WWF

REPORT

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The food-energy-water nexus as a lens for delivering the UN's Sustainable Development Goals in southern Africa

This publication is one in a series examining issues of relevance in the transition to a low-carbon, sustainable economy which delivers South Africa's developmental goals. It is part of a project entitled 'Low-Carbon Development Frameworks in South Africa' which is funded by the German Federal Ministry for the Environment, whose support is appreciated.

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WWF's mission is to stop the degradation of the Earth's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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SOUTHERN AFRICAN COUNTRY FACT SHEET

ANGOLA

- **Country Area (1000 ha):** 124 670
- **Population:** 20 172 332
- **Natural Resources:** Oil products, diamonds, gas, wildlife, fish, agricultural products
- **Agricultural Area (1000 ha):** 59 190
- **Access to Electricity (% of population):** 37 (at 2012) / 32 (at 2014)
- **Improved Water Source (% of population with access):** 49

BOTSWANA

- **Country Area (1000 ha):** 58 173
- **Population:** 2 209 208
- **Natural Resources:** Copper, diamonds, wildlife, cattle, nickel
- **Agricultural Area (1000 ha):** 26 001
- **Access to Electricity (% of population):** 53.2 (at 2012) / 56.6 (at 2014)
- **Improved Water Source (% of population with access):** 96

LESOTHO

- **Country Area (1000 ha):** 3 036
- **Population:** 1 953
- **Natural Resources:** Mohair, wool, diamonds, wildlife and water
- **Agricultural Area (1000 ha):** 2 277.3
- **Access to Electricity (% of population):** 20.6 (at 2012) / 27.8 (at 2014)
- **Improved Water Source (% of population with access):** 82

MALAWI

- **Country Area (1000 ha):** 11 848
- **Population:** 18 570 321
- **Natural Resources:** Sugar, tobacco, tea, cotton, coffee, wildlife and fish
- **Agricultural Area (1000 ha):** 5 790
- **Access to Electricity (% of population):** 9.8 (at 2012) / 11.9 (at 2014)
- **Improved Water Source (% of population with access):** 90

MOZAMBIQUE

- **Country Area (1000 ha):** 79 938
- **Population:** 25 930 150
- **Natural Resources:** Fish, gems, coal, wood, marble, precious stones and heavy sands

- **Agricultural Area (1000 ha):** 49 950
- **Access to Electricity (% of population):** 20.2 (at 2012) / 21.2 (at 2014)
- **Improved Water Source (% of population with access):** 51

NAMIBIA

- **Country Area (1000 ha):** 82 429
- **Population:** 2 436 469
- **Natural Resources:** Uranium, gold, silver, diamonds, fish, copper, lithium, zinc and lead
- **Agricultural Area (1000 ha):** 38 809
- **Access to Electricity (% of population):** 47.3 (at 2012) / 49.6 (at 2014)
- **Improved Water Source (% of population with access):** 91

SOUTH AFRICA

- **Country Area (1000 ha):** 121 909
- **Population:** 54 300 704
- **Natural Resources:** Gold, platinum, coal, iron ore, copper, sugar, timber, wildlife & fish
- **Agricultural Area (1000 ha):** 96 841
- **Access to Electricity (% of population):** 85.4 (at 2012) / 86 (at 2014)
- **Improved Water Source (% of population with access):** 93

SWAZILAND

- **Country Area (1000 ha):** 1 736
- **Population:** 1 451 428
- **Natural Resources:** Wildlife, sugar, food products and wood pulp
- **Agricultural Area (1000 ha):** 1 222
- **Access to Electricity (% of population):** 42 (at 2012) / 65 (at 2014)
- **Improved Water Source (% of population with access):** 74

ZAMBIA

- **Country Area (1000 ha):** 74 339
- **Population:** 15 510 711
- **Natural Resources:** Timber, wildlife, minerals and water
- **Agricultural Area (1000 ha):** 23 836
- **Access to Electricity (% of population):** 22.1 (at 2012) / 27.9 (at 2014)
- **Improved Water Source (% of population with access):** 65

ZIMBABWE

- **Country Area (1000 ha):** 39 076
- **Population:** 14 546 961
- **Natural Resources:** Gold, nickel, copper, asbestos, tobacco, chrome and platinum
- **Agricultural Area (1000 ha):** 16 200
- **Access to Electricity (% of population):** 40.5 (at 2012) / 32.3 (at 2014)
- **Improved Water Source (% of population with access):** 77

SOURCES: FAO, CIA, SADC, UNEP, WORLD BANK

INTRODUCTION

On 1 January 2016, implementation of the UN's Sustainable Development Goals (SDGs) was officially started. Meeting the 2030 targets in southern Africa – a region where common development challenges result in shared risks and common future prospects – is not without its challenges. Analysing the goals in terms of the food, energy and water nexus may be a useful tool to identifying a holistic approach towards sustainability and meeting the SDG targets.

Although they are not legally binding, the 17 SDGs are universal – meaning that they are applicable to all countries in the world instead of differentiating between so-called 'developed' and 'developing' countries. The SDGs aim to formulate concrete targets to be reached by 2030; targets that address social, economic and environmental challenges facing countries.

These targets were adapted after a long consultative process which took into account the achievements and shortcomings of the Millennium Development Goals (MDGs) for the period 2000–2015. The set targets for each SDG will facilitate measuring and reporting.

Dissecting the SDGs into individual targets makes sense for measuring and reporting, but risks losing sight of the fact that countries are not only interdependent but face interconnected challenges. Although the SDGs demonstrate greater recognition than the MDGs of the interdependent nature of society and ecosystems, there is an additional layer of complexity that is impossible to simply capture in the goals. One example of this is the food-energy-water (FEW) nexus. To explain: water provision needs energy (e.g. for operating water pumps), energy supply needs water (e.g. for cooling) and food needs both energy and water for agriculture and irrigation. These sectors are not only interdependent; they also pose particular risks to each other, for example when energy production causes water pollution. In the long term we therefore cannot manage these sectors disparately if we wish to guarantee a sustainable supply of all three resources.

The value and practicality of the nexus framework for catalysing and reviewing delivery against the SDGs are still to be determined. What is clear is that with Goal 2 (Zero hunger), Goal 6 (Clean water and sanitation) and Goal 7 (Affordable and clean energy), delivery against one without consideration of the interconnections with the others could result in – currently underappreciated – risks. Viewing the SDGs through the FEW lens makes it possible to explain the implications for other goals and achieve targets across multiple goals.

Figure 1: Sub-Saharan Africa and southern Africa, with Southern African Development Community (SADC) countries indicated

At the same time, the successful achievement of security for water, energy and food is related to regional factors that affect how these resources will develop. Pressures related to climate change, population growth, urbanisation and slow economic development are evident throughout the southern African region.

