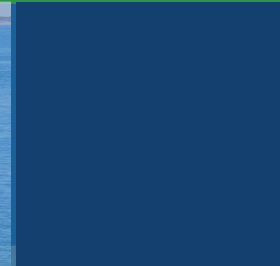
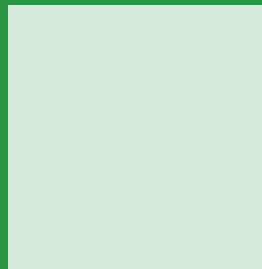




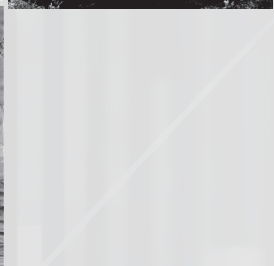
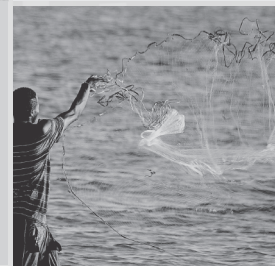
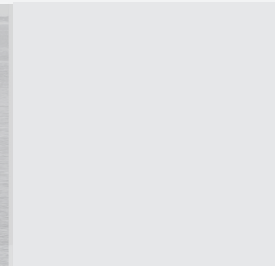
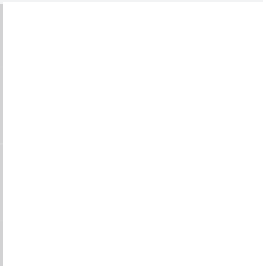
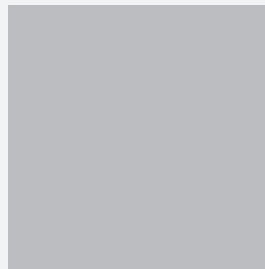
Opportunities for Micro-small and Medium-sized Enterprises within the Green and Blue Economies: Case of the Southern African Development Community





United Nations
Economic Commission for Africa

Opportunities for Micro-small and Medium-sized Enterprises within the Green and Blue Economies: Case of the Southern African Development Community





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Executive summary

Micro-small and medium-sized enterprises dominate the economies of the Southern Africa Development Community (SADC) in terms of their numbers, although not in value. Most, however, are micro- and informal enterprises and are largely cut off from opportunities to improve their capabilities. They mainly operate in the agriculture, fisheries, forestry, wholesale and retail trade sectors. Manufacturing micro-small and medium-sized enterprises are relatively few in number and data on medium-sized firms are sparse. Most employees in such enterprises are women, but few of the enterprises are women-led.

The agility of micro-small and medium-sized enterprises renders them responsive to opportunities in their immediate environments but also means that they have limited safety nets when faced with shocks, – such as coronavirus disease (COVID-19). Some of these enterprises have been able to respond to COVID-19 by taking their businesses online. Many SADC countries, and many informal micro-small and medium-sized enterprises, lack the information and communications technology (ICT) infrastructure and the skills and resources necessary for such a response.

In SADC countries, micro-small and medium-sized enterprises do not substantially participate in existing regional value chains, which are mainly composed of unbeneficiated natural resources. One large and buoyant market in SADC countries is the role of infor-

mal cross-border traders, who mainly trade food items, handicrafts and clothing. Many traders are women, and this trade plays an important role in food security and small-scale access to goods. Simplified border procedures can help these enterprises. Access to information on trade opportunities, tariffs and other factors can also support their business growth. Where informal cross-border trader associations exist, Governments and their border agencies should have regular engagements with them to help the sector to operate legally and with ease.

The adoption of the green and blue economies by SADC countries needs to be context-specific. In this regard, and as one example, SADC policy will need to manage the tensions between green and blue economy efforts on the one hand, which support the millions of small-scale farmers, fishers, harvesters and sellers of bioeconomy products, with efforts geared towards megaprojects driven by large enterprises. Green and blue economy policies and plans will also have to be sufficiently geared towards addressing rural development needs and seizing the potential of a rapidly urbanizing population. While extending rural infrastructure and support must continue unabated, green urban industrial programmes offer potential for the inclusive growth of micro-small and medium-sized enterprises.

In terms of trade, the African Continental Free Trade Area presents an opportunity for



micro-small and medium-sized enterprises to move into regional markets from which they can benefit. Operationalization of the Area must explicitly provide for such enterprises and support their participation. This can include through providing information on trade, protecting traditional knowledge, providing a window for upgrading for certain products produced by these enterprises, supporting trade in environmental goods and services on the continent (through the removal of tariffs), and implementing a phased programme for the enterprises to meet environmental standards and certification.

Improving regional infrastructure in SADC countries should reduce costs for firms and boost trade and economic growth across the continent. Improvements in energy generation and transmission, roads, ports and payment systems are particularly important for all enterprises. Investing in regional capabilities and so-called “public goods” could support a transition to a green and blue economy. This requires significant integrated planning and shared strategic priorities that in turn are embedded in national plans, approaches and implementation.

Globally, there are increasing levels of multilateral and bilateral finance for green and blue economy activities, much of which is targeted to climate-change mitigation, with a focus on renewable energies. Micro-small and medium-sized enterprises are often not the main beneficiaries of these funds – at least not directly – but can benefit through lines of credit provided to development finance institutions. Putting in place finance linked to business development services for these enterprises can support clusters of such enterprises in promoting the green and blue econ-

omies in priority industries. While a number of countries have begun to introduce finance for micro-small and medium-sized enterprises in key green and blue economy sectors and industries, more can be done. This includes through the development of clear green finance taxonomies that make it easier for investors and lenders to identify and support green and blue economy activities.

Technology and innovation are fundamental to the growth of the green and blue economies, insofar as new approaches and innovations are required to limit negative externalities. ICT and, in particular, digital infrastructure enable productivity across critical sectors. Many small-scale innovations have been highlighted in the case studies in the present report. These include digital market access platforms, drones for crop monitoring, blockchain-supported food traceability and non-digital examples of industrial symbiosis, in particular with the transformation of organic and plastic waste into new products.

Currently, most SADC countries do not produce complex green goods or services. These more complex goods are important for competitiveness, to improve productivity and to penetrate global value chains. Large-scale government programmes for the procurement of green and blue economy goods and services, with possible coordination between countries, could introduce local-content stipulations where import substitution is feasible, for instance, where national capabilities exist or where capabilities are adjacent to existing ones. Furthermore, within the existing agro-processing, fisheries and bioeconomy value chains, there is already potential to significantly scale up green and blue economy prod-



ucts and services by surmounting firm-level, national and SADC-wide constraints.

Marine biotechnology is a relatively new industry that has enormous potential for SADC countries. This is an area for technology transfer in which foreign Governments, corporations, universities and other research institutes should actively work in partnership with SADC institutions on research and development. High-tech micro-small and medium-sized enterprises will benefit from this collaboration.

The tourism sector in SADC countries is largely dominated by micro-small and medium-sized enterprises and is important for export earnings but has taken a heavy knock from COVID-19. The immediate policy focus will need to be on removing market access barriers for tourists who wish to visit SADC destinations. With a growing recognition of the importance of regional markets, there is also potential to develop new kinds of offerings to service new market segments. This presents an opportunity for micro-small and medium-sized enterprise to innovate, as does the sourcing of local and regional inputs into tourism operations.

Targeted support services from intermediary institutions representing micro-small and medium-sized enterprises can play an important role in advancing green and blue economy offerings overall. Industry associations have an important role to play in connecting such enterprises to information, networks and government. These associations should also encourage the participation of women-led and youth-led micro-small and medium-sized enterprises.

There is a strong case to be made for micro-small and medium-sized enterprise incubators in the green and blue economies to, first, link existing firms in SADC priority value chains to providers of green and blue economy services in order to green the value chains; second, support clusters of green and blue economy micro-small and medium-sized enterprises at a sectoral level; and, third, assist with the incorporation of such enterprises into regional and global value chains.

The present report demonstrates the many opportunities available to micro-small and medium-sized enterprises in the green and blue economies in SADC countries. Realizing this potential requires a number of actions to be taken. Proposals in this regard include the following needs:

- (a) To deepen, institutionalize and fund the support system for micro-small and medium-sized enterprises in the green and blue economies;
- (b) To design and implement green urban industrialization programmes;
- (c) To undertake a detailed analysis of the prioritized value chains in the SADC industrial strategy to understand and exploit greening opportunities;
- (d) To invest in medium-sized firms;
- (e) To expedite access to affordable energy; water and sanitation; transport infrastructure; and digital infrastructure and technology;



- (f) To design regional and subregional trade agreements to support the green and blue economies and micro-small and medium-sized enterprises;
- (g) To devise and implement appropriate green local-content provisions linked to major government procurement programmes;
- (h) To build upon areas of existing green and blue economy capabilities;
- (i) To include informal enterprises in micro-small and medium-sized enterprise programmes;
- (j) While building greater policy coherence, to advance pragmatic implementation.

1.1 Reaping the benefits of the African Continental Free Trade Area and achieving the Sustainable Development Goals through the green and blue economies

Sustainable economic recovery from the COVID-19 pandemic in the SADC countries requires the harnessing of new global growth industries and the adoption of innovative technologies. Furthermore, in order to drive the development of productive capacities and create resilience against future shocks, regional integration must be expedited, in particular the operationalization of the African Continental Free Trade Area. This can create deeper and wider markets and diversify national economies. Intra-African trade is key to diversifying export products and destinations and for firms to accumulate new capabilities. The Area needs structural transformation to be a success (Zalk, 2021).

The pace, inclusivity and resilience of structural transformation policies in Africa can only be achieved if they are aligned with the green economy (ECA, 2016a) and the blue economy. Sustainable industrialization reduces resource inputs, emissions and waste; avoids stranded assets; addresses urbaniza-

tion; produces resilient infrastructure; and supports the natural resource base (ECA, 2016b).

Around the world, trade in green and blue economy goods and sectors is growing. SADC countries have the potential to deepen their capabilities within the green and blue economies, expand their technology offerings, and trade with other SADC members and within the Area (which will result in reduced tariffs and expedite the lowering of non-tariff barriers).

Most African enterprises, including in SADC countries, are micro-small and medium-sized enterprises that have a critical role to play in advancing the green and blue economies owing to their flexibility and their responsiveness to challenges in their immediate environments. The more skilled, capitalized and networked micro-small and medium-sized enterprises can respond to high-tech activities, while other opportunities are best suited to smaller formal and informal enterprises, such as small-scale fishers and farmers, and enterprises that apply sustainable production methodologies, collecting and transforming waste or offering nature-based tourism experiences. Where the Area is concerned, producing for regional markets will allow these



enterprises to scale up their supply capacity. It will also help them to improve their marketing and distribution processes in an environment that they know better (African Union Commission and OECD, 2019).

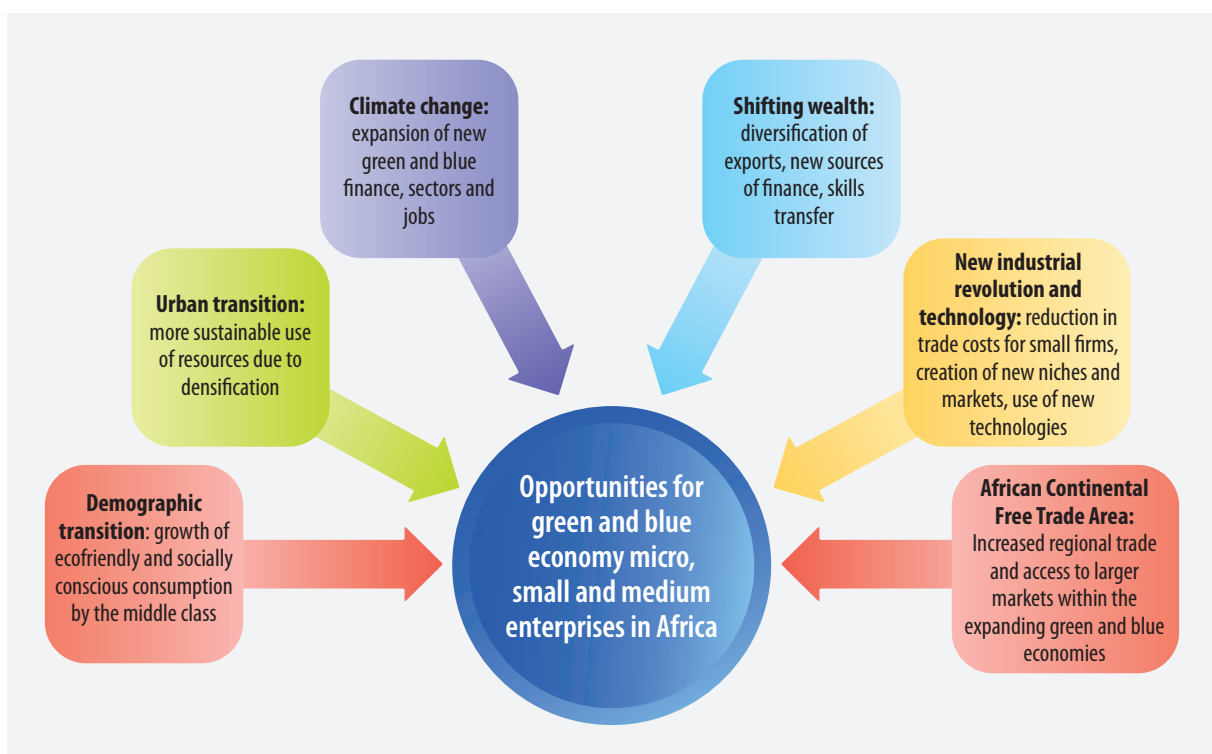
The harnessing of green and blue economy potential and green industrial expansion in Africa for structural transformation are processes occurring at a time when, together with the operationalization of the Area, African development is characterized by a number of other major trends. These trends include a demographic transition towards younger populations, increased urbanization, climate change, shifting wealth and the new industrial revolution (African Union Commission and OECD, 2019). These megatrends create major risks for social development and the natural environment, but they also present opportunities

for micro-small and medium-sized enterprises in the green and blue economies. These opportunities are depicted in figure I.

Women dominate employment in micro-small and medium-sized enterprises in SADC countries, but seldom own or control productive assets such as land. Advancements in the green and blue economies must recognize and address gender aspects of the sector. Similarly, given the growing population of young people, many of whom are unemployed, green and blue economy programmes geared towards micro-small and medium-sized enterprises must also promote inclusion by targeting youth enterprises.

The adoption of green and blue economy plans and activities supports achievement of the Sustainable Development Goals, in par-

Figure I : Megatrends and associated opportunities within the green and blue economies



Source: Adapted from African Union Commission and Organisation for Economic Co-operation and Development (2019).



ticular Goal 14, on life below water; Goal 15, on life on land; Goal 8, on decent work and economic growth; and Goal 17, on partnerships for the Goals. Partnerships are critical for the green and blue economies, which explicitly advance economic development choices that are socially inclusive and environmentally responsible. For this reason they require engagement and coordination across many different interest groups.

Unless green and blue economy activities and technologies are adopted, industrialization is likely to consume significantly more energy, water and materials and to produce more waste while increasing greenhouse-gas emissions per capita. For countries to substantively delink industrialization from high resource consumption levels, they will need to extensively shift their approach and design, their production methodologies and their technology use. Supporting micro-small and medium-sized enterprises within the green and blue economies can lead to the development of viable business propositions and industrial capabilities that are sustainable over the long term. This is in contrast with investments that have a significant negative environmental impact and that could become stranded assets. The participation of micro-small and medium-sized enterprises in a way that creates economic opportunities for local people should also form part of a just transition for workers and communities.

1.2 Approach

This study is intended to make the case for and identify opportunities for micro-small and medium-sized enterprises in green and

blue economies in SADC countries. Topics considered in the report include urbanization, the potential of the Area to open up opportunities for such enterprises in those economies, and the role of finance and technology and growing sources of demand as drivers of the green and blue economies.

