding) for climate-smart agricultural systems.

Concepts such as climate change, climate-smart agriculture and conservation agriculture have been incorporated into regional and to some extent national policies. However, in some Member States insufficient funding, a lack of human and institutional capacity, donor fatigue, and a lack of coordination among stakeholders remain key challenges to their implementation.
As of 2010, 58.8% of the total Sub-Saharan workforce was in agriculture and a slightly higher proportion (63.6%) of the total population was in rural areas. [29]

Most African agriculture takes place on a small scale, for example, most crop farms are smaller than 5 ha and evidence from numerous household surveys supports the idea that the median size of a crop farm is between 1-2 ha. [29]

Smallholder families consume much of their own agricultural output.

As most rural livelihoods in the region are dependent on the extractive use of natural resources, one of the key areas for resilience building is the agricultural sector. Activities aimed at increasing productivity and introducing adequate risk management strategies needs to be prioritized. For example, support to income diversification, introduction of Climate Smart Agriculture (CSA), Conservation Agriculture (CA), and the application of Good Agricultural Practices; support to and strengthening of the introduction of weather index insurance for small-scale farmers; and support to the creation of group savings as a risk reduction mechanism to enable investments in productive assets.

Successful implementation of a resilient agricultural sector will translate into job creation for the growing rural population which in turn may slow the trend of rapid urbanisation.

Communal farming, contrary to commercial farming, does not have a capitalistic entrepreneurial profit-making business ethos such as hired wage labour, interest on capital, rent for land and profit maximisation. Hence, the communal family farm does not represent capitalist production but a simple commodity production. Thus, the nature and character of communal farming has very little to do with profit making but rather food security. Efforts to transform this system to profit making has been found to be difficult. [30]
Labour availability

Almost all the agricultural workforce in Sub-Saharan Africa is employed by smallholder production systems rather than large farms, although there is no conceptually clear way to define ‘small farms’ or ‘smallholder agriculture’. [29]

The degree of dependence of smallholders on agriculture varies greatly both across and within countries. Although African smallholders depend on agriculture for sustenance as well as for cash income, many also pursue non-farm activities. [29]

In rural areas close to urban markets, households may specialise in the intensive production of high value agricultural outputs, such as fruits and vegetables or dairy, aimed at urban consumers. [29]

Most people in rural areas reside on Permission to Occupy (PTO) land, allocated to them by traditional leaders under whose areas of jurisdiction and influence they live. Such land cannot be sold. This is different to towns and cities where residents have title deeds for the land they occupy and can sell it. [31]

Tension often exists between traditional and elected leadership institutions which reduces their effectiveness in contributing to rural development. [31]

Rural non-farm employment serves as a form of diversification and a safety net for managing seasonal fluctuations in agricultural labour demand and provides cash income.

Drivers and trends

- Non-farm employment is growing in importance in many developing countries and many studies point to large continuing flows of population from rural to urban areas. [29]

- Agriculture’s share of total employment has been falling steadily in almost all countries in the region. As rural populations continue to grow rapidly, however, the absolute number of people working in agriculture and living in rural areas seems likely to rise for the next several decades in Sub-Saharan Africa. [29]

Marginalised groups

Smallholder agriculture is a common livelihood for women in Africa. Very few women work in the wage labour market, almost all are in smallholder production.

Agriculture is the main source of employment for almost two thirds of economically active African women. [29]
Natural capital

**DEPENDENCE ON NATURAL RESOURCES**

Much of the populace (60%) in Southern Africa living in rural areas depend on natural resources for their livelihoods. [32]

In Sub-Saharan Africa, 63% of households use **wood and charcoal** as their main source of fuel for cooking and at least one-third of this is harvested unsustainably. [17]

**Plant and animal products, timber and wildlife tourism** account for a large proportion of the region's GDP and are a source of livelihood for many of its citizens. [33]

**Rangelands** are used for livestock production (smallholder and commercial), intensive agriculture (often dependent on groundwater and irrigation technology), mining, tourism and the game industry. [35] Rangelands in the region comprise grassland, arid savannah, semi-arid savannah, thicket, karoo, desert and fynbos.

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**Impact of wildlife on agriculture**

The SADC region is endowed with rich wildlife resources and subsequently has **large revenue generating potential** through the tourism sector. If managed correctly, this will lead to the diversification of livelihoods away from smallholder agriculture, which will relieve some of the pressure on natural resources and reduce vulnerability in the region.

Destruction of crops and livestock by wildlife is a **direct threat to livelihoods** and invariably leads to hunting and killing of animals by agricultural communities. This contributes to a loss of biodiversity and potentially upsets food chains as keystone species such as apex predators are targeted.

Intensive livestock production for meat and milk is leading to an increase in large-scale ranching operations and more intensive production by smallholder farmers who protect their animals with fencing which **prevents wildlife from accessing traditional migration corridors** and dispersal areas. [17]

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**Impact of transboundary management on agriculture**

The state of the environment is a **major determinant of future development in the region** as a whole and impacts the lives of its citizens. As biospheres and ecosystems are not delineated by national borders, it is important that Member States collaborate to ensure the successful conservation and sustainable use of the region's natural resources through transboundary management areas and agreements.