Bearing in mind that the pressures differ significantly between various locations in the world and Africa, this briefing paper takes a regional approach, focusing specifically on southern Africa. 'Southern Africa' in the context of this paper includes the 10 countries Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. These countries are a subset of what is generally termed sub-Saharan Africa, namely the 42 mainland African countries south of the Sahara desert in addition to six island states. The 10 countries are all within the Southern African Development Community (SADC); however, the Democratic Republic of Congo is excluded, as it is commonly associated with central Africa, as are the island states of Mauritius and the Seychelles owing to the limited data available.

Although these 10 countries are at different levels of socio-economic development, they still face common challenges with regard to development and sustainability. In addition, many of them trade food, water and energy across borders, thereby creating interdependencies and increasing the need for regional approaches aimed at sustainable resource management. It is therefore valuable to take a detailed look at goals 2, 6 and 7. Also, given that the implementation of the SDGs will be affected by economic, environmental and social pressures, these pressures will be analysed for each goal in the context of southern Africa. Using the FEW nexus as a framework, the interconnections between these three goals as well as their relation to the other SDGs will be demonstrated.

This briefing paper does not propose a concrete way forward on linking the SDGs and the FEW nexus. In reality, the way forward would differ from country to country based on resource endowment and constraints. This briefing paper only aims to develop a better understanding of the complex relationships between different SDGs and to identify approaches that allow for greater integration and a holistic approach towards development and sustainability in a region where common development challenges result in shared risks and common future prospects.

- Sub-Saharan Africa has close to half of the world's available uncultivated land, unused water resources and considerable potential for improved yields (Schaffnit-Chatterjee, 2014). This suggests the **potential for self-sufficiency** and a far bigger role for African agriculture in **global food security** in the future. However, climate change remains an unpredictable factor in future productivity.
- Regional dialogue could help develop an expanded definition of food security or food self-sufficiency. A **regional perspective** on food as a resource would help to cope with issues of water management, food security and energy generation, and improve the prospects of achieving Goal 2.

- Water is at the heart of meeting the SDGs since it underpins economic development and directly influences many other sectors. Therefore, it is difficult to address water without also addressing energy and food. With many **shared rivers and river basins** in the region, there are already a number of regional responses that can serve as **good practice examples** for other sectors.
- Access to improved water sources and to **sanitation** facilities continues to be a challenge. With population growth and increasing urbanisation, **municipalities** play an important role in achieving this SDG.

- Unless urbanisation is supported by increased access to affordable clean energy, urban energy poverty could increase dramatically, with households largely relying on **unsafe, unhealthy forms of energy** such as paraffin, coal and traditional biomass (wood, charcoal, waste and crop residue). These forms of energy not only pose a risk to human health but will also contribute to added **deforestation** in the region.
- Insufficient and unreliable electricity infrastructure, the rising cost of electricity to pay for the addition of new energy capacity and the rehabilitation of energy infrastructure, and fluctuating petroleum fuel prices mean that **charcoal** may remain the fuel of choice even in many communities with access to electricity.

SOURCE: WWF ANALYSIS

Figure 2: The food-energy-water SDGs in the southern African context

GOAL 2: ZERO HUNGER

End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

STATUS QUO / THE CHALLENGE

Undernourishment means that a person's food intake is insufficient to continuously meet dietary energy requirements.

It is a challenge that differs significantly between countries in southern Africa. Figure 1[1] shows that, while South Africa is not greatly affected,[2] countries such as Angola and Mozambique have successfully reduced hunger, nourishing higher shares of their population. However, there are countries that have seen only a slow decline in undernourishment, such as Zimbabwe, or even an increase, as is the case of Zambia, Namibia and Swaziland. At the current pace it is unlikely that any country other than South Africa and potentially Lesotho and Angola will reach the goal of eliminating hunger by 2030.

A second indicator for hunger is the proportion of underweight children under the age of five years. Data on this indicator in the World Bank database is incomplete for all southern African countries.

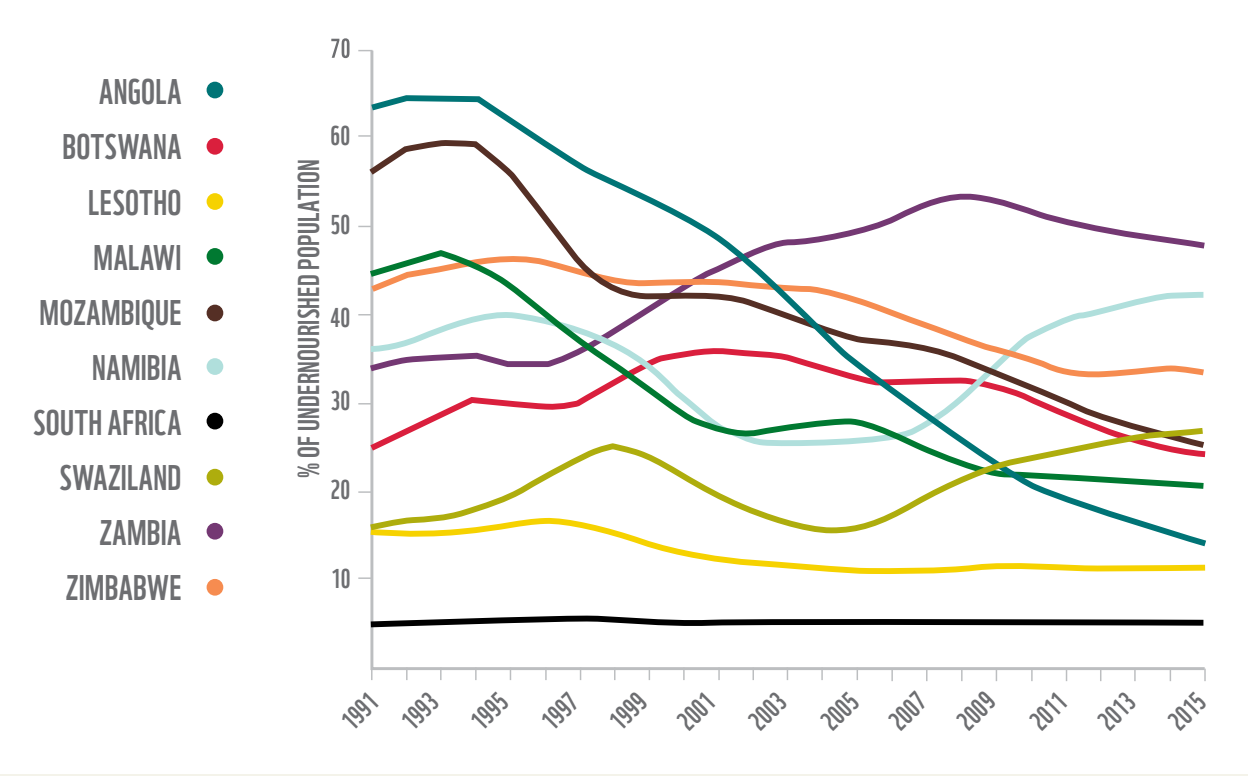


Figure 3: Percentage of undernourished population in southern Africa

[1] The data source for the figures in this briefing paper is the World Bank database on the World Development Indicators.