Considerable attention is given to identifying and presenting case studies of micro-small and medium-sized enterprises in different green and blue economy sectors. The case studies are illustrative of the broad potential for these enterprises. There are sections on such sectors as sustainable agriculture, tourism, bioeconomy, fishing and aquaculture, renewable energy, water and sanitation, and waste (including the efficiencies of materials).

This introduction is followed by five sections in which the steps set out in figure II are presented.

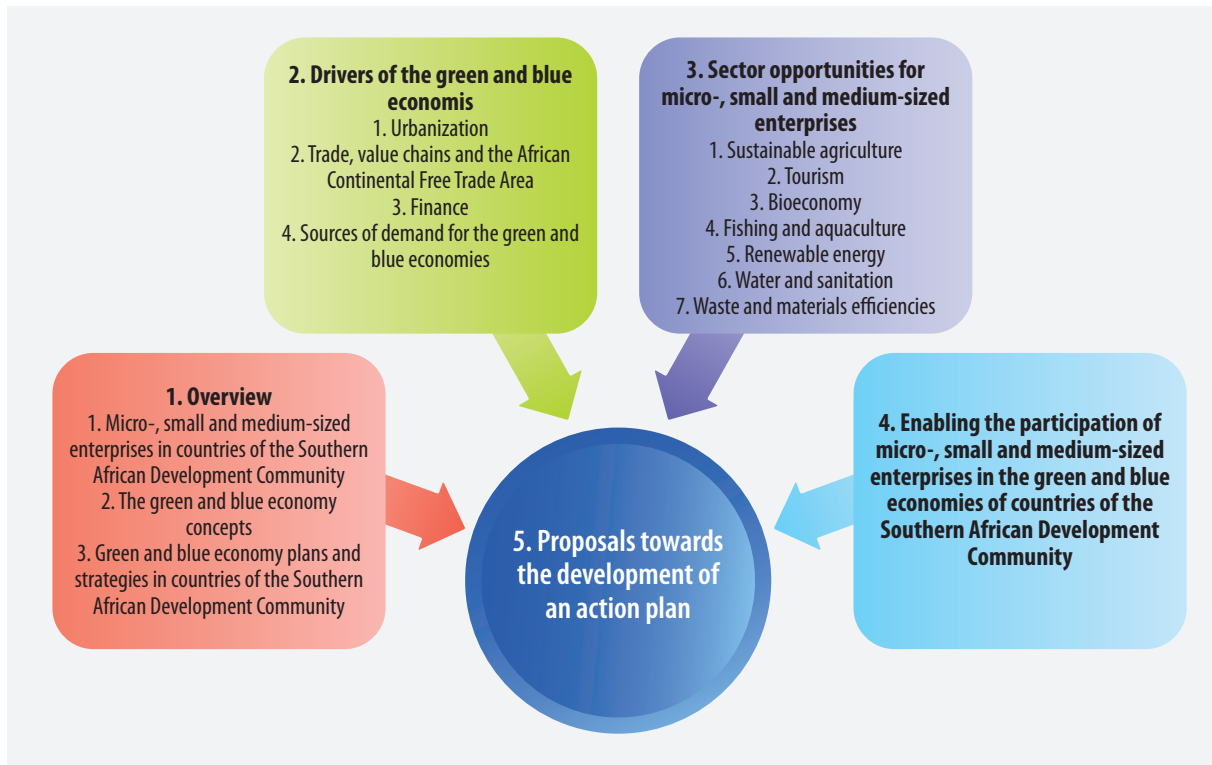
The compilation of the report involved a substantial literature review and a limited number of telephone, online and face-to-face interviews with experts on the green and blue economies and micro-small and medium-sized enterprises in SADC countries.

1.3 Limitations

The scope of the study is extensive and the discussions and findings in the report are by no means exhaustive. Such is the breadth of the topic under consideration that a detailed analysis of any specific aspect was not possible, but the synthesis of literature provides a useful set of insights that point to potential areas of focus and action.



Figure II: Five-step approach to the study



Source: Author's own compilation.

2.1 Micro-small and medium-sized enterprises

Micro-small and medium-sized enterprises vary significantly by size, age, number of employees, sector, business model, financial performance, goals and other factors.

Although much of the literature on micro-small and medium-sized enterprises in SADC countries clearly suggests that they account for the most enterprises and jobs, details on the sector are lacking. There are a number of challenges in measuring these enterprises. Many are informal, which means that they are not included in business registration databases or tax bases, and the definitions used to characterize and segment these firms vary (as discussed earlier). The most commonly employed definition of a small or medium-sized enterprise, however, is based on the number of employees. According to Khanna and others (2017):

- A microenterprise has fewer than 10 employees.
- A small enterprise has between 11 and 50 employees.
- A medium-sized enterprise has from 51 to 250 employees.

Micro-small and medium-sized enterprises play an important role in the economy by providing diversified goods and services, creating jobs, driving innovation and supporting livelihoods through the income that they provide. The enterprises are also linked to growth and diversification through the introduction of technologies (Disse and Somme, 2020).

Certain micro-small and medium-sized enterprises are innovative and provide different kinds of technology or solutions to meet underserved needs or to serve new niche markets. Their smallness can make them more agile in operational terms. In the green and blue economies, micro-small and medium-sized enterprises can be adopters of radical innovations in the production and manufacturing of environmental goods, services and technologies. Community-based businesses can engage social networks to develop more inclusive pathways to sustainability (Montmasson-Clair and others, 2019).



2.1.1 Characteristics of micro-small and medium-sized enterprises in the countries of the Southern African Development Community

The total number of micro-small and medium-sized enterprises in all developing countries, across the globe, was estimated at 162 million in 2017, of which 141 million were microenterprises and 20 million were small and medium-sized enterprises. An estimated 44 million of those micro-small and medium-sized enterprises were in sub-Saharan Africa, of which 97 per cent were estimated to be microenterprises. Nigeria accounted for 37 million of those 44 million enterprises (Khanna and others, 2017). According to these data, there were only about 200,000 small and medium-sized enterprises in sub-Saharan Africa.

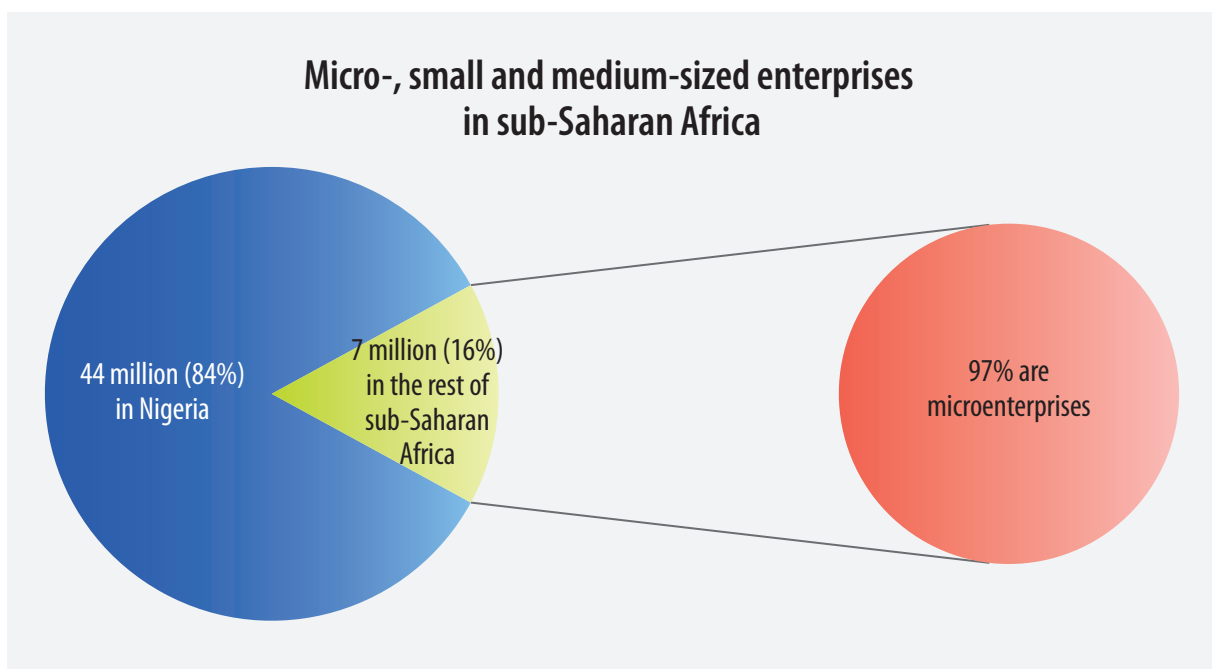
The role that these differently sized enterprises play in developing economies and the

challenges that they face can differ widely. For example, microenterprises often struggle with fluctuating income, low levels of economic activity, and a shortage of knowledge and relevant competencies. For medium-sized firms, access to sufficient risk capital, technology and stable electricity supply may pose a challenge (Fjose, Grünfeld and Green, 2010).

In most SADC countries, micro-small and medium-sized enterprises are more prevalent in the wholesale and retail trade sector. In Malawi and Zimbabwe, however, agriculture is the main sector for such enterprises, and in South Africa, trade and accommodation predominate (ECA, 2020a).

Women and young people dominate micro-small and medium-sized enterprises, in particular microenterprises and informal enterprises. In Africa as a whole, women are estimated to account for a significant share

Figure III: Micro-small and medium-sized enterprise numbers in sub-Saharan Africa



Source: Adapted from Khanna and others (2017).



of the labour force in the informal sector (United Nations Development Programme, 2020d) and young people are 1.6 times more likely to become entrepreneurs than older people (ECA, 2020a).

2.1.2 Informal economy enterprises

The informal economy is one in which the economic activities typically have no formal contractual arrangements. It may include legitimately produced goods and services that do not follow standards, regulations, business registration or operational licences (Koroma and others, 2017). Critically, informal economy operators can provide ready access to goods and services that are not available through the formal economy. Barriers to entry for informal operators are typically low, while formalization – such as registering a legal entity for tax purposes and complying with quality standards – can be costly and time-consuming.

The informal economy in many sub-Saharan countries is estimated to account for between 40 and 60 per cent of gross domestic product (GDP) (Fjose and others, 2010) but a higher share of employment, at between 70 and 90 per cent (Schwettman, 2020). In Southern Africa, most informal employment (which is not the same as the number of businesses) is in services (at 64 per cent), followed by industry (at 19 per cent) and agriculture (at 17 per cent) (Bonnet, Vanek and Chen, 2019). In Southern Africa, women constitute a lower share of this informal employment in agriculture and industry, but a higher share in services (Bonnet, Vanek and Chen, 2019). This is only to be expected, as women dominate informal retail trade.

Often, informal work is a survivalist strategy (Etime and Daramola, 2020). In addition to accounting for most jobs in SADC countries, many informal businesses also support livelihoods. This includes the small-scale fishers on the coasts and small-scale farmers inland (ECA, 2016a). Critically important for livelihoods, these agricultural and fisheries businesses also support local economies and provide communities with access to food. Informal trade, including cross-border trade, also supports food security.

In urban areas, residents in informal settlements or slums may rely on informal private providers for services such as energy, water, housing, public security, telecommunications, and waste management (Bowmans Law, 2020). Examples include the minibus taxi industry in South Africa and small-scale food traders operating close to the minibus taxi ranks.

Informal economy enterprises are usually microenterprises. They are single operators or family units: the share of own-account workers and unpaid family workers in total employment was estimated at 72 per cent in sub-Saharan Africa in 2017 (International Labour Organization, 2018). Work is often labour-intensive, low-skilled and situated in urban and rural environments (Etime and Daramola, 2002).

Women and young people disproportionately run informal businesses in sub-Saharan Africa (International Labour Organization, 2018). Much of the informal sector consists of small merchandise traders that sell and produce services, simple manufactured goods and processed food and beverages (Fjose and others,



2010). Informal agriculture accounts for a mere 10 per cent of GDP of the SADC area.

2.1.3 Data on micro-small and medium-sized enterprises

No consistent or comprehensive data exist on micro-small and medium-sized enterprises in SADC countries, but various disparate sources provide some insight:

- In Angola, 73 per cent of the population are employed informally (UN-Habitat and United Nations Development Programme, 2020).
- In Botswana, in a 2019 survey of formal businesses it was found that 90 per cent of formal businesses were micro-small and medium-sized enterprises, of which 66 per cent were microenterprises, and the remaining 34 per cent were small or medium-sized. In all, 67 per cent did not import or export, 29 per cent imported only, 2 per cent exported only and 2 per cent exported and imported. Some 61 per cent of the micro-small and medium-sized enterprises were women-led. In terms of the sectoral composition, 57 per cent were in services, 28 per cent in agriculture and mining and 15 per cent in manufacturing (ITC, 2019).
- In the Comoros, most micro-small and medium-sized enterprises and most jobs are informal. Services include commerce (mainly informal retail) and public sector services. The Comorian economy is based on agriculture, which constitutes 31.6 per cent of the total, with the largely artisanal fisheries sector accounting for 7.5 per cent (World Bank, 2020).
- In Eswatini, only 8 per cent of formal businesses are small and medium-sized enterprises. Microenterprises and individual enterprises dominate. Most are in the community and household, construction, retail, and agriculture sectors and are based in rural areas (Finmark Trust, 2018).
- In Lesotho, in 2016, 83 per cent of micro-small and medium-sized enterprises were individual entrepreneurs; only 17 per cent had employees. Wholesale and retail trade was the sector that provided the most jobs (30 per cent), followed by the agriculture, forestry and fishing sector (22 per cent). In all, 82 per cent of micro-small and medium-sized enterprises were not registered (Finscope, 2016).
- In Madagascar, the large informal economy accounts for 90 per cent of employment, much of which is in subsistence businesses (United Nations Development Programme, 2020b).
- In Malawi, there were about 1.6 million micro-small and medium-sized enterprises in 2019. A study targeting the more dynamic and high-potential enterprises within the micro-small and medium-sized enterprise category as a whole identified about 36,000 high-impact small and medium-sized enterprises (Genesis Analytics and Finmark Trust, 2020).



- In Mauritius, small establishments that employ fewer than 10 people represent 90 per cent of all businesses but employ about 54 per cent of the workforce. The top 10 per cent of firms account for 40 per cent of all sales, while about 60 per cent of small and medium-sized enterprises generate only a fifth of all sales. About 16 per cent of households derive an income from a household business, some 4 per cent of which do so from fishing or farming and 12 per cent from other household businesses (United Nations Development Programme, 2020a).
- In Mozambique, only 9 per cent of the population are formally employed (18 per cent in urban areas, 3 per cent in rural areas) (Finmark Trust, 2019).
- In Namibia, in 2016 there were estimated to be about 33,700 micro-small and medium-sized enterprises, of which 15,000 were formally registered. These enterprises contributed 12 per cent to GDP. According to estimates, most of these enterprises were retail traders, about a quarter were involved in food processing or other manufacturing, including handicrafts, and the remainder operated in the service sector (Namibia, 2016).
- In the Democratic Republic of the Congo, according to a report by the World Bank (2018a), over 90 per cent of firms were small, most were less than five years old and most were not engaged in high-growth activities. Informality was widespread and about 65 per cent of informal firms were active in the agro-industry and food trade, in retail trade, or in repair services.
- In Seychelles, it was estimated that, in 2010, 16.8 per cent of the workforce was employed in the informal sector. In manufacturing, most firms are small and medium-sized enterprises operating mainly in the fisheries, as well as the beverages, essential oils and coconut oil sectors (African Development Bank, 2014). Tourism and fisheries are major economic sectors, but in tourism, large hotels with fully inclusive packages dominate the landscape; inclusion of local micro-small and medium-sized enterprises is limited (World Bank, 2018b).
- In South Africa, the South African Revenue Service recorded 170,207 tax-registered small business corporations in March 2019, of which 25,500, or 15 per cent, were in the manufacturing sector. Wholesale and retail trade, catering and accommodation, financial intermediation, insurance, real estate and business services accounted for the largest proportion of small business corporations. Registered small businesses are increasingly important to the South African economy: they generated over one fifth of total turnover, or 2.3 trillion South African rand, in 2019 (Statistics South Africa, 2021).¹ Micro-small and medium-sized enterprises in South Africa are increasingly urban (Inter-

¹ At the time of writing, 1 rand was equivalent to 0.07 United States dollars.



national Finance Corporation, 2018). There were 1.8 million people running informal businesses in South Africa in 2017. Over the period from 2001 to 2017, agriculture, construction, community and social services, and transport and finance reported increases in their share of businesses not registered for value added tax, while the remaining industries experienced decreases in their shares (Statistics South Africa, 2019.)