Successful conservation and sustainable use of the natural resources of the region depend on **transboundary cooperation** between Member States and beyond.

As individual countries have differing agendas, resources and socio-economic situations, there needs to be a level of transparency regarding the use and development of water and land in the region. Cross-sectoral linkages mean that **poorly coordinated development and management** in one sector in a Member State has the capacity to negatively affect other sectors in other Member States.
Impact of climate change on agriculture

- Clearing of land for agriculture production and large-scale animal husbandry contributes to climate change through the emission of carbon and methane to the atmosphere. This then ultimately affects weather patterns and the agriculture sector. The most vulnerable to climate change events are the region’s rural poor who are largely reliant on rainfed subsistence farming.
- Essentially, the breakdown of ecosystems and the loss of natural goods and services in the region will have the greatest impact on the poor and marginalized sectors of society.
- Agriculture in the region is mainly rainfed and so is susceptible to rainfall variability. Extreme events associated with climate change increase the vulnerability of agricultural systems.

Biodiversity

Agriculture contributes to biodiversity losses for a number of reasons [17]:

- Over the short-term farmers obtain higher yields by clearing land of all vegetation before planting.
- High yielding crop varieties generally need to be planted as monocrops to achieve their yield potential.
- Increasing use of agrochemicals affects pollinators and predators, both within and around the cultivated area.
- Lack of market information and financial incentives prevents farmers from planting a more diverse range of crops.
- Overfishing leads to harvesting of immature and rare species of fish.
- Changes in land management and ownership, is leading to disruption of animal migration and general freedom of movement.

Water

Water supply and sanitation is poor in most SADC countries: > 98 million people do not have access to safe drinking water and ~154 million do not have access to improved sanitation facilities. [36]

Water use efficiency is poor in the SADC region. [36]

The volume of water available to support domestic and economic activities can be increased by using techniques such as desalination, wastewater reuse and green water. However, these are not commonly used in the region.

Groundwater is the main source of water for 70% of the population in SADC. It is particularly important in dry regions where surface water is scarce or seasonal.

Drivers and trends of water use and contamination

- Water pollution in the region is expected to increase due to economic development and demographic growth. Many water bodies already contain unacceptable levels of pollutants and contaminants. [36]
- Irrigation and water demand are increasing as more farmers turn to higher value dairy and horticulture products to meet basic income needs. In Tanzania, horticulture is the fastest growing agriculture subsector, generating USD 642 million in 2016. [17]
- Availability of affordable technologies such as water pumps and irrigation equipment are increasing access and use of water for agriculture.
- Potable water supplies are contaminated by human and animal waste as agriculture intensifies and spreads into new areas. Dust from eroded soils can also be a significant contaminant of water in savannah areas converted to annual crop production. [17]
- Run-off of fertilizers results in the rapid growth of algae in aquatic ecosystems, creating anaerobic conditions that cause complete ecosystem failure. [17]
- Pesticide residues can enter human and wildlife food chains via water. Although the process is gradual and less visible, it is very damaging. [17]
- Water salinity can prevent the growth of crops or reduce yields and is often caused by over-extraction of groundwater or failure to maintain drainage channels in irrigation systems. [17]

Impact of water on agriculture

The growing population of the region places added pressure on surface water resources that are diminishing in arid and semi-arid areas due to climate change. This could provide valuable motivation to promote water wise farming methods and technology that enables efficient use. Furthermore, an increased demand for clean potable water by an ever-growing population highlights the need for improved groundwater research and access. In the arid and semi-arid areas of the SADC region that are most affected by drought, such as the Karoo in South Africa, groundwater sources are vital for livestock and irrigation.

Groundwater is likely to play an important role in human survival and economic development under changing climatic conditions. [36]

Poor sanitation and a lack of access to potable water causes waterborne diseases which translate directly into a loss of revenue and the inability to sustain livelihoods. [14]

Furthermore, contamination of valuable water resources by fertilisers, pesticides and human and animal waste reduces its potential for use in crop irrigation and can have serious health implications.

The growing population of the region places added pressure on surface water resources that are diminishing in arid and semi-arid areas due to climate change.

In times of drought, irrigation water is scarce which affects second season cropping, such as wheat, for commercial farmers.
Many species are under threat from natural and human pressures and extinction rates in the region are high by global standards.

Threats include climate change, pollution, alien invasive species encroachment, overharvesting of natural resources, land clearing, poaching and illegal trade.

Forest clearing for agriculture and fuelwood is a significant cause of deforestation mainly for small and medium-scale farming activities. [17]

Government policies that encourage agriculture expansion, forestry and human settlement in natural habitats contribute to biodiversity loss. [34]

Disabling institutional and social factors include a lack of capital assets, ill-defined property rights, limited access to financial services and markets, inadequate safety nets in times of stress and a lack of participatory mechanisms for resource management. [34]

Pressure factors that directly increase demand for resources include rapid population growth, migration and natural disasters such as drought and floods. [34]

Unsustainable land use practices resulting in habitat and land degradation, include expansion of rainfed cultivation; soil mining and shortening of fallow periods; overgrazing and uncontrolled harvesting of biomass. [34]

Land conversion including deforestation, drainage of wetlands and invasion of grasslands is occurring relentlessly as a direct result of food system outcomes and practices. [17]

IFAD (2016) estimated that 70% of the increase in agricultural output observed from 2001 to 2008 in Sub-Saharan Africa was due to an expansion of the area under cultivation, and only 17% was due to improved inputs. [34]

FAO has projected that agricultural land in Sub-Saharan Africa will increase by 63 million hectares over the next decade. [17]

As the region’s population grows, so does competition for grazing land and forest resources. Large scale erosion and desertification have contributed to food insecurity in several areas in the region. [34]

Forest clearing for agriculture and fuelwood is a significant cause of deforestation often resulting from small and medium-scale farming activities. [17]

Farm yields and productivity are dropping due to poor soil management.