[2] The World Bank database on undernourishment indicates that data showing as 5 signifies a prevalence of undernourishment below 5%.

The most recent data shows the proportion of underweight children in the region ranging between 5.8% (for Swaziland in 2010) and 16.7% (for Malawi in 2014) (World Bank, 2016).

Despite these different conditions, southern African countries face similar challenges for their food supply, owing to transnational problems such as the degradation of ecosystems and resources, resource constraints, poverty and conflict. To guarantee a sustainable food supply throughout the region, economic, environmental and social factors need to be taken into account. In addition, examining the interrelations between Goal 2 and other SDGs helps to identify cross-cutting issues that influence the implementation of the individual goals.

ECONOMIC PRESSURES

AGRICULTURE CONTRIBUTES 8% OF SADC'S GDP

Agriculture is the keystone of many African economies, contributing 8% of the Southern African Development Community (SADC) region's GDP, which rises above 28% when all middle-income countries are excluded (SADC, 2013). All countries in southern Africa have seen an increase in GDP since the early 2000s. Economic growth, when inclusive, plays a decisive role in increasing food security by reaching those living in extreme poverty and increasing the population's standard of living. This is not an automatic function – for inclusive growth, stable political conditions are necessary, including wealth redistribution measures and expansion of the agricultural sector. This was the case in Angola and Mozambique, two countries that can be seen as examples of good practice. Namibia and Zambia, on the other hand, did not complement their economic growth with such measures. Figure 3 shows that while Angola and Mozambique have managed to decrease undernourishment, Namibia and Zambia have not. Economic growth on its own is therefore not a sufficient condition for food security.

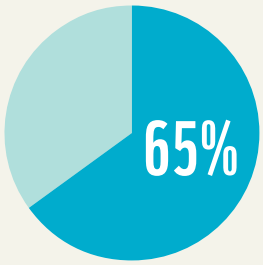
With economic growth being linked to increasing food security, it is problematic when growth slows down or even ceases, as has been the case since the world financial crisis in 2008–2009. If economic slowdown is linked to a reduction in agricultural output and industrial activities, this could lead to further food insecurity. Agricultural productivity is closely linked to global commodity prices and market forces, since many steps in the production chain rely on oil. Fluctuations in the oil price therefore have an impact on the price of agricultural goods. In addition, speculation in commodity prices are driving up the cost of food, thereby increasing food insecurity.

4% OF PUBLIC SPENDING IN AFRICA GOES TO AGRICULTURE

Finally, there is a gap between the rising demand for food and the infrastructure needed to meet this demand: investments in agriculture and related infrastructure in Africa, including road and railway systems, have declined. Agricultural assistance for Africa from international sources has declined from 12% to 4% of total foreign aid since 1990, while only 4% of public spending in Africa goes to agriculture (Funk et al., 2008). Without investment in agriculture, dependence on imports of agricultural commodities to satisfy the demand for food will most likely increase.

ENVIRONMENTAL PRESSURES

The link between agriculture and the environment is obvious – agricultural activities are based on environmental inputs such as land, soil and water. Consequently, in addition to contributing to climate change, agricultural activities are likely to also be directly affected by climate change. Although the effects of climate change cannot be clearly predicted, it is likely that temperatures and precipitation patterns will change,



65% OF ARABLE LAND IN SUB-SAHARAN AFRICA IS DEGRADED

leading to a drier climate and faster evaporation of available water resources. This development will have an adverse impact on crops and cause agricultural losses. Also, droughts and the increased risk of floods could lead to agricultural failures.

At the same time, agricultural activities can also have an adverse impact on the environment by causing land degradation, erosion and salination. In fact, agricultural growth in the region has been achieved through expanding agricultural land rather than improving productivity. As the agricultural footprint increases, it results in habitat shrinkage, fragmentation and degradation. Thus poor agricultural practices lead to an increased footprint without increased productivity, which undermines the ability of the region to provide sufficient food in the long term. Sustainable agricultural expansion will only be possible if the two-way effects between ecosystem services and agricultural practices are considered. Approximately 65% of arable land in sub-Saharan Africa is degraded, resulting in estimated economic losses of $68bn per year (Conway, 2014). This proves that environmental factors link back to economic ones.

SOCIETAL PRESSURES

Improved economic conditions together with urbanisation have resulted in a nutrition transition: a shift in dietary preferences away from raw staple grains towards meat and processed food, as well as an increase in the quantity of food consumed (Dolislager, 2014). This shift is particularly pronounced in South Africa. Unhealthy, energy-dense diets result in non-communicable, nutrition-related diseases, which have emerged at a faster rate in sub-Saharan Africa and at a lower economic level than in industrialised countries before the scourge of undernutrition has been successfully addressed (Vorster et al., 2011).

Long-term food security is at risk when population growth – and therefore growing demand – is not met by a sufficient increase in agricultural productivity. Estimates suggest that almost 50% of southern Africa's inhabitants will reside in urban areas by 2025 (UN-Habitat, 2010) with Angola, Botswana and South Africa being almost 70% urban by 2025 (UN-Habitat, 2010). As more people move to urban areas, fewer people live directly off the land. This goes hand in hand with changes in nutrition: people buy more processed food, calorific intake without the necessary nutritional value increases, and there is more food waste.

A drop in agricultural production and the resulting decrease in income and employment could lead to conflict. This conflict could in turn further aggravate food insecurity if it causes refugee movements within and between neighbouring countries, leaving behind untended and unharvested crops. Climate change, food security and social factors are therefore closely linked (White, 2005).