- In the United Republic of Tanzania, 22 per cent of the population are informally employed and 14 per cent self-employed. Farming and fishing account for 40 per cent of employment. Only 4 per cent of the population are formally employed in non-farming private enterprises and government (Finmark Trust, 2017).
- In 2012, 90 per cent of the working population of Zambia were estimated to work in the informal sector (numbering about 1 million informal enterprises), while there were estimated to be 30,000 formal enterprises. 70 per cent of all micro-small and medium-sized enterprises were in the agriculture sector (Shah, 2012).
- In Zimbabwe, small and medium-sized enterprises contributed \$8.58 billion to the country's GDP in 2016 and employed more than 5.9 million people (over 75 per cent of the total workforce of 7.8 million). Furthermore, small and medium-sized enterprises made up over 70 per cent of the tax-

payers registered on the Zimbabwe Revenue Authority database, while contributing only 20 per cent in taxes in 2018 (Financial Tribune, 2018).

2.1.4. Informal cross-border traders

There is a vibrant informal cross-border trade market in SADC countries, with business shopping by resellers forming an important part of the economy of South Africa (Rivett-Carnac, 2020a). Informal cross-border trade makes up about 30–40 per cent of total trade among SADC countries (Koroma and others, 2017). This is valued at more than \$30 billion (Makochekanwa, 2012). It is estimated that this market was worth about 10 billion rand to Johannesburg alone in 2017 (Zack, 2017).

Women constitute most of the traders on the continent (Koroma and others, 2017). Up to 70 per cent of informal cross-border traders in Africa are women and most are breadwinners in their families. Women cross-border traders are particularly vulnerable to harassment and violence (United Nations Development

Informal cross-border trade commodities are quite varied, ranging from raw or semi-processed to luxury goods (Kaplinksy and Morris, 2019). For the most part, however, such trade in Southern Africa is made up of handicrafts, foodstuffs and non-foodstuffs. Some of this is sourced from domestic producers but much is imported from non-SADC countries. Imports come through two channels: new products, in particular from low-cost Asian economies, and second-hand apparel from high-income economies. The Food and Agriculture Organization of the United Nations (FAO) notes that some formal firms

Box 1: Women and informal cross-border trade

Most cross-border traders in Southern African Development Community countries are female and their enterprises are informal. General cross-country challenges facing women informal cross-border traders include lengthy and costly registration processes with authorities and a lack of formal documentation.

Women in informal cross-border trade are pushed into informality as they experience high transaction costs and delays, corruption, insecurity and gender-based harassment. In addition, basic infrastructure and facilities are lacking, trade associations are weak and data on cross-border trade are not disaggregated.

Source: Adapted from Tizora (2021) and United Nations Development Programme (2020d).

engage in informal trade and some informal traders supply formal firms (Koroma and others, 2017). In other words, the informal and formal economies are connected.

Some African countries (largely outside the SADC area) actively support small-scale traders at borders by providing them with market information, working with cross-border trade representatives, linking these micro-small and medium-sized enterprises with international markets and considering their needs when developing policies and laws (Kaplinsky and Morris, 2019).

2.1.5 Coronavirus disease and micro-small and medium-sized enterprises

In 2020, COVID-19 led to the closure of many global borders and a decline in economies the world over, with particularly gender-skewed effects and outsize impacts on the developing world. The International Trade Centre (ITC) business impact survey conducted between April and June 2021 indicated that 66 per cent of African businesses were “strongly affected” by the COVID-19 pandemic compared with 55 per cent globally (ITC, 2020a). Many SADC countries are dependent on the export of a few goods and services. Given the

African context of low export diversification and low sectoral diversification (IMF, 2017), the continent was particularly hard hit.

Globally, four sectors are at the most risk from COVID-19: first, accommodation and food services; second, real estate, business and administrative activities; third, manufacturing; and, fourth, wholesale and retail trade (International Labour Organization, 2021a). As indicated earlier, wholesale and retail trade is the dominant sector for micro-small and medium-sized enterprises in the SADC area. Further, the accommodation and food services sector is important for SADC economies that are heavily reliant on tourism, such as Seychelles in particular.

Adverse effects of the pandemic include slowing demand, declining commodity prices (some have since risen), disruptions to supply chains, export bans, increased costs of freight and disrupted cross-border trade (ECA, 2020b). Furthermore, the informal nature of many micro-small and medium-sized enterprises in SADC countries means that these enterprises and their workers are more vulnerable. They fall outside safety nets (as they are not registered on a formal system)



and may have little savings to rely upon. As women-led enterprises are most often informal microenterprises, these businesses have been particularly badly affected by COVID-19 and by regulations introduced to contain the disease. Despite this, research in Eswatini shows that women-led businesses were less likely to retrench staff than male-led businesses (Tizora, 2021).

More than 80 per cent of goods imported and exported by SADC countries are transported via the road network. Essential medical and food supplies were delayed owing to border closures. This was particularly problematic for smaller landlocked and import-dependent countries in the region (ECA, 2020b). These supply-chain disruptions from COVID-19 have had a major impact on micro-small and medium-sized enterprises. Travel and movement restrictions affected both the sourcing and distribution of products and services (SEED, 2020). While this has led to a shift of business activities to the digital sphere for certain enterprises, it requires enterprises to have access to digital tools and to build capacities within their team.

The same trends in supply chains were identified in a study in South Africa on a sample of 724 responding enterprises. For example, 7 per cent of respondents planned to switch supplier. A trend towards greater investment and uptake in online and telecommunications infrastructure was also observed (1

in 10 invested more in additional infrastructure; 9 per cent digitized their business) (Ipsos, 2020).

There were similar findings in a study² undertaken by ECA and International Economics Consulting in April 2020, covering micro-small and medium-sized enterprises in a number of African countries where cash flow was the biggest challenge. Many businesses had adapted and pursued opportunities via e-commerce, with 80 per cent of surveyed large firms and 57 per cent of microenterprises reporting that they had done so (ECA and International Economics Consulting, 2020a).

In a follow-up survey³ conducted in June and July 2020, it was found that a drop in demand was the greatest challenge for micro-small and medium-sized enterprises, closely followed by reduced opportunities to meet new customers. Cash flow was the third biggest problem that the businesses faced in June and July 2020. Shortages in supply were also a major challenge for 58 per cent of surveyed businesses. Border costs, high freight costs and shipment delays were blamed. Interestingly, women-led businesses were more reliant on domestic suppliers, which might have offered some protection to their businesses (ECA and International Economics Consulting, 2020b).

² The survey was administered online from 14 to 20 April 2020. The results are based on 337 responses and 210 fully completed questionnaires, with each respondent representing an enterprise that operates in at least one African country, and disaggregated as: 76 microenterprises, 59 small enterprises, 42 medium-sized enterprises and 33 large enterprises (ECA and International Economics Consulting, 2020a).

³ This second survey by ECA and International Economics Consulting had 104 respondents based in 11 SADC countries, of which 42 per cent were micro-, 24 per cent small and 20 per cent medium-sized enterprises (ECA and International Economics Consulting, 2020b)

Box 2: Impact of the pandemic on informal cross-border trade

A significant share of informal cross-border trade is in perishable agricultural products such as tomatoes, peppers, cassava, fish and eggs. Because of the short notices given about border closures occasioned by the COVID-19 pandemic, there was insufficient time for informal cross-border traders to prepare. Stock was spoiled, causing financial losses to traders. In Kenya, for instance, farmers were en route to markets with truckloads of produce when border closures were announced. These farmers were forced to abandon their harvest of a full season and return home (Luke, Masila and Sommer, 2020).

Source: Adapted from ECA (2020b).

With the trend towards online operations, the gross merchandise value of a national e-commerce platform in Kenya has reportedly tripled since the start of the pandemic (Banga, Macleod and Mendez-Parra, 2021). In South Africa, although expenditure on entertainment, recreation and leisure declined in 2020, expenditure on homeware-related goods such as hardware, furniture and appliances increased (Businesstech, 2021). This is probably explained by people investing in their homes as places where they were forced to spend more time and from where many had to work during COVID-19 lockdowns.

While supply-chain and movement restrictions led to certain micro-small and medium-sized enterprises moving their marketplace online and making changes to supply-chain systems, restrictions on movement had an enormous impact on informal cross-border trade (Reliefweb, 2021). Recent COVID-19 border closures mean that this trade has slowed down. As informal cross-border trade is a vital source of income for women and smallholder farmers, with regular trips across borders for small-scale retail trade, border closures resulted in major losses and negative effects on food security (ECA, 2020b). Price hikes were experienced

in key agricultural staples in some of the continent's largest cities, such as Nairobi and Accra (Luke and Sommer, 2020). Border closures have had a devastating impact on informal cross-border traders operating in all African countries (Schwettmann, 2020.)

Outside informal cross-border trade, in South Africa (and, in all likelihood, in other SADC countries), women working informally were disproportionately hard hit by lockdown measures. Many lost their jobs, worked fewer hours or earned less (Skinner and others, 2021).

2.2 Green and blue economy: definitions

2.2.1 Basic concepts

The green economy approach posits that, in order for economic development to be sustainable, it must “value nature and people and create decent, well-paying jobs” (United Nations Environment Programme, 2011). A green economy involves growth in income and employment driven by investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosys-



tem services. At the same time, the green economy should maintain, enhance or rebuild natural capital, in particular for those whose livelihoods and security depend upon it (ECA and others, 2012).

The green economy concept is sometimes referred to as the “inclusive green economy”, to emphasize its social component (as its environmental component is usually the one prioritized). The green economy concept has garnered considerable international attention and driven efforts towards sustainable development (United Nations, 2012).

More recently, the related concept of the blue economy has been adopted in response to the growing global recognition of the importance of the oceans and inland water systems as the basis of life and the alarming negative environmental impacts on these systems caused by the economy. Like the green economy, the blue economy is premised on economic potential and activities operating within environmental limits, with social inclusion protected and advanced. The ECA publication *Africa’s Blue Economy: A Policy Handbook* aligns the concept of the blue economy with the principles of equity, low-carbon development, resource efficiency and social inclusion (ECA, 2016b). The blue economy is often conflated with the idea of an ocean economy, but it also includes inland water systems, such as lakes, dams and river systems.

An important focus for Africa is that job creation is a central objective for the adoption of an African blue economy (ECA, 2016b). A just

transition to a green and blue economy requires inequalities to be addressed (Khisha, 2020). Informal enterprises and vulnerable communities must be included and their risks of marginalization must be addressed in plans and action.

While both the green and blue economy are vehicles for achieving the Sustainable Development Goals in general (given the linkages and feedback mechanisms between the Goals), they are most closely aligned with certain specific Goals⁴:

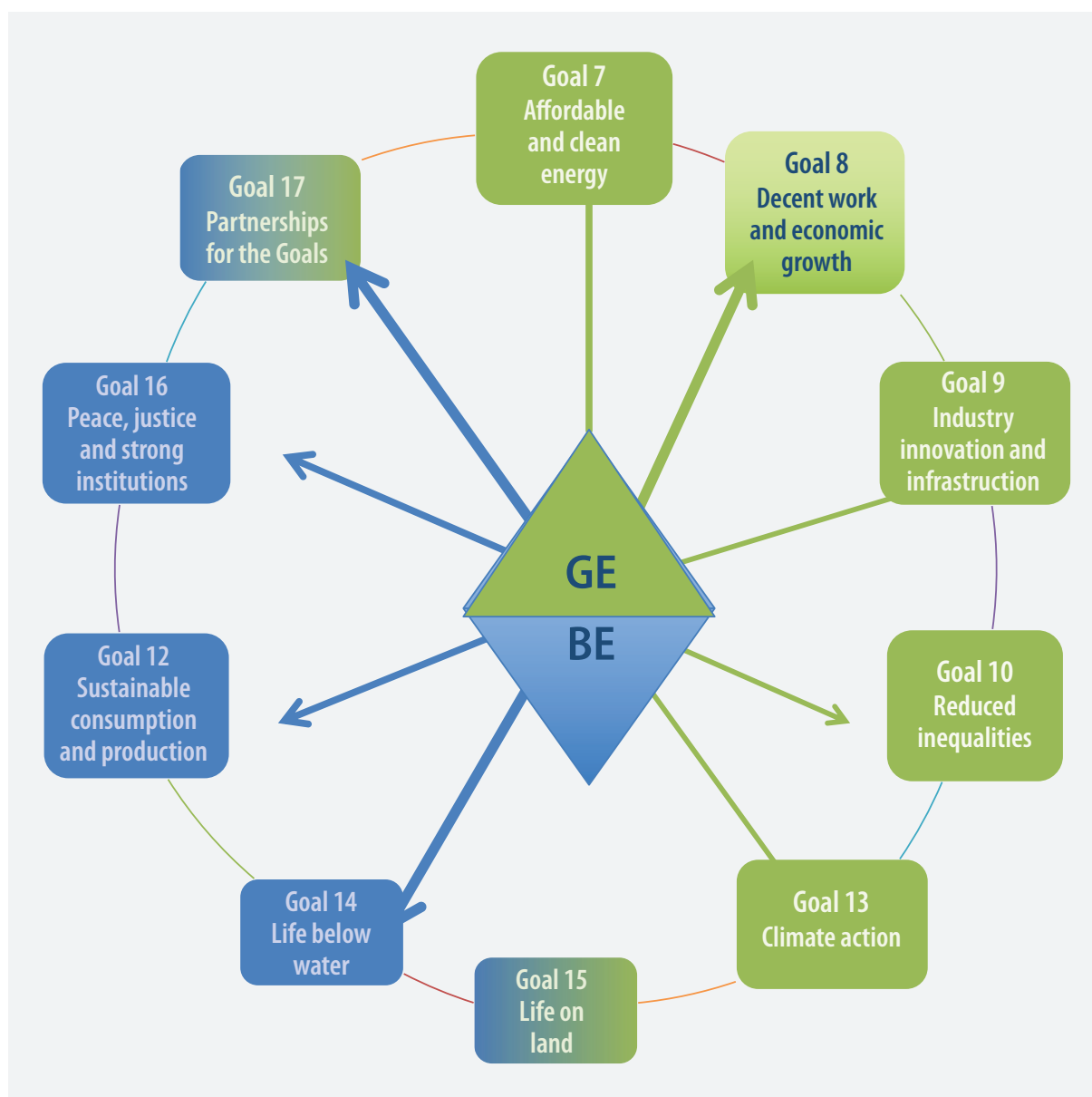
- **Goal 17, on partnerships for the Goals** – a critical goal for both the green and blue economies, thus underscoring the importance of working with stakeholders to promote these economies
- For the blue economy, Goal 14, on life below water
- For the green economy, Goal 8, on decent work and economic growth

A number of additional and closely linked Sustainable Development Goals may also be identified as of importance for the green and blue economies. These are shown in figure VI below, in which the weight of the arrow reflects the strength of the relationships.

⁴ Based on a review of published academic literature on the blue economy and the Sustainable Development Goals, by Lee, Noh and Khim (2020), and on articulation of green economy linkages to the Sustainable Development Goals by the Partnership for Action on the Green Economy (2020).



Figure IV: Green economy, blue economy and the Sustainable Development Goals



Source: Author's own compilation, adapted from Lee, Noh and Khim (2020) and Partnership for Action on the Green Economy (2020).

The blue economy has a stronger focus on Goal 16, on peace, justice and strong institutions, than does the green economy. This is likely because regional and international coordination and cooperation represent an indispensable requirement for ocean and waterway-related governance. Published literature on the blue economy gives relatively little attention to Goal 6, on clean water and sanitation; Goal 10, on reduced inequalities; and

Goal 13, on climate action. Clearly far more research is necessary to better understand, analyse, plan for and address the linkages between the blue economy and these Goals.