Improved management of regional forests, where possible using community-based initiatives, will enable lower income rural populations to sustainably access important natural resources e.g. wood for timber and energy, medicinal plants, bushmeat and fruit. This will enhance resilience and food security.

Food security can be utilised as a persuasive entry point for sustainable agricultural and forestry interventions. In order to improve the yields of smallholder farmers, soil productivity and water resource management must be addressed. Climate-smart agriculture could provide means to restoring soil fertility.

Greater than 40% of the SADC region’s species are endemic. [33]

Forests contribute important livelihood needs for the lower income rural populations (e.g. fuelwood, timber, charcoal, medicinal plants, and fruit).

Forest resources in the SADC region cover an estimated 394 million ha. About two-thirds of the region’s forests are in the DRC and Angola. [34]

Annual net forest loss in the SADC region was approximately 1.8 million ha (0.46%) in the period 2005-2010. Zimbabwe, Malawi, Tanzania, Botswana and Namibia had the highest rates of deforestation in the period 2005-2010. [35]
About 70% of the region’s population depends on agriculture for food, income and employment, which relies on the right amount of rain at the right time. [16]

Cultivated land accounts for only 6.11% of the total surface area in the SADC region. [16]

Agriculture production in the SADC region falls into two broad categories: commercial farms or smallholders, with the latter subdivided into subsistence and commercial production. [17]

In Southern Africa, livestock and crop production values are similar at 47% and 53% respectively. Regional differences in relative contribution of crop and livestock farming reflects the agro-ecological and cultural diversity. [16]

Commercial farms are characterised by extensive areas, use of mechanisation, high quality inputs (most importantly improved seeds) and good agricultural practices. [17]

Agricultural commercialisation is the transformation process in which farmers shift from mainly consumption-oriented subsistence production towards market- and profit-oriented production systems. [38]

The agricultural sector plays a pivotal role in employment in Sub-Saharan Africa, employing more than half of the total workforce. [16]

Almost all the African agricultural workforce is employed in smallholder production systems rather than large farms, although there is no conceptually clear way to define ‘small farms’ or ‘smallholder agriculture’. [29]

In Southern Africa, agriculture is credited for 65% of regional employment and 73% employment of economically active women. [29] National census data indicates that the number of people employed primarily in agriculture has increased over time. [16]

In Southern Africa, agriculture is also the primary source of livelihood for 10% to 25% of urban households in Sub-Saharan Africa. [16]
Livestock and fisheries

DRIVERS AND TRENDS

• In Sub-Saharan Africa the meat and dairy industries are some of the fastest growing sub-sectors. This reflects growing local economies, rising incomes and a corresponding dietary shift to incorporate larger amounts of animal products. The most significant animal products are poultry (meat and eggs), beef and dairy. [39]

• The market for poultry production outside of South Africa is currently dominated by smaller farmers, but the growing demand is resulting in rapid upscaling.

• Livestock numbers frequently exceed the land’s carrying capacity and compete with wildlife for resources. [32]

• Although growing, aquaculture investments and production are still low. [17]

• Unsustainable harvesting of wild fish stock is a great regional concern.

Animal husbandry in the SADC region consists mainly of cattle, goats, and poultry. Livestock are a key coping strategy and resilient pathway for many farming households.

Livestock populations in SADC are estimated at 64 million cattle, 39 million sheep, 38 million goats, 7 million pigs, 1 million horses and 380 million poultry. [40]

In Sub-Saharan Africa, livestock production systems tend to be expansive and pasture based due to the climate and vegetation. Movement of livestock in accordance with seasonal changes and fodder availability can be the only way to secure feed for large herds. [16]

In Southern Africa, over 90% of livestock owners are classified as smallholders and their animals largely consist of indigenous breeds. [41] Animals are kept for food security and livelihood needs.

Poultry contributes a substantial share (45%) of livestock production value in Southern Africa. [16]

The market for poultry production outside of South Africa is currently dominated by smaller farmers. There is a well-developed informal market for “village” chickens, which attract a relatively high price. [39]

Higher-yielding breeds are being introduced by commercial ranchers and through Government and donor-funded programmes, but their numbers are still insignificant compared to the total animal population since they require more specialised feeding and veterinary services. [17]

The SADC Transboundary Animal Diseases (TADs) project is designed to strengthen regional institutions in order to identify, diagnose and control the serious socio-economic impacts of transboundary animal diseases such as foot and mouth disease, contagious bovine pleuropneumonia, rift valley fever, pestes des petits ruminants, and African swine fever, and to make livestock a tradable commodity. [40]

A new strain of Foot and Mouth Disease from East Africa recently broke out in Zambia, potentially threatening the livestock industry in the region.