CONNECTION TO GOAL 6 AND GOAL 7

- Massive volumes of water are needed for the irrigation of crops and processing
- Agriculture has an impact on available water quantity and quality
- Agriculture is dependent on oil throughout the value chain
- There could be a shift to production of fuel crops instead of food crops
- Coal deposits often coincide with areas of high agricultural value

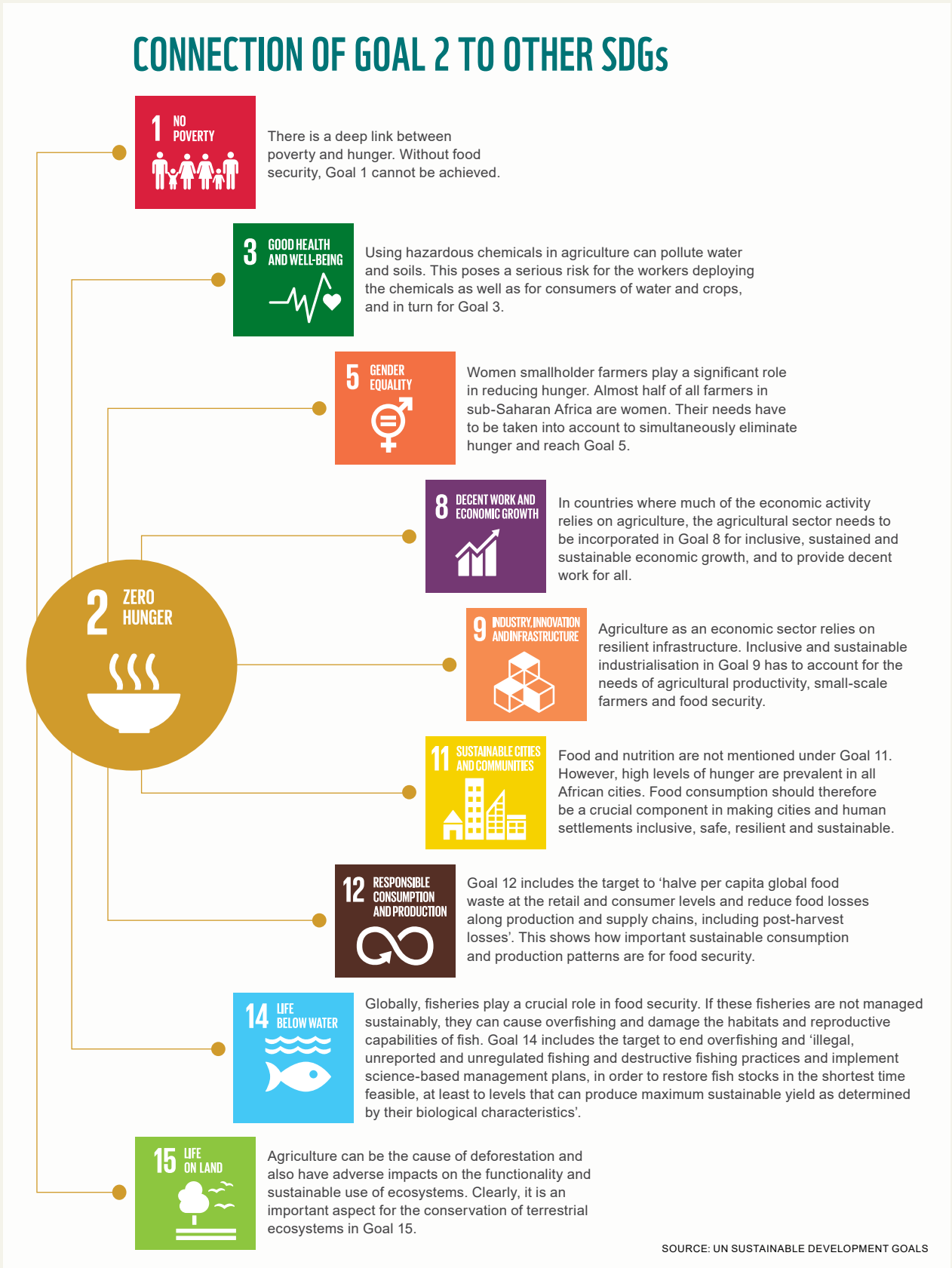


Figure 4: Connection of Goal 2 to other SDGs

GOAL 6: CLEAN WATER AND SANITATION

Ensure availability and sustainable management of water and sanitation for all.

STATUS QUO / THE CHALLENGE

Since the 1990s, most countries in southern Africa have managed to increase access to improved water sources. A notable exception is Zimbabwe, where the percentage of the population with access to improved water sources has dropped slightly from 79.4% in 1990 to 76.9% in 2015. Nevertheless, the access to improved water sources in the 10 countries in the southern African region has increased from 61.3% to 76.9% in the same time-frame. Although the data does not measure the water quality, it is generally understood that improved water sources are more likely to provide clean water than unimproved water sources, since improved water sources often employ technologies that prevent contact of the water with human excreta (World Bank, 2016).

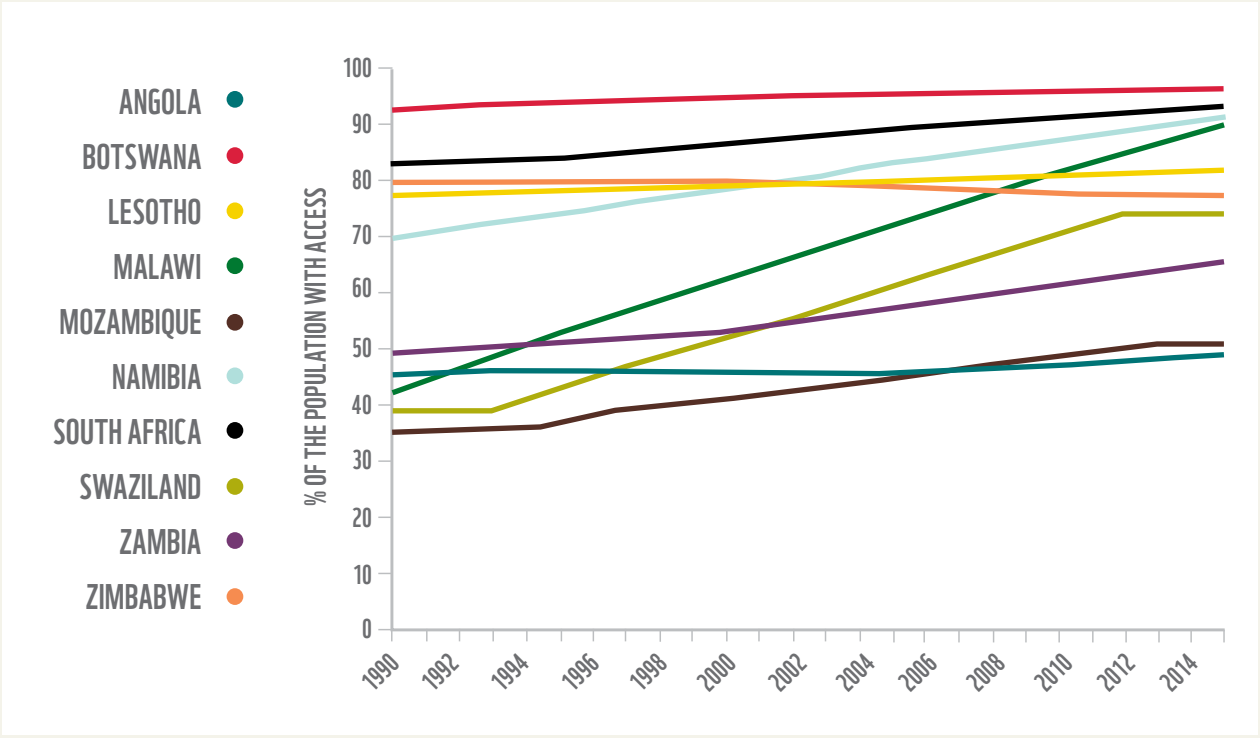


Figure 5: Access to improved water sources in southern African countries, 1990–2015

The picture is less optimistic when it comes to access to improved sanitation facilities. Despite gradual improvements since the 1990s, when only an average of 34% of the population had access to improved sanitation facilities compared to an average of 44.6% in 2015, the southern African countries still range on a relatively low level. Again, Zimbabwe presents an exception as the only country where access to improved sanitation facilities slightly decreased whereas access increased in all other southern African countries.