The green economy has strong links to climate action and affordable and clean energy. This is evidenced in practice by the global focus on increasing the uptake of renewable energy, to compensate for the causal linkages between



fossil fuels and heavy greenhouse-gas emissions (together with other negative effects on air quality and water). It also has clear links to Goal 10, on reduced inequalities, and Goal 9, on industry, innovation and infrastructure.

It is also not particularly easy to define the activities that fall either within or outside the green and blue economies. There are different ideas about limits to growth, the extent to which business-as-usual approaches must be discontinued to achieve authentic green and blue economy activities and what are deemed

acceptable trade-offs between the economy, society and the environment. Where the emphasis falls differs in practice from country to country and from stakeholder group to stakeholder group.

For example, in the blue economy, there is some controversy about the inclusion of certain sectors such as seabed mining (Carver, 2020; Cisneros-Montemayor, 2021). The different and competing views or approaches to the blue economy and green economy are conceptualized in table 1.

Table 1: Four approaches to the green and blue economies

Nature as capital	Nature as a driver of innovation
<ul style="list-style-type: none"> • Focus on conservation objectives • Favoured by environmental non-governmental organizations • Major sectors: regenerative agriculture; landscape management; renewable energy; ecotourism and marine protected areas; payment for ecosystem services models • Exclusion of carbon-intensive industries (such as oil and gas), mining, including deep-sea mining, and industrial-scale monocropping • Favours limits to development; regulations; and strong incentives or disincentives for certain activities 	<ul style="list-style-type: none"> • Focus on technological or technical fixes, including innovation hubs • Preferred by industries, governments and some research institutes • Major sectors: all sectors – in particular, emerging industries such as renewables, biotechnology, pharmaceuticals, deep-sea mining, mining for low-carbon inputs and 4G technology • Favours digital solutions to understand, monitor and drive planning approaches • Supports technological applications
Nature as livelihoods	Nature as good business
<ul style="list-style-type: none"> • Focus on poverty alleviation and food security objectives • Supports small-scale fishers and farmers, and their advocates • Major sectors: small-scale farmers, small-scale bioeconomy harvesters and users, small-scale fisheries, community-based ecotourism and community-based or small-scale aquaculture • Precautionary approach to mining, megaprojects and fossil fuel projects • Favours community-based research and development models; local ownership 	<ul style="list-style-type: none"> • Focus on economies, growth and employment • Favoured by industry and large global economies • Relevant to all sectors, but with a focus on large projects and major firms like multinational corporations • Large agriculture, manufacturing, pharmaceuticals, shipping, oil and gas, renewables, and mining, including deep-sea mining • Favours industry-led voluntary producer responsibility schemes, carbon trading, and so forth

Source: Adapted from Voyer and others (2018).



Measuring the green and blue economies is therefore quite difficult. Global efforts to measure trade in the green economy are generally based on tracking environmental goods and services. Environmental goods and services are understood to include “goods and services that measure, prevent, limit, minimize or correct environmental damage to water, air and soil, and also problems related to waste, noise and ecosystems” (Bucher and others, 2014). There is no definitive list of these goods and services, however. In practice, researchers and economists choose a more limited or expanded set, depending on the research question.

As blue economy activities also support the reduction or prevention of negative effects on oceans and inland water systems and their ecosystems, along with the negative social impacts, many environmental goods and services are also applicable to the blue economy, although not sufficiently so. As part of efforts to define environmental goods and services in the blue economy, a sustainable ocean economy classification for tradable goods and services sectors is proposed in a recent publication by the United Nations Conference on Trade and Development (UNCTAD) (2021), with the following sectors:

- Marine fisheries
- Aquaculture and hatcheries
- Seafood processing
- Sea minerals
- Ships, port equipment and parts thereof

- High technology and other manufactures not elsewhere classified
- Marine and coastal tourism
- Trade in fisheries services
- Maritime transport and related services
- Port services, related infrastructure services and logistical services
- Coastal and marine environmental services
- Marine research and development and related services
- Ocean energy and renewable energy

Developing these classifications and adopting ones suitable to the SADC countries will be important for efforts to expand, measure and trade within the blue economy.

2.2.2 Green and blue economy-related concepts

The low-carbon economy and the circular economy are two environmental resource-efficient economic development models related to the green and blue economies. The low-carbon economy is focused on economic activities with reduced greenhouse-gas emissions. The circular economy is focused on zero waste production, with waste material being reused, thus increasing efficiencies and reducing the negative effects of waste.⁵ Although there are strong areas of overlap between the green, blue, low-carbon and circu-

⁵ This economic system ultimately produces neither waste nor pollution, as materials are circulated within the produc-



lar economies, and although the concepts are mutually reinforcing, they are not identical.

Other related terms include traditional elements of economic systems reconceptualized as green, such as:

- Green industrialization, which is defined as “a process that ensures that the structural transformation process avoids stranded assets; copes with accelerated urbanization; reduces resource inputs and increases efficiency in the production process; cuts back on harmful waste emissions, such as chemical effluents and poisonous gases; strengthens infrastructure to reduce environmental impacts (such as pollution and extreme weather events); and maintains or improves the natural resource base, including providing associated environmental goods and services” (ECA, 2016c).
- Green trade, which is defined as the import and export of goods and services that are produced using value chains with enhanced sustainability of transport, production, use, maintenance and end-of-life cycling (Partnership for Action on the Green Economy, 2018).
- Green value chains, which incorporate the sustainable use of natural resources on the input side, maximize material

and energy efficiency, reduce negative environmental impacts at all points of the chain, and are climate-resilient (Miles, 2019). Furthermore, lead firms in global value chains, through their extended producer responsibility, can drive the greening of the value chains.⁶ This may involve the introduction of standards or requirements to their suppliers.

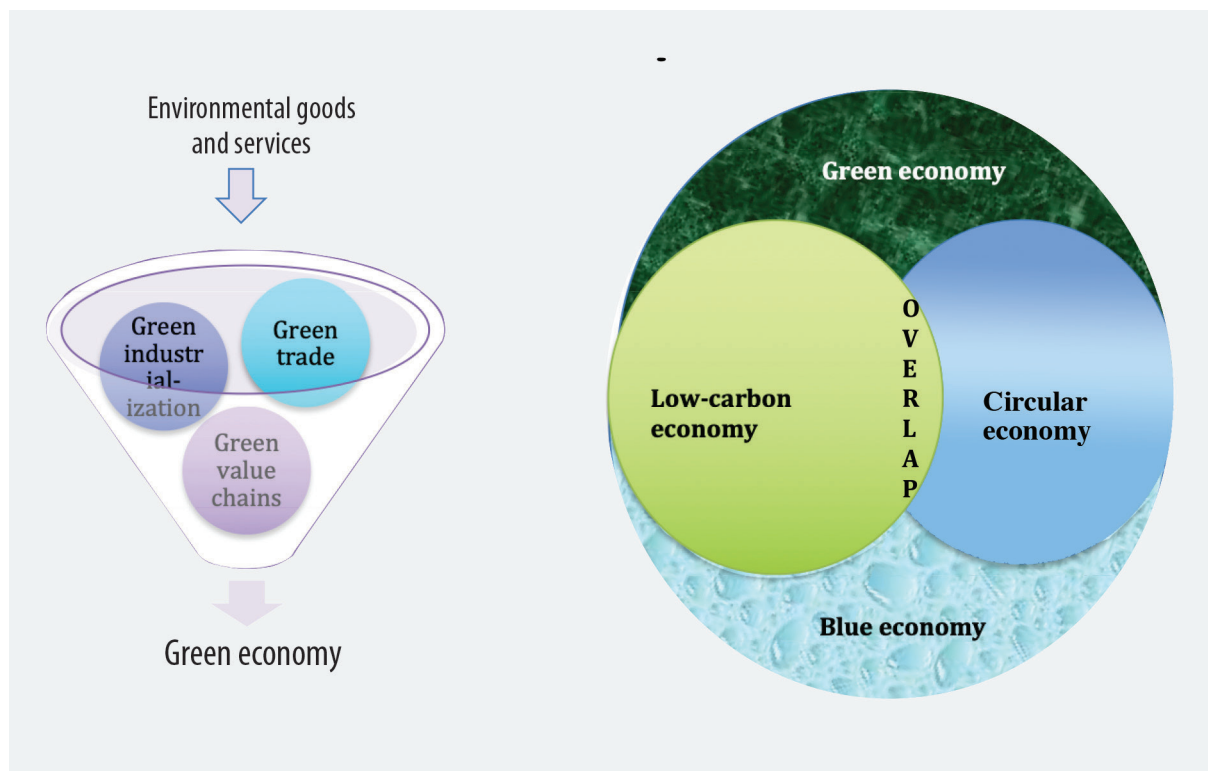
The relationship between these concepts and the green and blue economies are shown in figures V and VI.

Green trade is increasingly big business, in particular in goods and services related to renewable energy technologies. Renewable energy technologies averaged an annual trade growth of 14.5 per cent between 2002 and 2015, the fastest rate of any green goods. Solar power is at the core of global demand for renewable energy technologies, with solar photovoltaic units and control units accounting for over half of global demand in 2015. This was largely matched by growth in wastewater management technologies. A cluster of three groups, namely environmental monitoring, pollution management and solid-waste management products, follow as rapid growers (Partnership for Action on the Green Economy, 2018).

tion system. In addition, it uses a full-lifecycle perspective, including raw material extraction and processing, design and manufacturing, use and consumption, and end-of-use management. (Rademaekers and others, 2020).

⁶ For example, a select group of fashion retailers have offered better terms on supply-chain finance to suppliers that comply with sustainability practices. Non-governmental organizations can play a role in supporting shifts towards sustainable production or cleaner production. There are also global pressures to actively include suppliers that represent marginalized groups (World Bank, 2017).

Figure V: Economic concepts



Source: Author's own compilation.

In order to grow green and blue economies, a range of enablers are needed to support countries, communities and firms in this transition. For the green economy, ECA and the United Nations Environment Programme (UNEP) identified a need for: supportive institutions and policies; policy instruments that provide incentives and disincentives; the uptake of innovation and technology; capacity-building; finance; and a bolstered private sector to complement the efforts of governments to drive the transition to a green economy (ECA and UNEP, 2016).

Growth of the blue economy relies on similar enablers. ECA asserts that the adoption

of the blue economy in Africa must be based on regional cooperation and integration (ECA, 2016b). There is a particularly urgent requirement for the regional coordination and management of fishing stocks together with maritime surveillance and security and new modelling and accounting tools, such as ocean economy accounting. This underscores the earlier point on the importance of partnerships in driving the blue economy. Structural transformation is also highlighted as an imperative for the development of the blue economy in Africa, along with the need to create better linkages to other sectors of the economy.



2.3 Green and blue economies in the context of the Southern African Development Community and its policies and strategies

2.3.1 Context for the green and blue economies

SADC countries have an extensive natural capital, with diverse marine and terrestrial species and ecological systems. For example, South Africa ranks as the third most biologically diverse country in the world, while Madagascar has high levels of endemic species. Lakes Malawi and Tanganyika contain high numbers of freshwater species, and woodlands in Zambia and the United Republic of Tanzania are centres of bird and butterfly diversity (SADC, 2021a). African waters have been renowned throughout history for their abundance of fish resources. The South-West Indian Ocean has three of the five countries with the longest coastlines in Africa (Madagascar, South Africa and Mozambique). It also has four of the five countries with the largest exclusive economic zones (South Africa, Seychelles, Mauritius and Madagascar) and three of the five with the largest continental shelves (South Africa, Madagascar and Mozambique) (Bolaky, 2020).

This abundant natural capital supports livelihoods and economic development. Much of the population relies directly on the services provided by nature to survive, whether for energy, heating and cooking, food and water or nature-based goods and services for sale (such as nature-based tourism, crafts and medicinal plants).

In terms of their climate impact, SADC countries contribute comparatively little to global

greenhouse-gas emissions, but it is expected that they will be particularly vulnerable to the changes wrought by climate change on water availability and agriculture (with impacts on food) and on tourism, as coastal environments are affected by storms and sea level rises. Weather-related effects attributable to climatic events include Cyclone Idai in Malawi, Mozambique and Zimbabwe (which is estimated to have caused about \$2 billion worth of damage). Droughts have also had major negative effects, including one in Cape Town, South Africa between 2017 and 2018 and one in Malawi and Mozambique in 2019. The latter increased food inflation in Malawi and Mozambique (United Nations Development Programme, 2020d).

The green and blue economies call for production methodologies and value chains that are less resource-intensive and less polluting. Adopting such approaches can sustain ecosystems and thus support human survival.

Significant indigenous knowledge exists in SADC countries on the green and blue economies and the use of particular products for medicine, health, food, decoration and design. At the same time as global institutions have driven the idea of a green and blue economy, many traditional communities of farmers, fishers and traditional healers have long practised sustainable-use methods, from agroforestry and sustainable fishing to the use of specific natural species as health remedies.

Community-based adaptation strategies that draw on this indigenous knowledge and seek to support and reinforce existing natural and cultural practices hold potential. As interest grows in biotrade and bioprospecting, how-

ever, there are multiple potential trade-offs and challenges that need to be addressed around traditional knowledge, cultural and community rights, benefit-sharing, commodification and the like.

2.3.2 National green and blue economy policies and strategies

Recognizing the need for the green and blue economies to respond to biodiversity loss and climate change and for new industries to grow, a number of major multilateral institutions have incorporated elements of the green and blue economies – in particular climate mitigation and climate adaptation – into their country plans for the SADC area. These plans include the United Nations Sustainable Development Cooperation Framework; the country partnership frameworks of the World Bank; the country strategy papers of the African Development Bank; and various blue economy and green economy policies and strategies of ECA.⁷ Furthermore, the 2020–2026 Southern African subregional integration strategy paper of the African Development Bank (2020) points to the potential of the blue economy.

The paper states:

“The strategic areas of focus in the blue economy are nutrition sensitive investments in fisheries and aquaculture, renewable ocean energy, transport and logistics, tourism, ocean knowledge clusters, research and development, seabed exploration for oil and gas, and mineral extraction. Coastal, riparian and small island developing states (SIDS) have developed major activities based on the blue economy including port infrastructures to support off-shore fishing (e.g., Namibia), and other marine life, boat building (in South Africa), and vibrant leisure and tourism industries in SIDS” (African Development Bank, 2020a).”

The SADC green economy strategy was published in 2015. It identifies a number of prioritized sectors, as set out in table 2 (SADC, 2015).

Table 2: Green economy sectors and strategies

Sectors	Strategies
Agriculture	<ul style="list-style-type: none"> A.1. Support water supply and conservation A.2. Promote the use of adaptive agricultural technologies and techniques and provide incentives for the development of green agribusiness A.3. Promote land-use planning practices A.4. Promote working landscapes with ecosystem services to improve agrobiodiversity
Water	<ul style="list-style-type: none"> W.1. Enhance integrated management of shared watercourses W.2. Increase water-use efficiency W.3. Enhance and sustain ecosystems W.4. Preserve, upgrade and increase monitoring, data analysis and management W.5. Strengthen capacity in disaster risk reduction

⁷ See ECA, 2016a; ECA, 2016b; ECA, 2016c; and ECA, 2021a.