Several countries have established export industries e.g. Namibia has the largest fish export industry in Sub-Saharan Africa with a well-established supply chain to regional and European markets. [17]

In smallholder areas of the SADC region, the beef cattle numbers and their percentage contribution to the total country figures (where known) are as follows: [41]

<table>
<thead>
<tr>
<th>Country</th>
<th>Beef Cattle Numbers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>2.3 million</td>
<td>(67%)</td>
</tr>
<tr>
<td>South Africa</td>
<td>14.1 million</td>
<td>(91%)</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>5.2 million</td>
<td>(90%)</td>
</tr>
<tr>
<td>Zambia</td>
<td>1.2 million</td>
<td>(91%)</td>
</tr>
<tr>
<td>Mozambique</td>
<td>1.2 million</td>
<td>(90%)</td>
</tr>
<tr>
<td>Malawi</td>
<td>1.2 million</td>
<td>(90%)</td>
</tr>
<tr>
<td>Namibia</td>
<td>2.4 million</td>
<td>(88%)</td>
</tr>
</tbody>
</table>

In areas where crop production is marginal, cattle rearing is often dominant, mostly in free-grazing arrangements. In Botswana, Eswatini, Namibia, Tanzania and South Africa, the livestock industry is a key contributor to GDP. [8]

Inland and marine fisheries are dominated by artisanal fishing practices that contribute a valuable protein source to communities. [17]

Namibia struggles with unregulated practices and overfishing as do Zambia and Zimbabwe. Fish stocks in Lake Kariba are declining annually and the water is polluted by human and animal waste. [17]

Fisheries and aquaculture directly contribute USD 25-30 billion to the African economy. The industry provides employment to over 12 million people (58% in the fishing and 42% in the processing sector). [17]
Most farmers in Southern Africa are smallholders who cultivate less than 5 ha. [9]

Cropping typically contributes about 20% to 60% of annual food needs for poor households in the region. [9]

In Sub-Saharan Africa maize dominates the cereal market and is expected to account for almost 40% of total cereal consumption by 2025, followed by other coarse grains (27%), rice (18%) and wheat (15%). [16] Maize accounts for 80% of cereal production in Southern Africa. It is a particularly dominant crop in Kenya, Tanzania, Zambia and Zimbabwe. Maize production has been affected by extreme droughts and flooding in the region.

Other major cereals consumed in the SADC region include millet, rice, sorghum, barley and wheat. Cassava is consumed as the main staple in DRC. [16]

Common sources of protein include beans and other legumes, especially for the lowest income households. Beans and legumes are often intercropped with maize and cassava. Sweet potato production is also important for household level consumption. [16]

MECHANISATION

The use of capital inputs such as tractors and irrigation are very low in Sub-Saharan Africa. Cereal yields per hectare, value added per agricultural worker and total factor productivity are subsequently much lower in Sub-Saharan Africa than in Asia or Latin America. [43]

Mechanisation in Southern Africa has largely been limited to large-scale commercial farms (particularly in South Africa), while most smallholder farms rely on labour. This is largely due to the affordability of labour (outside of South Africa) and the relative unaffordability of agricultural equipment and the struggle to access required finance. [39]

Challenges to improved mechanisation include:

- Acquisition of equipment (mostly the cost of purchase).
- Maintenance, which is essential for farmers to obtain the full value of the equipment over its life. This constraint includes the availability of spare parts. [39]
- Cost effective utilisation over the long term. [39]
- Acquiring the necessary knowledge. [39]

FERTILIZER

Africa currently uses only 3% of the world’s fertiliser, at an application rate that is about 1/10 of global averages. [43]

Sub-Saharan Africa applies less than 20% of the fertiliser usage per hectare in the United States or India. Increased usage is needed to support yield growth.

IMPROVED SEED

The adoption of improved seed has increased in Africa over the past 20 years but is still far from the global average. South Africa is an exception, as most of its big commercial crops e.g. maize and soya, are cultivated using transgenic seeds [39].

Most smallholder farmers in Southern Africa obtain their seed from informal systems i.e. by saving a portion of their harvested grain each year, sharing seed with their neighbours, or buying seed on the local informal market.

Access to improved seed is sometimes possible through participation in subsidised seed distribution programmes under government or NGO initiatives. [39]

The main obstacles to greater purchases of improved seed are: [39]

- Cost availability adequate knowledge

IRRIGATION

Irrigation is critical for food security and rural development, but <5% of cultivated land in the region is equipped for irrigation. [36]

Land in the SADC region with irrigation potential is around 20 million ha but only 3.9 million ha is actually irrigated. This accounts for only 6.6% of the total cultivated area. Although the irrigated area occupies only 6.6% of cultivated land, productivity from irrigated agriculture is three-fold better than rainfed agriculture.
GDP CONTRIBUTION

In 2015, agriculture contributed 20.2% to SADC region GDP. [42]

Agriculture produce accounts for large proportions of export earnings in Southern Africa. [29] South Africa is a net exporter of agricultural products, with about 45% of exports going to Africa.