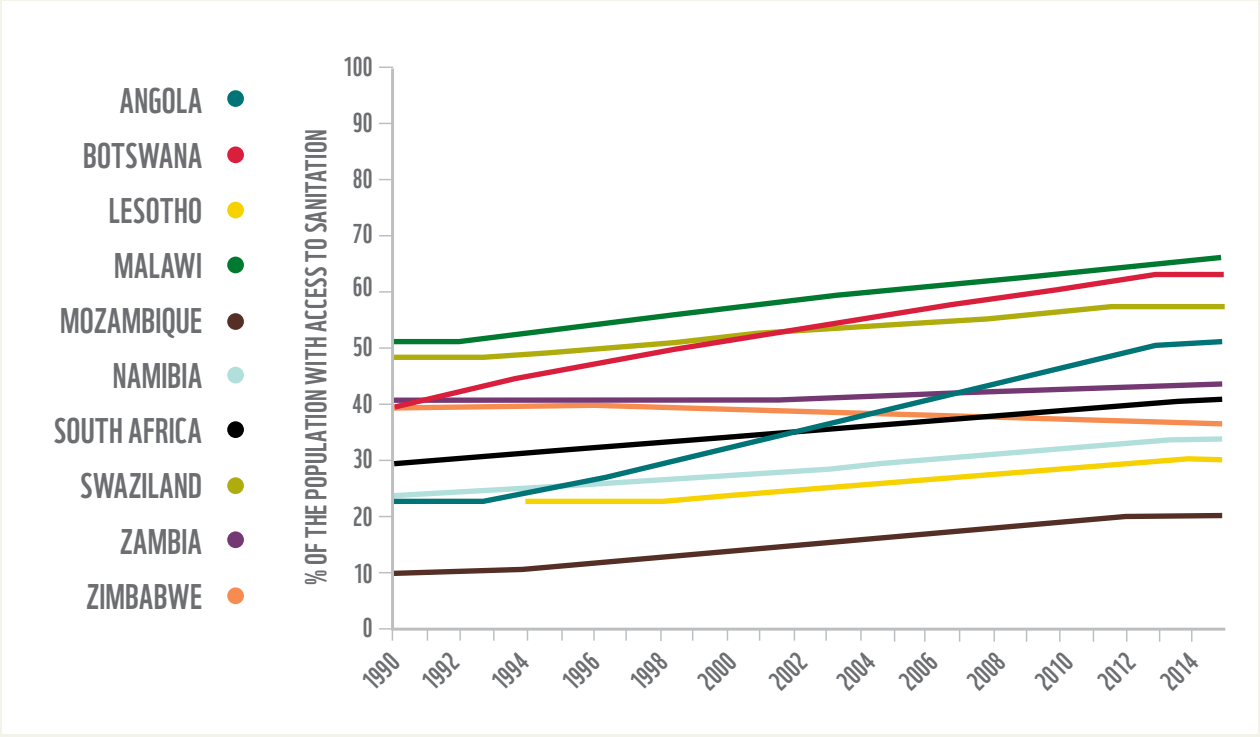


Figure 6: Access to improved sanitation facilities in southern African countries, 1990–2015

ECONOMIC PRESSURES

Increased industrial development and economic activities augment the demand for water because water is an input in most industrial supply chains, for example irrigation in agribusinesses and cooling and cleaning in others. Without decoupling economic growth and water use (i.e. increasing economic growth without affecting water) water consumption will rise and intensify the pressure on the already stressed water resources in southern Africa. Agriculture specifically plays an important role in water consumption in the region: on average, the 10 countries in the region use 62% of their total annual freshwater withdrawal for agricultural activities (World Bank, 2016). At the same time, the majority of agriculture is rain-fed, making farmers very vulnerable to climate change, and less than 20% of farmed land on the African continent is equipped for irrigation (FAO, 2012). In southern Africa, South Africa is the stand-out exception: irrigated agriculture accounts for over 60% of all water use and 30% of the country's crops. Technological solutions designed to ease water resource stress exist, but these are often slow to penetrate the market or are not suited to specific climatic or farming conditions.

The second risk is that agricultural and industrial activities affect water quality, owing to the breach of regulations or inadequate regulation. With mining making up much of southern Africa's industrial activity, waste discharge such as acid mine drainage affects water quality and poses a long-term risk to water resources.

ENVIRONMENTAL PRESSURES

A number of countries in southern Africa suffer from water stress. FFigure 7 shows the current water risk in the region as identified by the WWF Water Risk Filter. Water risk identifies areas with higher exposure to overall basin risk and is an aggregated measure based on more than 20 indicators from the Physical, Regulatory and Reputational Risk classes.