Sectors	Strategies
Forestry and biodiversity	FO.1. Plan and implement sustainable forest management FO.2. Increase protected areas in number and coverage FO.3. Provide tax benefits and subsidies for the development of agroforestry FO.4. Support the development of biotrade
Fisheries	F.1. Promote sustainable utilization of fisheries resources F.2. Promote green aquaculture F.3. Strengthen implementation of fisheries agreements F.4. Improve data collection and dissemination systems on fisheries resources
Energy	E.1. Support the use of renewable energy E.2. Promote investment in energy efficiency E.3. Improve energy infrastructure and access to electricity E.4. Reduce deforestation for energy purposes
Manufacturing and mining	M.1. Promote the reduction of the amount of natural resources needed to produce finished goods (resource productivity) M.2. Reduce negative externalities associated with waste and pollution M.3. Reduce climate change impacts on manufacturing infrastructure M.4. Support the development of green manufacturing sectors M.5. Promote the adoption of sustainable mining practices
Waste	WAS.1. Support the building and maintenance of wastewater and solid-waste management facilities WAS.2. Strengthen control on hazardous and e-waste disposal and promote waste recycling WAS.3. Support the improvement and regional harmonization of municipal solid-waste management schemes WAS.4. Promote waste recycling, reuse and reduction
Transport	TR.1. Promote investments in climate-resilient transport infrastructure and relocation of infrastructure exposed to climate change impacts TR.2. Promote green public transport networks and multimodal transport TR.3. Encourage trade between countries for (energy-efficient) low-emitting vehicles
Tourism	T.1. Promote the reduction of resource intensity in the tourism sector T.2. Support the protection of natural habitats and ecosystems T.3. Adapt the tourism sector to current and expected climatic changes
Human settlements	C.1. Support the reduction of urban resource consumption C.2. Discourage unsustainable housing and settlement practices C.3. Promote investments in public transport systems C.4. Reduce climate change impacts on cities

Source: SADC (2015).

While the Africa Blue Economy Strategy was finalized by the African Union in 2020 (Inter-African Bureau for Animal Resources, 2020), a blue economy strategy does not yet exist for SADC, although a blue economy concept note has been published (SADC, undated). This concept note provides a sectoral prioritization and highlights the following sectors as blue economy opportunities:

- Shipping and port facilities
- Fisheries
- Tourism
- Aquaculture
- Energy (including oil and renewable energy)

- Biotechnology
- Sub-marine mining
- Number of industries producing cleaner technologies
- Level of energy efficiency in production

The most recent regional indicative development plan for SADC, published in October 2020 and covering the period from 2020 to 2030, indicates that part of the regional focus must be on the sustainable development of integrated green and blue economies (SADC, 2020). At the same time, the SADC industrialization action plan and road map reduces the application of the green and blue economy concepts for industrialization to “ensuring greater environmental compliance (green and blue economy)”. Useful proposed key performance indicators include:

- Number of member States with green economy and climate change strategies
- Level of gas and carbon emissions
- Number of industries using cleaner production technologies

It is not clear how readily these indicators will be measured, but their incorporation should galvanize research to ensure that emissions are better measured, cleaner production technology is adopted, and greater energy efficiency is developed.

Many SADC countries do not have discrete green or blue economy policies, but instead refer to such measures in their national development plans as sustainable development or sustainable growth. Certain countries have ocean strategies and biodiversity and sustainability plans. Most have climate change strategies and all have submitted nationally determined contributions.

An overview of the green and blue economy strategies at the country level is provided in table 3.

Table 3: Country green and blue economy plans

Country	Green economy plans and strategies	Blue economy plans and strategies
Angola	The National Development Plan 2018–2022 includes a focus on agriculture, sustainable forestry and non-timber forest products, and also sustainable exploitation of fish. Combating drought and promoting the value of biodiversity are also part of the plan, as are actions for climate adaptation, including from the effects of landslides and flooding.*	No blue economy strategy
Botswana	Botswana lacks a specific overall green economy strategy, but both the 2016 National Development Plan and Vision 2036 make explicit commitments to inclusive growth, sustainability and prosperity for all.**	No blue economy strategy



Country	Green economy plans and strategies	Blue economy plans and strategies
Comoros	Emerging Comoros Plan 2030	Strategic framework for a blue economy national policy
Democratic Republic of the Congo	No green economy plan	
Eswatini	National Development Plan 2019/20–2021/22	No blue economy strategy
Lesotho	The country's second National Strategic Development Plan 2018/19–2022/23 does not foreground green economy priorities.	
Madagascar	No green economy plan	A national blue economy strategy is under preparation
Malawi	The third Malawi Growth and Development Strategy emphasizes climate priorities, alongside agriculture and water resources, in a vision that runs to the end of 2022 and builds on the previous version.	No blue economy strategy
Mauritius	Sustainable development report, June 2013	The Mauritius three-year strategic plan 2017/18–2019/20 covers ocean-based activities. The Ministry of Blue Economy, Marine Resources, Fisheries and Shipping has a five-year fishery development plan and a national action plan to prevent, deter and eliminate illegal, unreported and unregulated fishing. It also has an aquaculture master plan.
Mozambique	The Mozambique Green Economy Action Plan was approved by the Council of Ministers on 15 October 2013.	The Mozambique Policy and Strategy of the Sea was developed in 2017 to serve several objectives, including the development of a blue economy.
Namibia	1992 green plan. Vision 2030 embraces the vision of sustainable development.	In Namibia, a blue economy policy was developed in 2019 by an interministerial committee. This represents an overarching framework for marine spatial planning.
Seychelles	Seychelles sustainable development strategy, 2012–2020	The Seychelles Blue Economy Strategic Policy Framework and Road Map: Charting the Future (2018-2030) and the Blue Economy Vision were launched in 2014.
South Africa	Green Economy Accord 2011	Ocean Economy Strategy: Operation Phakisa, a blue economy strategy launched by South Africa in 2014.



Country	Green economy plans and strategies	Blue economy plans and strategies
United Republic of Tanzania	No green economy plan	The Zanzibar Planning Commission published a blue economy strategy in 2020. The blue economy policy aims to work in the following priority areas: fisheries and aquaculture, maritime trade and infrastructure, energy, tourism, and marine and maritime governance.
Zambia	The seventh Zambian National Development Plan (2017–2021) refers, among other measures, to climate-smart agriculture, sustainable fisheries, climate-proofed infrastructure (for agriculture), the restocking of wildlife and increase of key species (for tourism), climate-resilient electricity, increased investment in renewable energy, the establishment of catchment management institutions (water), sustainable forest management, waste management, low-carbon mass transit (all under climate change), and improved water, sanitation and hygiene	No blue economy plan, although the National Development Plan does address fisheries including aquaculture.
Zimbabwe	No green economy strategy	No blue economy strategy

* United Nations, United Nations Sustainable Development Cooperation Framework, Angola, 2020–2022. Available at <https://angola.un.org/sites/default/files/2020-10/Doc-UNSDCF-Angola-ENG-0804.pdf>.

** Available at <https://greeneconomytracker.org/country/botswana#:~:text=Botswana%20lacks%20a%20specific%20overall,sustainability%2C%20and%20prosperity%20for%20all.&text=Although%20Vision%202036%20is%20rhetorically%20ambitious%2C%20it%20lacks%20concrete%20targets>.

Country-level green and blue economy strategies or policies for each SADC country may not be necessary for green and blue economy programmes to be implemented. There does, however, need to be a clear process and detailed consideration of green and blue economies at the country level in order to articulate priority sectors, activities and technologies, and also to ensure the provision of the necessary resources. Clarity is also required on how these green and blue economy priorities are to be aligned and integrated with national development, infrastructure, finance and other plans.

SADC countries that are already advanced in their green and blue economy planning

may initiate joint work programmes in areas of alignment. Over time, they may be joined by other countries as this becomes viable. In practice, there are already a number of areas of regional collaboration at the green and blue economy sectoral and technology level that can be galvanized to link them to regional green industrial planning. This is particularly the case in renewable energy, where research into the potential for a regional wind energy value chain, explored in section 4.6, indicates that such a regional value chain requires both national procurement commitments and also innovative bilateral deals and investment support (Morris and others, 2020a).

3

Driving forces of the green and blue economies and the participation of micro-small and medium-sized enterprises

SADC countries are endowed with significant natural resources for the development of their green and blue economies. There is an opportunity to develop a sustainable regional industrialization path based on these resources. For example, there is great potential for the greening of commodity-based industrialization, nature-based tourism, agriculture and fishing, and green replacement technologies such as renewable energy and biomaterials. Some of these specific sectoral opportunities for the participation of micro-small and medium-sized enterprises are considered in more detail in section 4, which contains a sector-level analysis.

The megatrends of urbanization, climate change, regional trade and the African Continental Free Trade Area, a growing middle class and the fourth industrial revolution all provide impetus for sustainable industrialization. These driving forces are considered in more detail below under the themes of urbanization; trade among SADC countries, value chains and the African Continental Free Trade Area; technology (which covers the fourth industrial revolution); and finance (where green finance and climate finance are the focus).

3.1 Urbanization

Urban areas are places where multiple systems intersect, including food, housing and infrastructure. Only 55 per cent of urban residents across Africa are estimated to have access to basic sanitation and 47 per cent to handwashing facilities (Bowmans Law, 2020). The movement of populations into urban areas increases demand for building materials, energy, water and waste services, food and transport; all these goods and services can be provided by green and blue economy industries and firms.

With the growing urbanization in SADC countries, urban areas offer particularly good potential for a green urban industrial approach in which micro-small and medium-sized enterprises play a central role. There is a particular opportunity for young people to participate. Young people can “drive green industrialization only if they have green jobs in different sectors. And since most of these jobs are in urban areas, cities must also be included in Africa’s green agenda” (ECA, 2016c).

Adopting inclusive green urban industrialization requires Governments of SADC countries to embrace micro-small and medium-sized enterprises as drivers of urban de-

velopment by unlocking their potential. Many informal and small businesses in cities would benefit from increased efficiencies. This proposed approach calls for linkages between sectors to be maximized, including the provision of local inputs between, for example, low-cost housing and manufacturers. A number of initiatives are necessary: to provide micro-small and medium-sized enterprises with access to infrastructure, public goods, production facilities and service providers; to support skills development for firms; and to concentrate the various entities involved in the provision of goods and services for cities. Without this, agglomeration economies that lead to development in cities will not emerge (Duranton, 2013; Duranton and Puga, 2003; Turok and McGranahan, 2013; Quigly, 2009).

The potential for an urban-focused industrial policy was explored and modelled for Ghana. Although Ghana is not a SADC country, this so-called “Cities Matter” pathway showed the economic potential of an urban industrialization programme in Africa (Cloete and others, 2019). This is described in box 3.

There is increasing global focus on cities as sites for development. Under its NextGenCities2020 programmes in Angola and Zimbabwe, the United Nations Development Programme (UNDP) is investigating the potential of urban contexts to address a range of problems that exist, with a strong focus on city-region food systems. This urban-systems approach takes into account that “new forms of entrepreneurship, infrastructure provision,

Box 3: “Cities Matter” industrialization pathway

To investigate the potential of a more urban-focused industrial policy with potential climate change co-benefits, an alternative industrial development pathway was developed based on stakeholder input. The impact of this pathway relative to the status quo was investigated using a social accounting matrix-based multiplier model. This alternative pathway, labelled the “Cities Matter” pathway, was built around investment in transport infrastructure, low-cost housing, support for informal and small-scale businesses operating in cities, renewable energy, waste recycling, urban agriculture and sustainable and local manufacturing. Stakeholders believed that urbanization would only become a strong driver of industrial development once the local construction industry had started to use more locally produced inputs. This was reflected in the modelling through the inclusion of inputs from local sectors in modelling for low-cost housing and transport infrastructure investment.

Stakeholders emphasized that, given the reality of urban economies in Ghana, it would be very difficult to change the development trajectories of cities without increasing the efficiency of small-scale and informal businesses. Consequently, small-scale and informal-sector support (including commercial zones) received the largest proportion of investment (20 per cent) under the “Cities Matter” pathway.

In terms of growth in output, gross value added and gross domestic product, the modelling results showed that the “Cities Matter” pathway had the potential to significantly increase growth. Output, for example, increased by more than 50 per cent from an already impressive 12 per cent under the “Standard Industrial Policy” pathway to 18.3 per cent under the “Cities Matter” pathway.

Source: Adapted from Cloete and others (2019).



use of data and decision-making methods can all create shared value and contribute to sustainable urban development in ways that call into question established paradigms of planning and urban design, that still require effective governance but maybe not of the type ... seen ... over the last hundred years” (Lima, Silva and Hungulo, 2021).

Section 4 below provides a sectoral discussion and identification of opportunities for micro-small and medium-sized enterprises. The case study includes a number of urban enterprises, which operate in such sectors as agriculture and food, renewable energy, water and sanitation, and waste (including building materials).

SADC countries should investigate adopting urban industrialization policies that prioritize green and blue economy sectors and activities. The policy design should include and support urban micro-small and medium-sized enterprises, in particular those run by women and young people.

3.2 Trade, value chains and the African Continental Free Trade Area

3.2.1 Trade and value chains

The value of trade among SADC countries has remained low, at only 16.6 per cent of the total trade of those countries, as a result of limited gains in productive capacities: exports from the SADC countries are largely from the agricultural and mineral sectors and much of these are raw or unprocessed (European Union, 2020). This reliance on unprocessed natural resources is hampering

the capacity of Southern Africa for industrial diversification and complexity. Countries face the challenge of transitioning from a commodity-dependent growth path to value-adding, knowledge-intensive and industrialized economies (African Union Commission and OECD, 2019).

South Africa is the main destination for most intraregional exports. It is also the main source of intraregional manufactured exports, which are concentrated in clothing, electronics, chemicals, machinery and the automotive industry (Makgetla and Levin, 2020).

Four SADC countries are included in the top 10 supplying markets in Africa for products imported within Africa, as shown in table 5. While South Africa exported the most of any country in Africa to other African countries, the value of the exports amounted to only 27 per cent of the total value of South African exports. By contrast, Eswatini, the ninth largest African supplier to other African countries in terms of value, exported 92 per cent of the total value of its exports to other African countries. This indicates how strongly reliant Eswatini is on regional markets for its exports.

South Africa is the largest importer of exports from Africa by value, but such imports represented only 12 per cent of the country's total imports. Botswana imports the greatest share of imports by value from African supplying markets, at 69 per cent.

As already indicated, the SADC Revised Regional Indicative Strategic Development Plan aims to accelerate industrialization in SADC in part through the development of new regional value chains (SADC, 2020). In the



Table 4: Southern African Development Community countries in the top 10 African supplying countries for exports to Africa

Country	Value of exports to Africa (United States dollars)	Exports to Africa as a share of total exports (percentage)
South Africa	24 109 819	27
Zimbabwe	2 644 221	62
Namibia	2 368 389	37
Eswatini	1 845 678	92

Source: World Economic Forum (2021).

Table 5: Southern African Development Community countries in the top 10 African importing countries for imports from Africa

Country	Value of imports from Africa (United States dollars)	Imports from Africa as a share of total imports (percentage)
South Africa	10 219 646	12
Namibia	5 125 994	66
Botswana	4 516 851	69
Zambia	3 350 857	46
Mozambique	2 429 493	32
Democratic Republic of the Congo	2 370 054	36
Zimbabwe	2 298 412	48

Source: World Economic Forum (2021).

SADC Industrialization Strategy and Roadmap 2015-2063, six value chain clusters are identified: agroprocessing; minerals beneficiation and related mining operations; pharmaceuticals; consumer goods; capital goods; and services (SADC, 2017a). Establishing stronger regional value chains in these areas will require deep analysis along with significant regional cooperation, including in managing the trade-offs between countries, achieving regulatory alignment and coordinating infrastructure initiatives (Makgetla and Levin, 2020). This includes understanding how best to green these value chains through green technology adoption, process

innovation and, in some cases, new green and blue economy materials.

Micro-small and medium-sized enterprises in general play a limited role in value chains in SADC countries, but those that are women-led are particularly limited in their participation. The reasons for this include low productive capacities (both in terms of quantity and quality); limited access to market-driven information; infrastructure challenges, including unequal land accessibility; an unfair commercial environment; limited access to post-harvesting technologies in agriculture; and a lack of export competence (UN-Wom-



en, 2019). Expanding opportunities for women-led micro-small and medium-sized enterprises in the green and blue economies will require programmes to address these constraints on the participation of women-led businesses.