In Southern Africa, the majority share of production value of fruits and vegetables is due to South Africa’s export oriented horticultural production. [16]

EXTENSION SERVICES

The New Partnership for Africa’s Development (NEPAD), the African Forum for Agricultural Advisory Services (AFAAS), and the Global Forum forRural Advisory Services (GFRRAS) guide and assist with the development of enabling structures to improve the situation of extension and advisory services in Africa.

FOOD STORAGE

According to estimates by the African Post-Harvest Losses Information System, as much as 10%-20% of grain is estimated to be lost prior to processing. [20]

Sharply reducing postharvest losses is an important avenue for improving food and nutrition security. Agricultural extension can help to lower these losses by disseminating. [20]

MARKET ACCESS

Smallholder farmers struggle to access markets due to inadequate access to market related information, limited produce storage capacity and the inability to share risk and information with other farmers based on their geographical remoteness. [44]

Improving access to markets and market information enhances farmers’ bargaining power and enables them to make better-informed decisions about production and marketing. [44]

VALUE ADDITION

Most African commodities are exported in their raw form and processed elsewhere with very little value added in the producers’ economies. The primary sectors, mining and agriculture, contribute about 50% of most SADC countries’ GDP and most exports are raw materials and commodities of low value – therefore SADC’s net trade is significantly negative. [44] Industrial development in most SADC countries is underdeveloped and poorly diversified. [44]

SADC aims to enhance agro-industrialisation in the region through the Regional Agricultural Policy, the SADC Industrialisation Strategy and Roadmap (SISR) (2015-2063), the SISR Action Plan. Priority value chains as identified in the SISR (2017) include soya, sugar, meat products, cassava, dairy products, fish and fish products, horticulture (fruit, vegetables and flowers), wildlife (meat and hides) and forestry (timber and non-timber products). [44]

TRADE

Nontariff measures increase trade costs and restrict the participation of African agribusinesses in both global value chains and intra-African trade. Such nontariff barriers include trade policies e.g. export bans and regulatory failure resulting in high transport, border-crossing and agricultural input costs. [44] Lack of coordination across departments, onerous border procedures, weak cross border cooperation and corruption also constitute barriers to intra-African trade. [44]

Multi-country resource-based development corridors can be an important tool to promote regional trade, for example the Nacala corridor between Zambia, Malawi and Mozambique; the Beira corridor linking several countries with Mozambique’s port of Beira; and, the Lobito corridor linking the DRC, Zambia and Angola. [44]
The SADC region is heavily affected by climate change and variability, and projections suggest that impacts will become more severe. Current variability and extreme events across the region are increasingly evident. [9]

Climate change will directly affect crop yields by:

- An increase in temperature, leading to increased heat stress and reduced crop yields. (The region’s staple crop – maize – is particularly prone to the effects of climate change);
- Changes in rainfall patterns: increasingly erratic rainfall events of high intensity, leading to floods and more frequent droughts and dry spells; and
- A delayed onset of the rainfall season and an early tailing off, thus reducing the growing period for crops. [9]

Developments in the sector will enhance the resilience of the rural populations of the region to climate shocks and changing weather patterns.

A high dependence on rainfed monoculture cropping and the use of traditional methods of farming exacerbates the vulnerability of smallholder farmers to the vagaries of climate change, as drought or flooding tends to result in total crop failure. [32]

The growing trend in animal product consumption in Southern Africa will contribute to global climate change through the carbon releases associated with land clearing for pastures and feed as well as the methane generated by large cattle herds.

As a result of its propensity to trigger increased movement of people and livestock in search of water and grazing, drought conditions can increase the outbreak of transboundary animal diseases such as Foot and Mouth Disease, Contagious Bovine Pleuropneumonia, Highly Pathogenic Avian Influenza, Anthrax, amongst others. [9]

Failing crops and livestock deaths resulting from climate change events will increase the reliance of smallholders and rural communities on natural resources. If not managed, this can lead to deforestation, land degradation and biodiversity loss.

Impacts of changing weather patterns and extreme climatic events on smallholder farmers include but are not limited to: crop failure and livestock death, financial losses, an inability to purchase adequate inputs for the next season, lack of feed for livestock and limited finances for labour employment. This ultimately contributes to regional food insecurity and increased unemployment rates.

Workers bartering increases following difficult seasons; however, this can lead to oversupply and a reduction in prices and income earned. Moreover, livestock-to-grain trade deteriorates due to an increased grain demand, which ultimately affects food insecurity.

There is overwhelming support and evidence for agriculture-induced socio-economic growth in developing countries, including the Southern Africa region. [29] What makes it more critical in low income countries is that most of the population (over 70%) lives in rural areas and over 75% of the poor are rural smallholders who primarily depend on agriculture for their livelihoods.

This implies that developments in agriculture can have far reaching direct effects in uplifting the lives of the poor and enhancing their resilience to the effects of climate change. However, many developing countries have not fully utilised agriculture for its multiple functions. [38]

Accelerated changes to farm structure, accompanied by investment in mechanisation, improved farming practices, inputs and storage have the potential to induce a much higher rate of productivity growth.