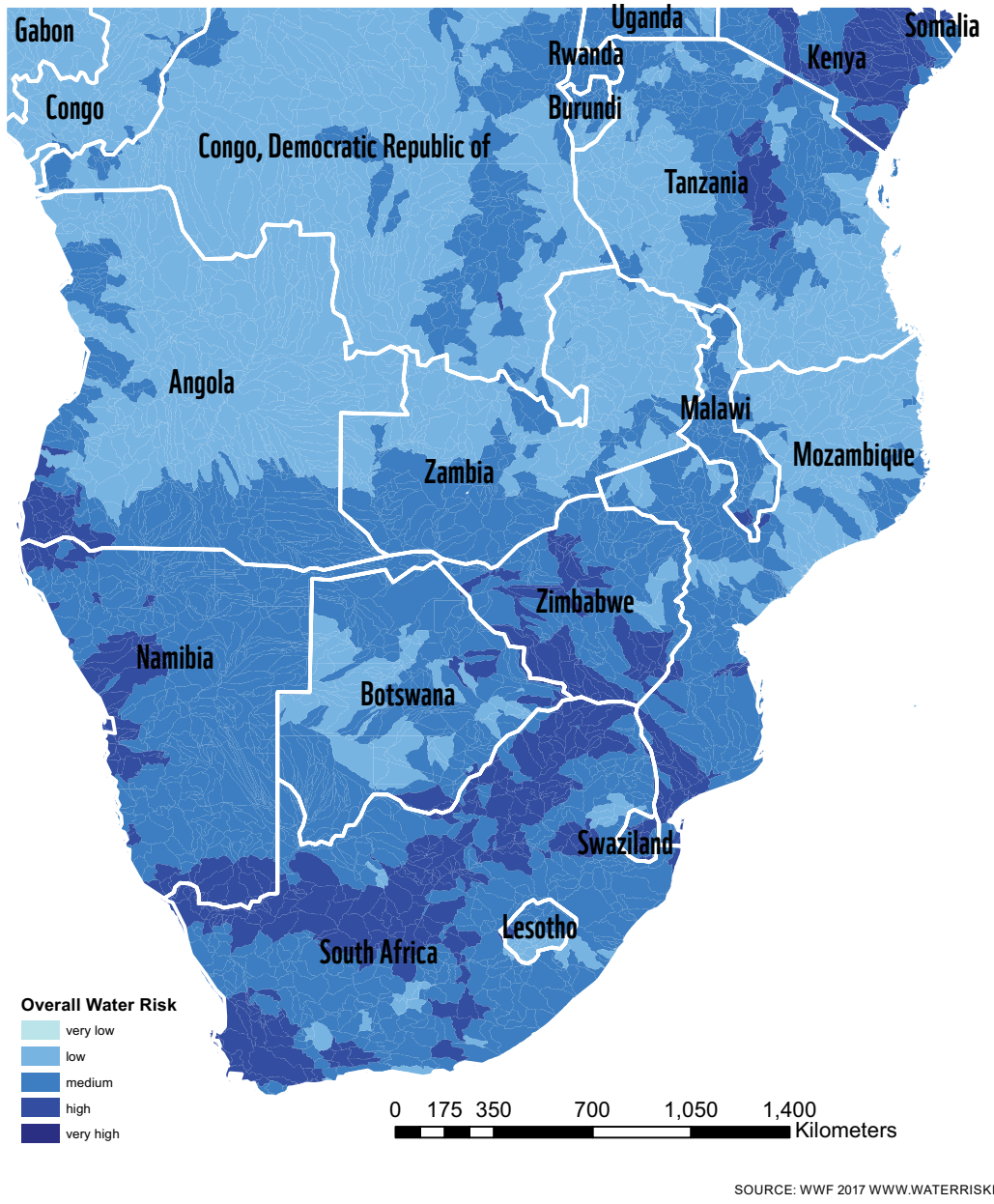


Figure 7: Overall water risk in southern Africa

This water stress is likely to increase with climate change, which affects not only weather patterns but also the amount and quality of water available. This is particularly the case for dry subtropical areas found in southern Africa, where the Intergovernmental Panel on Climate Change projects a reduction of renewable surface and groundwater (IPCC, 2014). This is owing to a projected change in rainfall patterns and more evaporation caused by increased temperatures.

The reduction of reliable seasonal rainfall is likely to further intensify the competition for water among users. Already today, southern Africa is experiencing a growing number of droughts. The effects of these droughts on food and energy insecurity are foreshadowing the possible effects of climate change.

SOCIETAL PRESSURES

Even if water quantity and quality do not decrease, population growth will put stress on previously sufficient water resources. Figure 8 shows the renewable internal freshwater resources per capita in southern African countries between 1962 and 2014. What is interesting about this figure is that the absolute level of water is not decreasing. The available water per capita is decreasing because of population growth. This means that with growing populations, the number of countries in southern Africa facing water scarcity will increase. Should this be coupled with depleting water resources due to climate change, the risk for water stress and scarcity will only further increase.

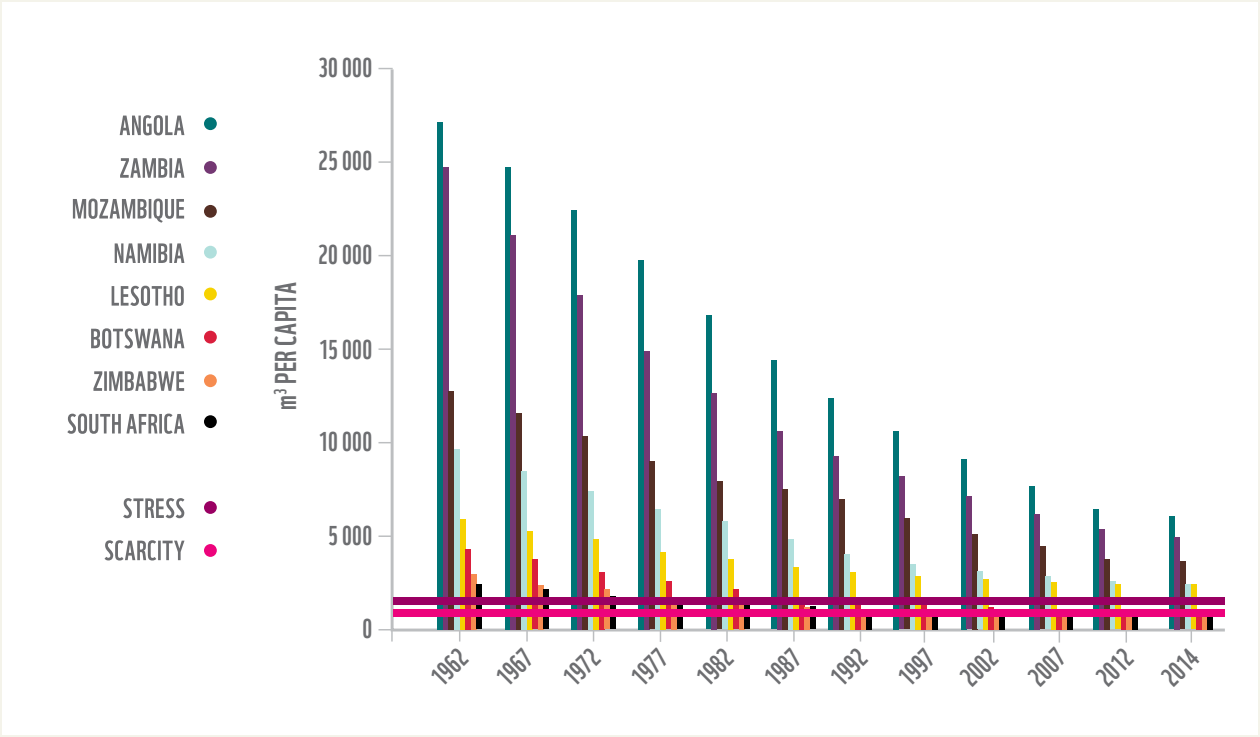
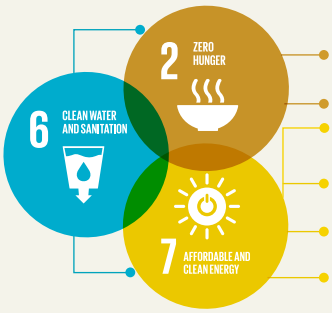


Figure 8: Renewable internal freshwater resources per capita in southern African countries (cubic metres), 1962–2014

In addition, urbanisation can put pressure on the provision of water services. As mentioned above, it is expected that almost 50% of southern Africa's inhabitants will live in urban areas by 2025 (UN-Habitat, 2010). Already, municipalities are not able to provide the infrastructure required to meet the growing number of inhabitants' demand for water and improved sanitation.