Beyond work to improve the capabilities of green and blue economy firms and to enhance adoption within prioritized value chains, non-tariff barriers must also be addressed. This is of critical importance to unlocking green and blue economy trade. Improving infrastructure in SADC countries can reduce costs for all firms and boost trade and

economic growth across the continent. Energy transmission and generation, roads, ports and payment systems are all of great importance. Transport costs are high, as are those resulting from regulatory and administrative bottlenecks.

Focusing on energy as a major source of greenhouse gases, Bah (2020) suggests that fundamental conditions for sustainable industrialization growth include increased energy efficiency and greater inclusion of renewable energy in the energy mix of SADC countries. Furthermore, medium- and high-tech manufacturing will need to be adopted

Table 6: Southern African Development Community rankings: global economic including green trade complexity indicators

SADC countries	Green complexity index, rank	Green complexity potential, rank	Economic complexity index, rank	Most proximate green product
South Africa	41	44	43	Sacks and bags, packing of jute and other bast fibres
Malawi	63	87	70	Surveying etc., instruments not elsewhere specified
United Republic of Tanzania	66	72	96	Sacks and bags, packing of jute and other bast fibres
Mauritius	78	56	89	Brooms and brushes of vegetable materials
Zimbabwe	79	82	75	Sacks and bags, packing of jute and other bast fibres
Madagascar	81	74	117	Brooms and brushes of vegetable materials
Mozambique	86	96	104	Jute and other textile bast fibres, raw or retted
Zambia	103	92	65	Sacks and bags, packing of jute and other bast fibres
Angola	120	122	112	Methyl alcohol

Source: Adapted from Mealy and Teytelboym (2020).



where possible, as it tends to be cleaner than low-technology manufacturing, creating less pollution per unit of value added and exports (Avenyo and Tregenna, 2020). Water resource use and waste policies will also need to ensure that increased industrialization is planned for and that circular economy strategies are employed to reduce negative effects.

In terms of green trade, Africa imported only \$20 billion of environmental goods and services between 2014 and 2018, which represents 3.6 per cent of its total imports and a mere 0.84 per cent of its total exports (UNDP, 2020d). SADC countries also perform poorly on trade in environmental goods and services. In a recent global analysis looking at countries' green complexity index, green complexity potential, economic complexity index and green adjacency potential or products proximate to existing exports, SADC countries ranked low, as they export few, mainly basic green products (Mealy and Teytelboym, 2020).

Note: It is worth considering that trade in natural products in SADC countries, such as traditional medicines, might not have been adequately captured in the global green trade taxonomies and calculations for this exercise. It is unlikely, however, that natural products derived from traditional knowledge would be considered highly complex products if they remain unbeneficiated.

Mealy and Teytelboym (2020) note a strong path dependence in the accumulation of green capabilities. They also find that the size of national green stimulus packages is linked to green trade performance and green capabilities. They indicate the potential for deliberate national green industrialization

programmes as one means of building green capabilities and, ultimately, exports.

Industrial programmes that build on existing capabilities in green and blue economy sectors and deepen these, while supporting so-called “economically adjacent” products and services, is a pragmatic approach to improving green and blue economy capabilities in SADC countries. This is similar to the first step of a blue economy approach proposed for countries in the South-West Indian Ocean region by Bolaky (2020) and one of the proposals within a case study of the green trade and industry potential of South Africa (Partnership for Action on the Green Economy, 2018).

The same South African case study also points to the potential of localization policies linked to government procurement programmes (a form of green stimulus) to support the development of green products and services for goods and services currently imported. The Renewable Energy Independent Power Producers Procurement Programme, in South Africa, is one example, although it also has lessons on the need for consistency in demand for the survival of localization-driven industries. Furthermore, industrial symbiosis based on existing industrial waste and by-products (in other words, adopting a circular economy approach) also holds potential (Partnership for Action on the Green Economy, 2018).

Although African countries might be not able to compete as exporters of certain green and blue economy goods and services, some countries might be able to export to others on the continent. The African Continental



Free Trade Area holds potential as a driver of continental trade in green and blue economy goods and services.

3.2.2 African Continental Free Trade Area

The African Union launched the Area on 1 January 2021 to address the continent's strong dependence on commodity exports. Exports from Africa to the rest of the world ranged from 80 to 90 per cent between 2000 and 2017, of which a large share was made up of commodities; intra-African exports in 2017 were only 16.6 per cent of total exports from Africa (UNCTAD, 2019b). In 2016, trade within each regional economic community was highest in SADC, at \$34.7 billion. Of the regional economic communities in Africa, SADC is the most integrated. Such trade preferences as the African Growth and Opportunity Act (with the United States of America) and Everything but Arms (with the European Union) have historically been directed at external high-income markets rather than neighbouring economies (African Union Commission and OECD, 2019).

At the session of the Assembly of Heads of State and Government of the African Union in December 2020, it was agreed that trade under the Area would commence from January 2021 and would be based on existing reciprocal offers until other phases and offers had been finalized. Negotiations to finalize the rules of origin, schedules of tariff concessions and schedules of specific commitments for the five priority service sectors (business services, communications, finance, tourism and transport) are ongoing, despite the initial deadline of June 2021. The deadline to finalize these negotiations is June 2021 (Tralac, 2021).

Other areas where negotiations are ongoing or will start relate to the development of protocols on competition policy and intellectual property rights, whereas the Protocol on Investment has been finalized. A third phase will involve the negotiation of an e-commerce protocol and a protocol on women and young people (Baliño, 2021). The largest trade bank in Africa, the African Export-Import Bank, will provide a \$1 billion financing facility to address tariff revenue losses as a result of the creation of the Area. An Africa-wide digital payment system is also planned (Hartzenberg, undated).

Intra-African trade will continue on multiple tracks while the adoption of the Agreement Establishing the African Continental Free Trade Area progresses. There should be increasing policy convergence and a simplification of rules across the different trading regimes (Hartzenberg, undated). This regional integration will ultimately lead to larger markets, which is key to attracting investors and improving productive capacities. By 2030, the total African market is estimated to rise to 1.7 billion, of which some 600 million people will be middle class (Bramdeo, 2018). This presents an enormous potential market for green and blue economy goods on the continent. ECA projects that the Agreement could lead to growth of 52 per cent in intra-African trade through the removal of tariffs, and of more than 100 per cent if non-tariff barriers are addressed (Luke and Sommer, 2020).

A range of non-tariff barriers to trade must be addressed, including at-the-border trade impediments (such as red tape and corruption) (African Union Commission and OECD, 2019). These obstacles are severe and need



to be addressed at the national and regional levels, rather than at the firm or cluster level. As indicated earlier, insofar as these barriers require investment in infrastructure, green and blue economy technologies and approaches must be prioritized.

While the Agreement does not explicitly refer to the green economy or the blue economy, the preamble refers to sustainable development as an objective. Like the SADC Action Plan for Industrialization (SADC, 2017a), which sets a target for the participation of small and medium-sized enterprises and proposes the establishment of support agencies for micro-small and medium-sized enterprises to, among other purposes, facilitate their integration into regional and global value chains (SADC, 2017), the African Continental Free Trade Area also has a stated objective of supporting inclusive growth, including advancing gender equality. Article 3 (e) of the Agreement has a stated objective to “promote and attain sustainable and inclusive socio-economic development, gender equality and structural transformation” (African Union, 2018). Furthermore, within the Protocol on Services, article 27.2 (d) states that the export capacity of formal and informal service suppliers should be improved, with a particular focus on micro-small and medium-sized operators and on service suppliers led by women and young people. As such, the Agreement prioritizes entrepreneurial opportunities, including for women and young people, within the Area.

Intra-African trade is key to the development of new capabilities by micro-small and medium-sized enterprises. Producing for regional markets allows small and medium-sized

enterprises to scale up their supply capacity and improve their marketing and distribution process in an environment that they know better (African Union Commission and OECD, 2019). A number of specific green economy, blue economy and micro-small and medium-sized enterprise considerations for negotiations and implementation under the Area include:

Reducing tariffs on environmental goods and services. As already indicated, there are complexities in defining green and blue economy goods and services. Given, however, that the green and blue economies are recognized as essential for the sustainable industrialization of Africa, countries in the Area could agree to an initial list of critical green and blue economy goods and services for the purposes of:

- Lowering tariffs on these goods and services. As member States finalize their tariff schedules, they should not exclude or place critical green and blue economy goods and services on sensitive lists (Luke and Sommer, 2020). Renewable energy technology inputs, such as turbines and photovoltaic systems, are clear examples (UNDP, 2020d), as are water equipment and devices. Furthermore, as negotiations start on transport and tourism, further environmental services could be considered for low tariffs.
- Tracking trade in these goods and services will develop an understanding of import and export patterns and barriers in key environmental goods and services.



Intellectual property rights and competition policy. Intellectual property provisions are not yet sufficiently well addressed in the SADC trade framework to mainstream economic integration (Nkomo, 2014). Negotiations on the Agreement Establishing the African Continental Free Trade Area present an opportunity to apply a consistent approach to intellectual property rights, make commitments to build capacity in institutions to safeguard such rights, and cooperate on important issues such as health.

At the same time, while intellectual property has a role to play in protecting firms' competitiveness, technology transfers of critical technologies should also be considered for green and blue economy micro-small and medium-sized enterprises in Africa and between countries in Africa. At the World Trade Organization, least developed countries have recently promoted the position that, instead of a focus on intellectual property, more effective technology transfer is required to enhance productivity and enable the sustainable and environmentally friendly development of new products (World Trade Organization, 2021a). A similar situation exists with the disparate levels of technology acquisition and adoption among the countries of the Area and among the SADC countries. Negotiations on the protocol on intellectual property rights should include a review the 45 recommendations included in the Development Agenda of the World Intellectual Property Organization, including in relation to technology transfer and micro-small and medium-sized enterprises, to assess how effectively the recommendations are being implemented and whether they could be applied to the Area.

For the adequate inclusion of the green and blue economies, it could be helpful for the provisions of the Agreement that address intellectual property rights to include steps to protect traditional knowledge, genetic resources and folklore (Abrie, 2019). Some green and blue economy innovations can be linked to traditional knowledge. As these sectors become more tradable in SADC countries, the rest of Africa and the entire world, these intellectual property rights need to be safeguarded, but they are not adequately catered for in various African free trade agreements (Balaram, 2018). The SADC Free Trade Area, for example, does not contain significant references to intellectual property related to traditional knowledge and does not contain significant protections of such intellectual property.

Competition policy is an avenue through which, in the context of the Area, illegal, unreported, and unregulated fishing and sustainable management of the blue economy can be countered more broadly (UNDP, 2020d).

Explicit support for micro-small and medium-sized enterprises in regional trade. Specific recommendations to support efforts by micro-small and medium-sized enterprises to participate in trade could be adopted by making information about trade, including on tariffs and regulations, more easily available. Countries should be encouraged to report more deliberately on the participation of such enterprises in trade. They should also be required to consider potential effects on enterprises before introducing new trade regulations and customs procedures, and to consider access to finance and cross-border payments. As such enterprises make up 80



per cent of service providers in Africa. Benchmarks should be developed to evaluate how the implementation of service commitments affects them (Ibo, 2021).

To ensure that informal cross-border trade benefits from the Area, operationalization of the Agreement must be accompanied by simplified trade regimes and improved customs cooperation in order to reduce trade costs and incentivize the transition to formality, where appropriate (UNDP, 2020d). Provisions of the Agreement could accommodate a small volume of consignments and implement specific trade permits and visa regimes for small traders. Provisions could also reduce other outlays such as value added tax and import and export taxes (UN-Women, 2020).

Furthermore, the designation of tariff lines deemed “sensitive” may provide some policy space in sectors in which small businesses that dominate production may suffer if imports quickly outcompete them (UN-Women, 2019);

Standards and certification in intra-African trade. Standards are important to protect human health and assure customers about quality and safety, but standards can also become impediments to trade, in particular for micro-small and medium-sized enterprises. They are the most common non-tariff measures in merchandise trade, as indicated by data from the Integrated Trade Intelligence Portal of the World Trade Organization (2021b).

Sanitary and phytosanitary agreements dealing with food safety and animal and plant health and technical barriers to trade dealing

with product standards and labelling have a direct bearing on trade in the green and blue economies in SADC countries and elsewhere. In the implementation of the Agreement, the sanitary and phytosanitary requirements and technical barriers to trade standards will need to be balanced with measures to facilitate access to regional value chains by micro-small and medium-sized enterprises. Regional value chains are an important entry point for these enterprises into trade, as they may have less focus on quality and certification than non-regional export markets (Kaplinsky and Morris, 2019).

To assist micro-small and medium-sized enterprises that are based in SADC countries and that trade in the Area in meeting standards, Governments can:

- Harmonize regional standards and accelerate the implementation of mutual recognition agreements. Such agreements help to reduce or eliminate the cost of retesting and recertifying goods, services and labour, enabling immediate entry into markets. SADC has such agreements in place, but implementation is slow (Sawere, 2019). The annex to the Agreement Establishing the African Continental Free Trade Area on sanitary and phytosanitary measures includes mutual recognition of standards, licensing and certification of service suppliers across the continent (UN-Women, 2019).
- Strengthen the capacity of knowledge-intensive agencies (laboratories, standards testing facilities and so forth, with regional reach and scope)



to help firms to enter regional value chains and remain there (Kaplinsky and Morris, 2019). Highly traded products would immediately benefit from this. In time, a set of standard testing institutions covering the entire SADC area could support traders in SADC countries. For now, a pragmatic, phased approach might involve bilateral arrangements on specific product lines, which, over time, might be extended to all SADC countries. Such agro-processing products as oilseeds, edible oil, oilcake, sugar, sugar confectionery and processed meat and fish could be some of the first products to be addressed in this manner (Paramoer, 2018).

Furthermore, many voluntary labelling and certification schemes exist that give goods and services a green stamp. “Organic” is one of the best-known green trademarks, and organic certification exists for many naturally derived commodities (UNCTAD, 2019c). Sustainable fishing, sustainable tourism and sustainable bioeconomy products also have labelling or certification schemes. For some middle-class global markets, this assurance is growing in importance. It is not clear, however, how important third-party certification is at present for consumers in SADC countries.

While markets for sustainably produced goods and services are growing in SADC countries and the rest of Africa, green certification – or eco-labelling – can be too expensive relative to its benefits for micro-small and medium-sized enterprises. Agencies supporting such enterprises can play an important role in providing business development services and in supporting green and

blue economy enterprises in upgrading their offerings. This could include financial support for access to standards and testing, but also labelling and certification schemes (where the business case for such labelling or certification exists).

Annex II contains information on Eco Mark Africa – an initiative to develop an Africa-wide eco-labelling scheme – and some of the approaches adopted and challenges encountered.

3.3 Technology and innovation

Innovation involves a new way of doing things – new processes, products and technologies (Mvulirwenande and When, 2020), and even new partnerships or systems. Within the conception of the fourth industrial revolution as the coming together of digital, biological and physical systems, technology has a prominent role. It brings new tools such as artificial intelligence, cloud computing, robotics, 3D printing, the Internet of things, and advanced wireless technologies (Ndung’u and Signe, 2020). Many new technologies rely upon or are enabled by ICT and related infrastructure. Investing in ICT for enablement is a critical strategy to upgrade value chains (World Bank, 2017).

In Africa, a number of recent digital policy developments have been made to address lagging and unequal digital access on the continent. These include the African Digital Transformation Strategy 2020–2030 (which outlines the development of a continent-wide digital single market by 2030); the situational analysis of digital trade and digital economy in



Africa (in which the author proposes a framework towards harmonized laws for the digital single market) and an e-commerce protocol to the Agreement to provide clarity on operational and regulatory issues and to act as a building block for the single market initiative (UNDP, 2020d).

3.3.1 Performance

Africa was the fastest-growing mobile communications economy in the world in 2019 (ITC, 2020b) and nearly half of all mobile money accounts in the world are in Africa. The growing use of mobile telephones, the Internet, computers and mobile networks has opened opportunities to implement various smart systems, such as smart water systems (Mvulirwenande, 2020). Furthermore, a number of underwater network cables connect the continent with the world and African economies with one another (ITC, 2020b). These connections notwithstanding, access to advanced technology in Africa is constrained by a shortage of electricity, poor Internet density, and limited broadband penetration (Ndung'u and Signe, 2020). ICT infrastructure is still not fully developed and a number of smaller economies still rely on old systems. For example, Internet bandwidth in South Africa is at least 30 times that of Lesotho, Malawi and Zambia. Furthermore, relatively high tariffs also restrict the digital economy in Southern Africa (African Union Commission and OECD, 2021), which hampers distributed technology solutions.