Agriculture provides important income opportunities for the rural poor, particularly during land preparation and crop harvesting periods. This provides low skilled employment which generates income for impoverished staple purchases, thereby contributing to food security and poverty alleviation. This employment sector is going to be crucial with the projected population growth in the region.

Furthermore, the development of effective regional infrastructure provides market opportunities and enhances competition. Greater investment in prioritised infrastructure at national and regional levels will promote trade, provided there is sufficient political will to do so. [20]

Smallholder farmers, who constitute the bulk of the rural poor in SADC, have not fully benefited from agriculture’s multiple functions because they predominantly practice consumption-oriented subsistence agriculture which excludes them from the formal market system and the related income-mediated benefits. [38]
Land tenure

A recent study by the World Bank Group shows that only 10% of land in Sub-Saharan Africa is formally registered; most of it is undocumented and informally administered. [45]

Most people in rural areas in Southern Africa reside on PTO land, allocated to them by traditional leaders under whose areas of jurisdiction and influence they live. Such land cannot be sold. This is different to towns and cities where residents have title deeds for the land they occupy and can sell it. [31]

DRIVERS AND TRENDS

Registration processes to gain land tenure are often costly and cumbersome – meaning that in practice few people hold individual or communal land tenure rights. [45]

IMPACT OF LAND TENURE ON AGRICULTURE

- The missed opportunities surrounding enhanced agricultural productivity from improved investment in the region should motivate SADC governments to streamline the processes for residents to obtain land tenure.
- Motivation for improved land tenure exists in the potential enhancement of livelihoods of the vulnerable sectors of society, particularly women, who are disproportionately dependent on communal land.
- Investments in the smallholder agriculture sector will always be regarded as high-risk unless the tenure rights of smallholder producers are strengthened. [45]
- As a result, many people in rural communities face land insecurity and lack collateral to obtain loans. [45]
- There are risks in traditional leadership delegation of land. These structures can contradict universal standards of human rights, are geared towards preserving traditional order and are open to abuse.
- A lack of investment prevents smallholder farmers from adopting climate-smart farming methods, technology and inputs to increase productivity.
Insurance and risk

01 Access

Most African farmers have limited or no access to weather insurance, and largely rely on savings to cope with shocks. [20]

Mobile technology is seen as key to improving access to market and weather information, weather index-based crop and livestock insurance, climate information services, and micro insurance schemes.

02 Policies and social safety nets

There is opportunity for mobile technology to improve access to weather information, weather index-based crop and livestock insurance, climate information services, and micro insurance schemes—all of which will help smallholder farmers improve yields, access markets, and adapt to climate change and climate shocks.

Uninsured risk discourages smallholder farmers from investing in climate-smart or productivity-raising technologies and constrains agricultural development in the region.

Reducing risk in smallholder farming requires agricultural development policies, and policies that create a conducive enabling environment for agriculture. Managing risk in smallholder farming requires social protection policies that can also contribute to reducing risk.

The multiple risks and vulnerabilities that smallholders face are increasingly well understood, and new policy frameworks are emerging that distinguish between different types and sources of risk (for example, idiosyncratic and covariant risk affecting agricultural production, markets and health) and between different response options (investment in crop or livestock protection, irrigation, market stabilisation and access, cash transfers etc.). [46]

The risk of extreme weather conditions to smallholder production should motivate governments to develop social protection policies to allow the farmers to operate in the increasingly uncertain environment. This in turn will contribute to achieving food security goals in the region.

A lack of social safety nets means smallholder farmers are vulnerable to extreme climatic events. The loss of a crop can have a knock-on effect in reducing revenue available for inputs for the next season. This could contribute to food insecurity and impoverishment of rural communities in the region.
In Sub-Saharan Africa 65% of farm power relies on human power, 25% on animal power and only 10% on engines. Compared to other developing regions, with engines generating 50% of farm power, this is very low. [50]

Climate change related disasters, such as drought, can have adverse effects on power generation capacity in the region. For example, hydro-electric power generation at Lake Kariba and Cahora Bassa.

DRIVERS AND TRENDS

- Most renewable energy capacity is grid-connected; however, off-grid applications have seen strong growth in recent years. [49]
- The use of mini-grids and/or household solar systems and other mini- and pico-scale technologies is becoming popular in the SADC region, as national utilities face significant financial constraints that have hindered their capacity to meet government targets for energy access and grid extension. [48]
- To improve the rate of uptake, the majority of Member States offer subsidies of some kind for the installation of off-grid systems, recognising that rural households will rarely have the financial capacity to pay for the technologies themselves. [48]
- Power shortages experienced across the SADC region hinder progress towards higher agricultural and industrial production which is central to the development of productive capacity and the creation of employment - ultimately contributing to poverty alleviation.
- SADC has linked various national generating plants. This interconnectivity has facilitated the establishment of a trading platform, enabling countries with power shortfalls to purchase from those with surplus.
- The poor financial health of utilities, high upfront costs and inconsistent regulatory frameworks for renewable energy development tend to hinder investment in the sector. [48]

Impact of access to energy on agriculture

Access to modern electricity/energy services and equipment for smallholder farmers in developing countries could have significant positive impacts on food security, gender empowerment and rural poverty.