CONNECTION TO GOAL 2 AND GOAL 7



- Agriculture needs water for irrigation and processing
- Mining of fossil fuels as well as agricultural activities can have a negative impact on water quality
- Different kinds of (thermal) power plants need water for cooling
- Hydropower plants rely on water availability
- A shortage of energy also affects delivery of water services, for example the energy needs of water pumps

CONNECTION OF GOAL 6 TO OTHER SDGs

3 GOOD HEALTH AND WELL-BEING

Goal 3 aims to substantially reduce deaths and illnesses from water pollution and contamination. The lack of (safe) water and sanitation leads to health problems, for example when human excreta are not properly separated from, and therefore contaminate water.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

Resilient infrastructure in Goal 9 needs to take into account local water availability. When striving for industrialisation, there is a risk of unsustainable water consumption, and water-use conflicts between different sectors may arise. Without a sufficient legal framework and proper regulation and monitoring of industry, water pollution by factories is a serious threat.

11 SUSTAINABLE CITIES AND COMMUNITIES

While Goal 11 acknowledges that there are planning challenges associated with cities and other human settlements, it does not explicitly address the need for sustainable water infrastructure. As more people move to cities, the pressure on existing water infrastructure rises. Municipalities need to be equipped and empowered to provide this infrastructure in order to make cities safe, resilient, sustainable and equitable in the provision of services.

14 LIFE BELOW WATER

Water use can also impact the oceans, seas and marine resources referred to in Goal 14. Unregulated sewage disposals into these water bodies, fossil-fuel mining and agricultural activities can have adverse impacts on the marine water resource and the flora and fauna it is home to.

15 LIFE ON LAND

Life on land is impacted by the availability and quality of water. Goal 15 sets a twofold target: to protect inland freshwater ecosystems and the services they provide and to reduce the impact of invasive alien species on water ecosystems.

SOURCE: UN SUSTAINABLE DEVELOPMENT GOALS

Figure 9: Connection of Goal 6 to other SDGs

GOAL 7: AFFORDABLE AND CLEAN ENERGY

Ensure access to affordable, reliable, sustainable and modern energy for all.

STATUS QUO / THE CHALLENGE

Although electrification in southern Africa has increased, in 2012 a mere 37.8% of the population had access to electricity (World Bank, 2016).

Figure 10 shows that, within southern Africa, South Africa is exceptional with access to electricity for more than 85% of the population. Access is a greater challenge in Lesotho (20.6% in 2012), Malawi (9.9%), Mozambique (20.2%) and Zambia (22.1%).

Particularly in rural areas, energy access remains low. In Angola, for example, 83% of the urban population has access to electricity compared to 6% of the rural population. Furthermore, in rural areas there is a significant reliance on traditional biomass as an energy source, mainly for cooking stoves. Traditional biomass includes fuels such as wood, charcoal, waste and crop residue. These fuels not only have a higher environmental impact, for example by causing deforestation, but are also one of the main health and safety risks for households in rural areas in southern Africa.

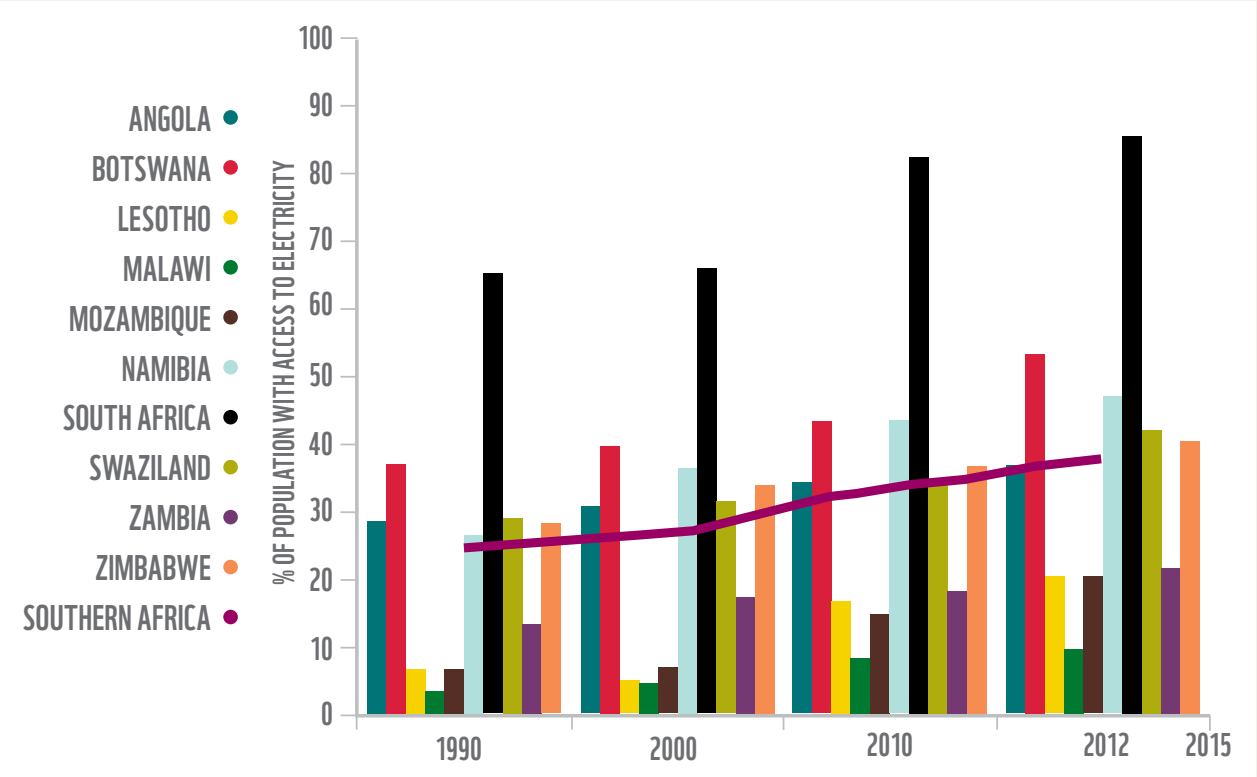


Figure 10: Access to electricity in southern African countries, 1990–2015

So far, renewable energy plays a negligible role in energy supply in southern Africa. While little data is available on this, in 2013 renewable energy, excluding hydropower, had a share of less than 1% of total electricity production in South Africa, Botswana and Mozambique.