For enterprises, having a website is associated with a 5.5 per cent increase in the share of direct exports in their sales, but only 31 per cent of formal enterprises in Africa have a website (African Union Commission and

OECD, 2021). Because digital access is better in cities, five cities host 49 per cent of the 7,000 African start-ups: Cape Town, South Africa; Lagos, Nigeria; Johannesburg, South Africa; Nairobi; and Cairo. To respond to the potential of innovation, including technology uptake, a number of technology and innovation parks or clusters have been set up in other parts of the SADC area. In addition to those found in Cape Town and Johannesburg, there are 21 parks or clusters in the Democratic Republic of the Congo, seven in the United Republic of Tanzania, and four in Zambia (ITC, 2020b).

Start-ups in Africa are engaged in many sectors. The sectors with the most start-up investments are ICT and Internet services; Internet applications and software; audiovisual, broadcasting and publishing services; and hardware, robotics and manufacturing 4.0. In 2018, African technology start-ups raised almost \$1.2 billion in equity, compared with \$560 million in 2017, showing a marked growth in innovation (African Union Commission and OECD, 2021).

3.3.2 Prospects

Growth in the green and blue economies and a green recovery both require digitization to support them. Broadband Internet and digital services enable productivity across critical sectors, including agriculture, education, government and health care. Digital technology and services can power innovation and create jobs. In the energy sector, digitalization plays a key role in the monitoring and management of smart grids, in which end users produce their own energy and also supply the network with any excess power that they generate (United Nations, 2021a).



Nanotechnology is important for the green economy in Africa, including through improved crop yields and the use of solar cells and batteries for renewable energy infrastructure. African researchers are also using nanotechnology to add value to natural resources (such as biomass and minerals to produce nanomaterials) (United Nations, 2021a).

Despite the potential of biotechnology and the African capabilities in recombinant DNA techniques, tissue culture, mutagenesis, genomics and bioinformatics (ECA, 2015), large gaps still exist. Biotechnology has strong linkages with the green and blue economies, including through the many terrestrial and marine organisms. Developing biotechnology capabilities will require investment in scientific and technology skills and broader capabilities.

Green innovation centres can be put in place for specific sectors, such as in biotech and agriculture, to support increased farm productivity. Linked to this is the need to extend the work of research and development institutions in SADC countries to create a pool of green growth technical advisory experts. This area requires collaboration between government, the private sector, universities and civil society within national innovation systems and could result in regional programmes (Khisha, 2020).

Further considerations for technology and innovation for micro-small and medium-sized enterprises in the green and blue economies of SADC countries include:

- As already indicated, as SADC embarks on deeper industrialization

and regional integration, adoption of medium to high technology will be critical to build competitiveness and deepen value chains, but also to lessen the negative environmental impact of the economic growth, in particular the intensity of emissions (Avenyo and Tregenna, 2020). This requires a level of leapfrogging in technology acquisition.

- Despite some improvement, the lack of affordable digital access continues to hamper micro-small and medium-sized enterprises. The best digital access and technology systems in the SADC area are typically found in cities, thus posing a challenge to rural enterprises in agriculture, fisheries and forestry, among other sectors.
- Digital technologies are already disrupting traditional business models and government service delivery models. Examples of digital technologies in the green and blue economies include:
 - ♦ Data science, which can help in the planning of informal settlements and urban slums. The data can be facilitated by satellite imagery, which has many applications.
 - ♦ New technologies to monitor and manage resource use. For instance, smart meters and machine-learning systems can drive more efficient use of materials. See, for example, case study 36 in section 4.8.



- ♦ Technology to monitor and record species' populations, movements, utilization rates and health, such as drones and tracking devices or satellite imagery for agriculture, forestry and fisheries, etc. For example, a micro-small and medium-sized enterprise launched in South Africa to provide farmers with data obtained using drones and imagery is now a global medium-sized enterprise that supports growers and insurers alike with insights to improve productivity.⁸
- ♦ Technologies to create consumer market access for small producers through e-commerce and disintermediation. For example, during lockdown, the best-selling experience in South Africa on a large international travel website was an online shark diving experience in Cape Town.⁹ Another online business that connects farmers and buyers in South Africa through a digital trading and auction platform evolved to address food security needs during the COVID-19 pandemic (HelloChoice, 2021).¹⁰
- ♦ Technologies that explicitly link local informal producers with businesses for supply-chain purposes. (For example, see the case study on Kudoti in section 4.8 and the case study on Abalobi in section 4.5).
- ♦ Technologies to provide traceability in the supply chain. One such business recently launched in South Africa plans to use blockchain technology to provide a digital livestock identification system (Beefledger, 2021).
- Nanotechnologies have many green and blue economy applications and researchers and enterprises in Africa need to have access to this science and technology for innovation purposes and to leapfrog.
- New information and monitoring technologies may have a big impact on fisheries management. This includes the increased computing power of handheld devices; the proliferation of user-friendly Global Positioning System and Global Navigation Satellites System applications; increased capacity for big data storage, sharing

⁸ The company uses technology to quantify underperforming areas, running smart and efficient programmes, employing insights to manage workflows, investigate and intervene; to manage and maximize plant inventories and thus promote the visibility of the tree population; and to provide inspection data for insurers. The company works with the citrus, avocado, apple and nut industries (Aerobotics, 2021).

⁹ The experience, priced at 300 South African rand per person, had five-star ratings from teams and individuals from many international companies and organizations. All income from the online experience goes to the Rockhopper Fund, which supports education and awareness for healthy oceans. This digital blue economy online tourist experience demonstrates that technical know-how, combined with a unique setting and access to market through digital marketplaces can create business opportunities.

¹⁰ The platform offered farmers an alternative to wasting food by connecting them with registered charities to assist with programmes to feed vulnerable people. The programme redirected 270 tons of fresh produce from the waste pile and converted it into 830,000 meals, feeding 190,000 people.



and analysis; variety and improved durability of drones and low-maintenance radar stations; accessibility and accuracy of satellite imagery; continuous improvements in on-board digital cameras and recorders; expanded use of automatic identification systems and vessel monitoring systems, and the Internet at sea (Girard and du Payrat, 2017, p. 4).

- The manufacture, installation, servicing and maintenance of technologies that support climate-change mitigation and adaptation in SADC countries present a number of specific opportunities linked to demand for micro-small and medium-sized enterprises. Industrial programmes at a country or regional level should be explored with a view to producing some of the technology inputs locally and providing the skill sets already identified as priority needs for SADC countries during assessments of their technology needs by UNEP and the Technical University of Denmark.¹¹ The identified technologies include new production methods, equipment and machinery for the energy, water, agriculture, forestry and landscape rehabilitation (including marine and coastal landscapes) sectors. As the technology identification exercise is focused far more on the green economy than on the blue economy, there is scope for additional work to

be done to identify other sector-specific blue economy technologies and methods within the shipping, ports, ocean energy and mining, fishing and aquaculture sectors. The full list of technology needs identified is provided in annex III.

Young people dominate technology-related start-ups as entrepreneurs and employees alike. To create jobs and opportunities for the growing population of young people in Africa, far more needs to be done to increase digital access, skills and trade. Addressing ICT infrastructure backlogs and tackling emerging challenges requires coordination among SADC countries and at the regional level. New challenges for digitalization include taxation considerations, digital security, privacy, personal data protection and cross-border flows of data (UNDP, 2020). Girard and Bu Payrat (2017), in identifying challenges in digital technology uptake in the blue economy in fisheries management, also point to cost, complex data requirements, the challenges of sharing data and the skills shortage.

Governments need to make further investments in data literacy and in technical equipment and computer infrastructure. The African Union and OECD (2021) recommend spreading digital innovations beyond large cities, helping informal workers to become more productive and empowering enterprises for digital competition. This could drive inclusion and enhance the opportunities

¹¹ The partnership between UNEP, the Technical University of Denmark and research centres in SADC countries has already produced technology needs' assessments for both climate change mitigation and adaptation in those countries (UNEP and Technical University of Denmark, 2021). The South African climate change technology needs assessment of 2007 identified the provision of water supply and sanitation, new crop species and cultivars, energy-efficiency incentives, the control of the spread of vector-borne disease, information technology, solar power, and the promotion of the source reduction, recycle and reuse (Partnership for Action on the Green Economy, 2017).



for market access and innovation for all micro-small and medium-sized enterprises. Furthermore, supportive technology systems, with tech hubs, clusters of firms and access to skills can support digital innovation. These hubs often provide access to specialist skills and networks as well as market intelligence.

Along with trade and the potential of technology, new green and blue economy finance also creates impetus for the uptake of green and blue economies in SADC and among micro-small and medium-sized enterprises. Finance, in particular green and climate finance from development finance institutions, is considered below.

3.4 Funding of green and blue economies by development finance institutions

Development finance institutions have been identified as fundamental contributors to economic development that can place developing economies on a more climate-friendly and resilient development trajectory (UNCTAD, 2019a). The institutions perform this function by providing longer-term capital than that which is privately available and by directly or indirectly stimulating funding for important sectors and classes of firms such as micro-small and medium-sized enterprises.

It is difficult to arrive at a comprehensive picture of the development finance institution environment in Africa generally and SADC specifically for the green and blue economies and the role of micro-small and medium-sized enterprises within them. This is because there is no comprehensive and comparable

database of all multilateral, bilateral and national development finance institutions that provide finance in Africa, let alone a database by sector and firm type (such as micro-small and medium-sized enterprises). There is also no generally accepted definition of the green and blue economy sectors across multiple public and private lenders; there is limited detail about the financing dispensed by development finance institutions disaggregated by sector and firm type; and the geographical focus of the various studies of the issue differ (some focus on a certain area, such as the SADC countries or sub-Saharan Africa, and some on Africa as a whole).

The African Development Bank is the largest development bank in Africa, while the Development Bank of Southern Africa and the Industrial Development Corporation, both institutions of South Africa, play a significant role in both South Africa and the broader region, in particular the SADC countries. Overall, however, the development finance institution environment in Africa is fragmented, with a relatively large number of undercapitalized development finance institutions of limited scale. Africa hosts 95 such institutions, representing 21 per cent of development finance institutions worldwide but accounting for only 1 per cent of global development finance institution assets (Xu and others, 2020). Financial initiatives on the continent also include major programmes implemented by such intermediaries as Conservation International, the World Wide Fund for Nature and the like to broadly benefit green and blue economy uptake.

Development finance institutions operate in an environment in which they raise capital



from a range of public and private sources, including multilateral development banks, bilateral development finance institutions and private capital markets. This is taking place in a context of increasing commitments by private firms and funds to invest in more environmentally and socially effective ways (Shipalana, 2020).

Evidence suggests that there is mounting scale and scope – off a low base – of financing for green economy sectors, and to a lesser extent blue economy sectors, in which development finance institutions at multiple levels of operation play an important role. Much of this has been allocated towards large-scale projects, in particular utility-scale renewable energy.

The European Bank for Reconstruction and Development (2019) has recorded a sustained increase in annual commitments for financing climate adaptation and mitigation by seven¹² of the largest multilateral development banks. The commitments rose from \$27 billion in 2011 to \$61.6 billion in 2019. The bulk of the funding is sourced from the banks' own balance sheets. Sub-Saharan Africa accounted for \$7.4 billion of the 2019 funding commitments of the group of multilateral development banks referred to above. Although no detailed regional breakdown is provided of multilateral development bank disbursements, most of them flow to public recipients or borrowers. This suggests that a large proportion of multilateral development bank funding flows to regional and na-

tional development finance institutions for on-lending.

Bilateral lending in Africa exceeds multilateral lending. For example, in 2019, bilateral finance accounted for two thirds of such finance (Baker McKenzie 2020). It is not clear, however, what proportion of bilateral funding can be classified as green economy or blue economy funding. Two patterns stand out:

- Chinese lenders, both development finance institutions and private, dominated infrastructure finance in Africa between 2008 and 2020 (Baker McKenzie, 2020).
- By far the largest two categories of Chinese lending to Africa falls into two sectors: transport and power (China-Africa Research Initiative and Boston University Global Development Policy Center, 2021). To the extent that Chinese-financed investment in these sectors lowers emissions, for example, in the form of renewable energy and rail infrastructure, it contributes to green investment in Africa.

3.5. Funding by major multilateral development banks and national development finance institutions

3.5.1 African Development Bank

The African Development Bank¹³ has a number of green and climate finance programmes

¹² The African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the Inter-American Development Bank Group, the Islamic Development Bank and the World Bank (for further details, see African Development Bank and others, 2021).

¹³ See: www.afdb.org/en/topics-and-sectors/initiatives-partnerships.



in place. It also has finance programmes for micro-small and medium-sized enterprises and digital inclusion programmes, including the following:

- The Africa Climate Change Fund was established in 2014 with initial contributions of €11.4 million from Germany, Italy and the Flemish Region, Belgium. It supports Governments in Africa in developing climate resilience strategies, gaining access to climate finance and developing co-finance-associated programmes and projects.
- The Adaptation Benefit Mechanism has been piloted by the African Development Bank since 2019 to certify the social, economic and environmental benefits of adaptation activities and promote them to investors or lenders.
- The Africa nationally determined contributions hub aims to mobilize support for finance, capacity-building, technology development and transfer to assist member States in meeting their obligations under the Paris Agreement on climate change.
- The African Carbon Support Programme, with \$1 million in support from Japan, provides technical assistance in gaining access to carbon finance.
- The African Financial Alliance on Climate Change promotes climate action through knowledge-sharing, climate

risk-mitigating financial instruments, climate risk disclosure and climate finance flows.

- The African Guarantee Fund provides partial credit guarantees and capacity development to African financial institutions to incentivize investments in small and medium-sized enterprises.
- The Africa Digital Financial Inclusion Facility will deploy up to \$400 million in grants and loans to support various entities in scaling up digital financial services. The entities it supports include banks and non-bank financial institutions, mobile network operators, remittance and payment service providers, financial technology companies, government ministries, regulatory bodies and regional economic organizations (African Development Bank, 2021).

3.5.2 New Development Bank

The New Development Bank was established in 2016 with an authorized share capital of \$100 billion and initial equal capital contributions from each country totalling \$50 billion to build “a robust and diversified portfolio of sustainable infrastructure projects” in the group of countries comprising Brazil, China, India, the Russian Federation and South Africa, known as the BRICS countries. The Bank has extended \$1.16 billion in loans for projects classified as promoting clean energy, sustainable development and environmental protection to three entities in South Africa: two development finance institutions (the Development Bank of Southern Africa and the Industrial Development Corporation)



and the public electricity utility (Eskom)¹⁴ (New Development Bank, 2021).

3.5.3 Development Bank of Southern Africa

The Development Bank of Southern Africa has established a number of climate finance facilities aimed at developing sustainable and environmentally friendly infrastructure solutions. Key facilities that support finance in the Southern African region include:

- The Climate Finance Facility is a \$110 million fund launched in 2019 to incentivize private investment through long-term debt in low-carbon and climate-resilient infrastructure and to catalyse greater overall climate-related investment in Eswatini, Lesotho, Namibia and South Africa.
- The Bank is accredited to participate in funding networks such as the Green Climate Fund and the Global Environment Facility.
- In March 2021, the Bank launched its first green bond through a €200 million private placement with the French Development Agency. Eligible projects include those in the area of renewable energy, low-carbon public transport, waste management and water and ecological infrastructure.
- A green fund was created when the National Department of Forestry, Fisheries and the Environment of South Africa placed 800 million rand with the Bank to support the tran-

sition to a low-carbon, resource-efficient and climate-resilient development path. Funding windows are available for green cities and towns, low-carbon economies and environmental and natural resource management (Development Bank of Southern Africa, 2021).