Additionally, rolling out renewable energy projects in rural areas will lessen the burden of electricity supply on governments as well as lower the state’s (and cumulatively the region’s) contribution to carbon emissions.

The lack of access to electricity/energy by smallholder farms in SADC hampers their productivity by limiting land preparation, irrigation, storage and processing. The lack of electricity means no cold storage which affects the shelf life of fresh produce and contributes to wastage and a loss of income.

Community-based schemes can struggle to deliver an effective service due to poor governance and a lack of professionalisation. The private sector is important in such schemes, but the absence of economies of scale makes them unattractive. [48]

Climate change related disasters, such as drought, can have adverse effects on power generation capacity in the region. For example, hydro-electric power generation at Lake Kariba and Cahora Bassa.
Communications and technology

Information and communication technology infrastructure is already in place within SADC, but has been implemented inefficiently due to a lack of development in other sectors. [51]

To establish the affordable, ‘always-on’ connectivity that SADC envisions for the region, the ICT Sector Plan component of the Regional Infrastructure Development Master Plan promotes development of four strategic pillars: infrastructure; capacity building and content; e-services and applications; and research, innovation, and industry development. [51]

At present, information and communication technologies in SADC are as follows:

- Approximately 60% of the population has adopted mobile technology, with regional ranges from 20% to 100%. [51]
- Only 4% of SADC residents are internet users, although usage varies widely between Member States e.g. from 1% in the DRC to 40% in the Seychelles. [51]
- Rural populations have lower ICT access compared to urban populations. This implies a shortfall in the implementation of the country’s strategies for ICT spread to rural areas.

Similar to global trends, postal mail volumes are declining at an annual rate of 5%, although parcel mail is increasing due to e-commerce. National postal services handle 96% of domestic letters and 80% of international letters, but only 28% of domestic parcels and 20% of international parcels. [51]

Impact of access to communications and technology on agriculture

- Improved mobile phone, radio and television signal access in rural areas can be employed for information sharing, and can be developed as tools for poverty alleviation, for example, through sharing health and climate information, e-learning at schools or enabling economic activity through mobile phone banking.
- Involving the private sector in the provision of necessary knowledge infrastructure and services could enable ICT distribution to rural areas.
- Better access to mobile banking and information on weather patterns could enable smallholder farmers to be better positioned in facing extreme climatic events through improved financial planning and informed agricultural decision making. This in turn could contribute towards food security and poverty alleviation in rural areas.

- Limited access of rural communities to ICT in the region will impact access to mobile phone banking and micro-insurance options. It will also limit the amount of information available to them in terms of weather patterns, improved farming methods and inputs, and market information. This will limit the growth potential of smallholder farmers and increase their vulnerability to extreme climatic events, ultimately contributing to food insecurity and impoverishment.
Tourism

SADC Member States are at very different levels of tourism sector development. Besides South Africa as the regional tourism centre (with almost 10 million visitor arrivals) there are a few other successful standalone tourist destinations, namely Botswana, Namibia, Tanzania, Mauritius and the Seychelles. [52]

In the region, the total number of visitors from other SADC countries is more than twice as high than that of overseas arrivals. South Africa receives the bulk of all SADC visitors. Botswana, Zimbabwe and Mozambique also record very high regional arrivals. Due to their island status Madagascar, Mauritius and the Seychelles receive very few regional tourists. Angola and the DRC have little appeal to the regional travel market.

Most SADC countries are still at the stage of ‘re-emerging’ tourist destinations, e.g. Malawi, Mozambique, Zambia, Zimbabwe and Madagascar. [52] Other SADC countries are mainly attractive as business destinations, i.e. Angola and the DRC.

Lesotho and Eswatini are still at a ‘pre-emerging’ stage of tourism development. Most of their visitors are South Africans travelling there for business and employment. Only a few international tourists visit these destinations and mainly for short trips. [52]

TOURISM GROWTH

A total of 25 million international tourists visited SADC in 2015 and the number is projected to increase to 38.6 million in 2025. [53]

Opportunity exists for tourism to be marketed overseas as a regional package. The Regional Tourism Organisation of Southern Africa (RETOSA) is the principal partner for developing regional cross-border tourism in the region. However, RETOSA lacks adequate funding to carry out its mandate effectively.

CONTRIBUTION TO GDP

Tourism’s overall contribution to SADC GDP was USD 58.2 billion in 2014. SADC’s share of tourists visiting Africa stood at above 47% in 2016. Of that 47%, South Africa accounted for 59% of the visitors. However, the high number of South African overseas arrival numbers may include international tourists in transit to other regional destinations i.e. if the visitors decided not to stay inside the transit lounge at the airport. [53]

EMPLOYMENT

The tourism sector in the SADC region was directly responsible for 2 million jobs, and a further 5.2 million indirectly, in 2013. [53]

GROWTH OF THE TOURISM INDUSTRY IN THE SADC REGION MAY COMPETE WITH THE EXPANDING RURAL POPULATION FOR LAND AND COULD CONTRIBUT TO HUMAN-WILDLIFE CONFLICT DUE TO CROP DAMAGE.