ECONOMIC PRESSURES

Power outages and insufficient electricity are affecting economic activities, with costs for back-up diesel generators being high or even unaffordable, for small businesses in particular. Southern Africa's electricity supplies are highly dependent on hydropower, and also on South Africa, which exports power to much of the region. South Africa's electricity shortage since 2007 has strained not only its own industry; it has also compelled mining companies in neighbouring countries such as Zambia to suspend operations altogether in the past (Childress, 2008). More recently, the 50% below-average rainfall in the 2014–2015 season has reduced hydropower output from the Kariba Dam that supplies Zambia and Zimbabwe. In Zimbabwe, all mining companies and big industries have been ordered by the government to reduce their electricity consumption by 25%. The lack of energy security is therefore affecting industrialisation and regional economic growth prospects.

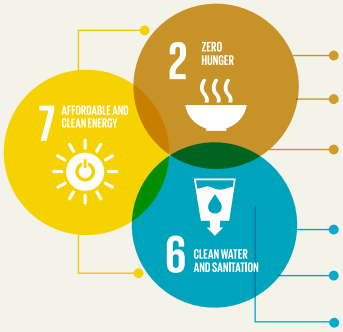
ENVIRONMENTAL PRESSURES

As mentioned, traditional biomass still plays an important role in energy for cooking. The felling of trees for charcoal and firewood carries the threat of deforestation and has a major impact on ecosystems. The depletion of forest cover will be aggravated by climate change-related impacts (including unpredictable rainfall levels, drought and flooding). Even if additional energy infrastructure is built, this could cause environmental stress: power plants and the roads to service them can be a cause of land-use change and habitat fragmentation, even more so if the power plant is run on fossil fuels. Mining of fossil fuels, which are abundant in the region, and fracking for shale gas will have a negative impact on water quality.

SOCIETAL PRESSURES

Urbanisation has already been mentioned in relation to Goal 2 and Goal 6. In the case of energy, it can lead to additional pressures. Where rapid urbanisation occurs, utilities and municipalities are often not able to keep up with the demand for electricity. In the absence of widespread access to energy, households will increase reliance on unsafe, unhealthy forms of energy. In particular, low-income migrant populations from rural areas may be forced to spend a significant share of their often erratic income on charcoal, thus perpetuating the poverty trap.

With a growing middle class in urban areas, a change in consumption patterns towards high-intensity energy-consuming services can be observed, with an increase in the use of, for example, refrigeration and air conditioning. This puts further stress on energy supply systems.



CONNECTION TO GOAL 2 AND GOAL 6

- Agriculture is dependent on oil throughout the value chain
- There could be a shift to production of fuel crops instead of food crops
- Food security cannot be achieved unless people can afford the fuel with which to cook the food
- Different kinds of (thermal) power plants need water for cooling
- Hydropower plants rely on water availability
- A shortage of energy also affects delivery of water services, for example the energy needs of water pumps

Figure 11: Connection of Goal 7 to other SDGs

NEW THINKING

Figure 12: The multiplicity of interconnections between goals 2, 6 and 7 and the other SDGs

When looking at the interconnections between the SDGs and the role the food-energy-water (FEW) nexus plays in the achievement of these goals, it becomes clear that 'silo thinking' needs to be abandoned in favour of a new approach to regional cooperation in southern Africa to address the common challenges of the region. However, using the nexus approach as a way of looking at the interlinkages between sectors may require a fairly complex measurement framework. Reliable data on the FEW sectors, and food systems in particular, and the kind of detailed data necessary to develop such a framework, do not always exist in the region.

The trade in food, energy and water already transcends borders in the region, as will the impacts of climate change. Therefore, in planning the implementation of the SDGs, the regional approach as well as the nexus needs to be integrated into policies. To achieve this integration, it will be important to understand the connections between the resources – for example, whether one resource influences another, or whether they mutually influence one another. There may be trade-offs, where one resource benefits while another is negatively affected; or synergies, where multiple resources benefit from their interconnections. From the perspective of the SDGs, it is also important to consider whether the FEW nexus imposes complexity that would hamper the achievement of the SDGs, or whether it enhances the feasibility of achieving the SDGs.

For example:

- Cities, agriculture and industry need to be integrated into river-basin management.
- Energy planning needs to give priority to less water-intensive technologies, i.e. moving away from coal and nuclear power to renewable technologies such as solar and wind power.
- Water and energy efficiency need to be promoted.
- Maintenance needs attention: pumps and pipes in agricultural and urban areas need to be set up in a way that optimises resource use and limits wastage.

Innovation will play an important role in the achievement of the SDGs. This concerns technical advancements, for example in the areas of desalination, efficient water pumps and monitoring of resource use, but also business models to finance the transition to water-efficient power supply and agriculture. Here, the countries in southern Africa need to build capacity and share best practice within the region.

This briefing paper has presented a multi-scale approach: while the SDGs are tackling issues on a country level, it is also necessary to look at every SDG in relation to the others and between countries. Here, government priorities play an important role, as does the recognition that no single country in the region can thrive if its neighbours are struggling. Instead, there needs to be a multilateral and collective response to meeting the needs of current and future generations.

CONCLUDING CONSIDERATIONS

- The value of the FEW nexus framework as a lens for catalysing and reviewing delivery against the SDGs is still to be determined, but this framework can be used pragmatically to identify and improve synergies among SDGs.
- The risks arising from the nexus and the implications for the SDGs depend on time horizons and scales: global, regional and national, right down to a catchment or household level.
- The local and regional-scale dynamics of the nexus present an almost endless set of possibilities for risks, threats and opportunities for the SDGs. The extent to which these risks or opportunities are realised depends on the extent to which countries work together.
- The cumulative effect of economic slowdown, global environmental change, volatile commodity prices and higher water and energy prices could be dire and hold millions of people in poverty.
- Food, energy and water insecurity can increase social tensions or act as a multiplier in the context of the climate change, population growth and urbanisation which the region will be facing.
- Climate variability and exposure to climate-related risks are high across the region and nexus sectors. The impacts of these risks can be aggravated by the interdependencies between resources.
- Ignoring the FEW nexus could lead to an increased rate of deforestation.
- Achieving the SDGs will require decisions for nexus-based adaptations that take into consideration the need to build climate resilience in economic, social and environmental systems.

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100% RECYCLED

50%

of southern Africa's inhabitants will reside in urban areas by 2025.

52%

of the world's remaining arable land is in Africa.

4%

of public spending goes to agriculture in Africa.

45%

the amount biomass accounts for of the final energy consumption in the region.

44.6%

of the southern African population has access to improved sanitation facilities.

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