Impact of tourism growth on agriculture

Tourism has the potential to become a leading sector through which poor countries can achieve economic development and lift their people out of poverty. This is due to its capacity to employ thousands of skilled and unskilled workers. The sector is particularly relevant for the SADC region, whose membership comprises mostly least developed countries with high levels of poverty and unemployment. [53]

For most SADC states the best strategy for national tourism development and the receipt of related benefits lies in regional networks of cross-border itineraries and marketing the participating countries as a joint tourist destination.

SADC Member States are at very different levels of tourism sector development. Besides South Africa as the regional tourism centre (with almost 10 million visitor arrivals) there are a few other successful standalone tourist destinations, namely Botswana, Namibia, Tanzania, Mauritius and the Seychelles. [52]
**Climate information**

**ACCESS TO CLIMATE INFORMATION**

The SADC Climate Services Centre provides operational, regional services for monitoring and predicting extremes in climate condition. It develops and disseminates meteorological, environmental and hydro-meteorological products.

**CAPACITY BUILDING**

The Centre provides **training in climate prediction** for personnel in the National Meteorological/Hydrological Services (NMHSs). Training also covers end-users, such as farmers. [54]

The SADC Cyber-Infrastructure (CI) Framework aims to build increased capacity in regional research and education networks, data sharing infrastructure and trained human capital – to make efficient and effective use of the CI resources. [55]

**IMPACT ON AGRICULTURE**

Through the implementation of the regional CI framework and national initiatives, several Member States in Southern Africa now have **high performance computing facilities**. The infrastructure provides opportunities for domains, domain scientists and collaboration through research and development projects. For meteorology, this will support more local and regional weather and climate scientists. For meteorological services, this means improved in-house and in-country capacity to run models, with less reliance on external resources from developed countries. [55]

The Centre’s products contribute to **improved disaster risk management** in the region and subsequently help to ensure farmers are better prepared for weather and climate disasters.
COVID-19 pandemic

COVID-19 AND THE ECONOMY
• As a result of the COVID-19 pandemic, economic growth in Sub-Saharan Africa is expected to fall sharply from 2.4% in 2019 to between -2.1 and -5.1% in 2020, inducing the first recession in Sub-Saharan Africa in 25 years. [59]
• Analysis shows that COVID-19 will cost the region between USD 37 billion and USD 79 billion in output losses for 2020.
• GDP growth will decline rapidly in SADC region’s largest economies—Angola and South Africa—due to persistently weak growth and investment. [59]
• The uncertainty of the impact of COVID-19 on local markets is expected to lead to increased risk aversion from investors who are waiting to see its potential impact in Africa.
• Since global economic growth is a key driver of commodity prices, local prices have dropped as the virus has spread. This compounded with a reduction in global demand of raw materials will severely impact SADC countries such as the DRC and Zambia, which are significantly exposed to risk in terms of industrial commodity exports. [59]
• The region’s tourism sector is expected to experience large losses due to severe disruptions to travel.
• The manufacturing sector is also impacted as the global supply chain experiences delays, raw material shortages, increased costs and reduced orders. [59]

COVID-19 AND AGRICULTURE
• To prevent the virus spreading, measures have been implemented that will affect food systems at all levels.
• Reduced production of high value commodities (i.e. fruits and vegetables) is already likely, but is not noticeable as yet because of the lockdowns and disruption in the value chain. [60]
• Restrictions in vehicle movement will affect the livestock sector due to reduced access to animal feed and slaughterhouses.
• Blockages to transport routes will be particularly detrimental to fresh food (e.g. dairy, fresh fish and seafood) supply chains resulting in food losses. [60]
• Shortages of labour could disrupt production and processing of food, notably for labour-intensive industries (e.g. horticulture). [60]
• Transport restrictions and quarantine measures are likely to restrict access to markets, curbing farmers productive capacities and hindering them from selling their produce.
• A reduction in the agriculture labour force in SADC will have a dire effect on rural incomes and livelihoods as well as the industry itself, which is particularly labour intensive.
• The crisis is further magnified in SADC countries that are already experiencing food shortages.

COVID-19 AND FOOD SECURITY
• The COVID-19 crisis will likely cause a food security crisis in Africa, with agricultural production potentially contracting between 2.6% and 7%. [61]
• Food imports could decline substantially (13%-25%) due to a combination of higher transaction costs and a reduced domestic demand (lack of income). [61]
• Access to food will be more difficult and more expensive. Many depend on the food systems stability for their livelihoods and shocks to the food chain may disrupt production and trade which can have volatile market effects and implications on food prices and agri-food based incomes. [61]
• China has already seen an increase in food prices by 20% in comparison to 2019 prices. This could be due to food hoarding and chain disruptions. [61]
• The virus will have the greatest impact on the poor and marginalised with limited power and resources to adapt to unpredictable crisis events.
• Looking at the Ebola virus disease (EVD) effects in Liberia, a reduction in household income can be expected across the board, not just in communities where the virus is present. It is also likely that food security will be further compounded by lower household crop production as was the case with EVD.
• In DRC, the EVD outbreak disrupted food production and supplies which resulted in violence in the area and a need for large amounts of humanitarian food assistance.
• The World Bank is deploying up to USD 160 billion in financial support to help developing countries protect the poor and vulnerable, support businesses and bolster economic recovery. [59]
TIPS Report for the Department of Trade and Industry.