3.5.4 Industrial Development Corporation

The Industrial Development Corporation has a number of funding programmes and lines of concessional finance linked to the green economy, including:

- Green Energy Fund, backed by the French Development Agency, which supports investment in solar and biomass and in energy-efficiency projects
- Placement of a 5 billion rand green bond with the Public Investment Corporation in 2012 (Industrial Development Corporation, 2021)

3.5.5 Other sources

Other sources of innovative green and blue economy finance in SADC countries include the following:

- In 2018, the Government of Seychelles, with assistance from the World Bank, issued a \$15 million blue bond to finance the growth of its fishing sector through sustainable fishing practices and marine protection. It issued the bond with three objectives: sustainable expansion of its fishing within its marine protected areas; fisheries management planning and insti-

¹⁴ Author calculations from project data: www.ndb.int/projects/list-of-all-projects/.



tutional capacity; and value addition for the blue economy, including from aquaculture, industrial, semi-industrial and artisanal fishing and processing. The programme has been administered by the Seychelles Conservation and Climate Adaptation Trust, which has disbursed \$3 million, and the provision of loans by the Development Bank of Seychelles (Seychelles Conservation and Climate Adaptation Trust, 2021).

- In May 2021, the International Finance Corporation provided a private financial services group with a loan of up to \$150 million to support its strategy to expand its climate finance business and to help South Africa to meet its greenhouse-gas reduction targets. The group will provide lending for biomass and other renewable projects (ABSA, 2021).

3.5.6 Micro-small and medium-sized enterprise green and blue economy finance

Access to finance is the main issue facing micro-small and medium-sized enterprises (Disse and Sommer, 2020). In a recent analysis, it was estimated that close to half of micro-small and medium-sized enterprises in the developing world lack access to finance (either fully or partially), with severe financing shortages experienced in African countries. The severity of the problem varies across regions and is particularly high in sub-Saharan Africa, where it is estimated that 60 per cent of these enterprises need a loan but have no access to loan finance (Amoussou, Karagueuzian and Bah, 2021). The enterprises cannot fulfil their

full potential, since they are disproportionately affected by institutional and market failures, primarily their limited access to finance.

Most development finance institutions include lending to micro-small and medium-sized enterprises as part of their mandate or vision (Xu and others, 2020), but there are few details of disbursements by firm size and sector. In practice, access to finance remains the main challenge facing these enterprises. This is in part because micro-small and medium-sized enterprises require public policies that provide integrated access to financial services and business advisory and management services. Evidence shows that, for such enterprises to prosper, these services should be combined (Uusiku, 2019).

Windows or lines of green and blue economy finance for micro-small and medium-sized enterprises, in particular technologies and sectors, can support a more systematic approach to building participation by these enterprises in the green and blue economies. A number of examples exist of specific green and blue economy sectoral or subsectoral finance programmes for micro-small and medium-sized enterprises in SADC:

- The Southern African Renewable Energy Investment and Growth Programme was launched in June 2019 with a view to designing and implementing an approach to preparing, bundling and structuring investments in clean-energy projects by small and medium-sized enterprises in Namibia, the United Republic of Tanzania and Zambia (International Climate Initiative, 2021a).



- The Ministry of Finance of Eswatini plans to mobilize climate finance at a national level for smallholder farmers and rural micro-small and medium-sized enterprises and to pair this with training support (Alliance for Financial Inclusion, 2020).
- In Seychelles, the Central Bank of Seychelles, together with the Ministry of Finance, provides interest rate subsidies to micro-small and medium-sized enterprises through a loan scheme under the Seychelles Energy Efficiency and Renewable Energy Programme. Preferential terms for beneficiaries include a contribution of only 2.5 per cent of the loan amount, the waiving of certain administrative fees, and a grace period granted for repayments (Alliance for Financial Inclusion, 2020).
- In partnership with the World Bank and the Graduate School of Business of the University of Cape Town, the GreenCape development agency created the Green Outcomes Fund, which is a programme designed to incentivize fund managers to invest more in micro-small and medium-sized enterprises in the green economy (GreenCape, 2021a).

As evidenced by the above examples, there appear to be accelerating amounts of green and blue economy finance across a range of finance providers on a multilateral and bilateral basis in Africa. The multitude of programmes and vague definitions of green and blue economy finance make it difficult to fully track these finance flows. Considerable scope

exists for greater coordination and even consolidation of the funding by development finance institutions of programmes and projects in the green and blue economies at the country and regional level.

While micro-small and medium-sized enterprises for the most part are not the focus of existing funding, programmatic approaches with special windows, offerings or provisions for such enterprises can help to galvanize efforts and support their inclusion. Such funding should be tied to non-financial support, such as capacity-building, which is critical for the success of such enterprises.

More can also be done to provide access to information for micro-small and medium-sized enterprises on the green and blue finance landscape, the different categorization of projects and their eligibility as green or blue. Green financial taxonomies can help in this regard (Alliance for Financial Inclusion, 2020). South Africa recently produced a green finance taxonomy as a draft discussion document.

3.6 Growth in market demand

A number of global, regional and national trends are driving demand for green and blue economy goods and services from end consumers, businesses and governments alike. This builds the business case for micro-small and medium-sized enterprises to invest in providing these goods and services. Examples of this process include:

- Lead firms in global and regional value chains are complying with vari-



ous global initiatives on voluntary emissions reductions, sustainability standards and environmental, social and governance expectations from shareholders and lenders. Lead firms pass these requirements through their supply chains to their suppliers (World Bank, 2017; UNDP, 2020d). Furthermore, global corporate social investment is also often aligned with green and blue economy principles (although the economic linkages are not always as direct).

- Countries that have contributed the most to climate change, largely found in the global North, have an obligation – and have made commitments – to transfer technologies and investments to climate change programmes in Africa.
- Country incentives and disincentives, aligned with commitments under the United Nations Framework Convention on Climate Change, are resulting in policy measures such as carbon taxes and in positive incentives for green and blue economy activities. One example in South Africa is the tax incentive for landowners who manage their land as a protected area (Stevens, 2020).
- Extended producer responsibility regulations in certain countries require firms to take responsibility for the impacts of their products¹⁵ (Department of Forestry, Fisheries and the Environment, 2021a).
- Some consumers have perceptions of improved health outcomes from the consumption of sustainable agriculture products, including organic food, and of organic or chemical-free pharmaceuticals and cosmetics. There is also a growing global awareness of environmental and social injustice. Increasingly, consumers want assurances that the products that they purchase have been produced sustainably (Nielsen, 2018). This is linked to market appeal and brand positivity.
- Declining costs such as falling prices for renewable energy make this form of energy increasingly attractive to industry and households. Laws such as those on feed-in tariffs can further enhance the business case for industry and households (GreenCape, 2021b).
- Security of supply can be met by green and blue economy goods and services where utility services are unreliable and these inputs are critical for industry or for households (GreenCape, 2021b).
- Underserved dispersed demand can be met by green and blue economy services, in particular for rural communities or businesses located far from infrastructure services. In these instances, off-grid renewable energy, water and waste services can provide access to infrastructure services.
- Green and blue economy finance

¹⁵ See the South African Regulations Regarding Extended Producer Responsibility (R.1184), published on 5 November 2020. Available at www.factssa.com/news/newly-published-epr-regulation/.



has created new streams of concessionary funding that can support the adoption of green and blue economy technology.

- Enterprise support systems often focus on sustainability innovations. National cleaner production systems also support the uptake of clean technology.
- Demand for traditional natural products remains high and the traditional health market is vibrant in SADC countries. While not fully regulated or labelled “green”, these nature-based goods and services are already actively sold and traded in SADC countries, including across borders.
- Government procurement programmes that auction green and blue economy goods and services to private sector parties to support infrastructure provision drive investment in green and blue economy goods and services. Consistent demand in these programmes is critical to ensure that micro-small and medium-sized enterprises can build and maintain viable businesses.

Altogether, these different drivers of market demand for green and blue economy goods and services represent significant market potential. The drivers are likely to accelerate as the global trend for sustainable goods and services grows (UNDP, 2020d). Furthermore, micro-small and medium-sized enterprises that wish to trade, or participate in, global and regional value chains will increasingly be expected to meet certain green and blue economy standards or conditions. For countries supporting micro-small and medium-sized enterprises working in the green and blue economies, building clusters and industries of these goods and services will support competitiveness and create market opportunities.

3.7 Main findings

Green urban industrial potential, the African Continental Free Trade Area, technology and innovation, green and blue finance and many drivers of market demand support the growth of the green and blue economies in SADC countries and create an environment in which opportunities arise for micro-small and medium-sized enterprises. Specific sectoral opportunities and constraints also exist. These are further explored in chapter 4 below.

Sectoral opportunities for micro-small and medium-sized enterprises in the green and blue economies

4.1 Green and blue economy sectors with the broadest potential for micro-small and medium-sized enterprises

Conceptually, the green and blue economies straddle different sectors, activities, value chains, technologies and skills. There is also variation within and between green and blue economy sectors and across the SADC countries. Urban and rural contexts also differ and micro-small and medium-sized enterprises display different characteristics too. All this means that the literature on and examples of micro-small and medium-sized enterprises are extensive. For this reason, a conceptual lens has been used to refine the sectors considered in the present report that offer green and blue economy opportunities for such enterprises. A two-step approach has been employed:

- First, the SADC green economy strategy, SADC blue economy concept note and SADC action plan for the industrialization strategy and framework have been compared. Sectors in which there is the greatest alignment in approach have been identified (table 7 shows the three strategies and their focus on sectors).
- Second, the aligned sectors are further analysed in terms of the extent to which micro-small and medium-sized enterprises participate in undertaking the primary activities (the sectors in which most enterprises are large technology- and capital-intensive firms have been excluded).

4.1.1. Comparison of the three documents of the Southern African Development Community

In the green economy strategy of SADC, key sectors and actions are identified based largely on the efficient and sustainable use of materials and also on waste reduction. In contrast, the blue economy concept note identifies sectors and (descriptively) points to the opportunities within them, while the SADC industrialization action plan clearly identifies key value chains and products and services within them:

- Tourism and fisheries appear in all three documents. The phrasing used in the green and blue economy documents is similar, whereas in the SADC industrialization action plan, no tourism or fisheries products or subsectors are identified.



- Biotechnology and biodiversity also appear in all three documents. The SADC green economy strategy and SADC industrialization action plan both classify biotechnology and biodiversity businesses in the forestry sector, whereas the blue economy concept note links such businesses to the marine environment.
- Energy, mining and manufacturing, which also appear in all three documents, receive different treatments. In the SADC industrialization strategy, fossil fuels and traditional mining operations are included in the priority value chains of the SADC industrialization strategy, while seabed or sub-marine mining is included as a sector in the blue economy concept note, along with offshore gas and oil. In the green economy document, the focus is on renewable energy and energy efficiency, green manufacturing, resource productivity and sustainable mining practices. The SADC industrialization action plan identifies a number of pharmaceutical manufacturing processes, and also some in leather and footwear and some in clothing and textiles.
- Waste is considered in some detail in the green economy strategy, but to a much lesser extent in the blue economy concept note, in which it is mentioned only in relation to ballast water from shipping and hull fouling.
- Water receives some attention in the green economy strategy but none in the SADC industrialization action plan or the blue economy concept note.
- Human settlements receive some consideration in the green economy strategy. In the SADC industrialization action plan, both cement and soda ash are identified as priority value chains, but in the mining and manufacture categories, not in terms of human settlements. The blue economy strategy does not mention human settlements.
- For agriculture, the focus of the green economy strategy is on farming methods and inputs, with no particular products being highlighted, while the focus of the SADC industrialization action plan is on prioritized crops and other products.



Table 7: Comparison of three strategic approaches of the Southern African Development Community to the green economy, blue economy, and prioritized industrialized value chains

Green economy sectors and strategies	Blue economy concept note sectors		Agroprocessing	Industrialization sectors and prioritized value chains
<p>Agriculture</p> <p>A.1. Support water supply and conservation</p> <p>A.2. Promote the use of adaptive agricultural technologies and techniques and provide incentives for the development of green agribusiness</p> <p>A.3. Promote land-use planning practices</p> <p>A.4. Promote working landscapes with ecosystem services to improve agro-biodiversity</p>	-	-	<p>Agroprocessing</p>	<ul style="list-style-type: none"> • Soya, sugar, cassava • Meat products (beef, poultry) • Dairy products • Horticulture products (flowers, fruit and vegetables) • Other foods and drinks (maize, rice, oil seeds, black eye peas) • Wildlife products (game meat and hide processing)
<p>Water</p> <p>W.1. Enhance the integrated management of shared watercourses</p> <p>W.2. Increase water-use efficiency</p> <p>W.3. Enhance and sustain ecosystems</p> <p>W.4. Preserve, upgrade and increase monitoring, data analysis and management</p> <p>W.5. Strengthen capacity in disaster risk reduction</p>	-	-		

Green economy sectors and strategies		Blue economy concept note sectors		Industrialization sectors and prioritized value chains
<p>Forestry and biodiversity</p> <p>FO.1. Plan and implement sustainable forest management</p> <p>FO.2. Increase protected areas in number and coverage</p> <p>FO.3. Provide tax benefits and subsidies for the development of agroforestry</p> <p>FO.4. Support the development of biotrade</p>	<p>Biotechnology</p> <ul style="list-style-type: none"> Explore the potential of using marine biotechnology to address a suite of global challenges, such as sustainable food supplies, human health, energy security and environmental remediation 	<p>Forestry</p> <ul style="list-style-type: none"> Timber and non-timber forest products (medicinal, cosmetics, essential oils and other herbal products) 		
<p>Fisheries</p> <p>F.1. Promote the sustainable use of fisheries resources</p> <p>F.2. Promote green aquaculture</p> <p>F.3. Strengthen implementation of regional fisheries agreements</p> <p>F.4. Improve data collection and dissemination systems for fisheries resources</p>	<p>Fisheries</p> <ul style="list-style-type: none"> Implement ecosystem-based approaches Remove subsidies that drive overexploitation Use sustainable management systems Aquaculture Reduce the proportion of industrial fish in fishmeal 	<p>Fisheries</p> <p>(Appears under "Agriculture")</p>		
<p>Energy</p> <p>E.1. Support the use of renewable energy</p> <p>E.2. Promote investment in energy efficiency</p> <p>E.3. Improve energy infrastructure and access to electricity</p> <p>E.4. Reduce deforestation for energy purposes</p>	<p>Energy</p> <ul style="list-style-type: none"> Perform deepwater oil drilling Harness methane hydrates Generate renewable energy – wind, wave, tidal, biomass, thermal conversion and salinity gradients 	<p>Energy minerals including polymers</p> <ul style="list-style-type: none"> Oil, gas, coal and uranium in various countries 		



Green economy sectors and strategies	Blue economy concept note sectors		Industrialization sectors and prioritized value chains
<p>Manufacturing and mining</p> <p>M.1. Promote the reduction of the amount of natural resources needed to produce finished goods (resource productivity)</p> <p>M.2. Reduce negative externalities associated with waste and pollution</p> <p>M.3. Reduce climate change impacts on manufacturing infrastructure</p> <p>M.4. Support the development of green manufacturing sectors</p> <p>M.5. Promote the adoption of sustainable mining practices</p>	<p>Sub-marine mining:</p> <ul style="list-style-type: none"> Explore the potential riches of polymetallic nodules, cobalt crusts and massive sulfide deposits, the latter being a source of rare earth elements, such as yttrium, dysprosium and terbium, which are important for new ICT hardware and renewable energy 	<p>Minerals and beneficiation cluster</p>	<ul style="list-style-type: none"> Ferrous metals (iron and steel) Base-metal minerals (copper, aluminium, nickel and cobalt) Fertilizer Diamonds Platinum Cement Soda ash Mining machinery Small-scale mining <p>Pharmaceuticals and preparations cluster</p> <ul style="list-style-type: none"> Antiretrovirals Anti-tuberculosis drugs Antimalarials (Artemisinin) Condoms Bednet value chains Health commodities (–syringes; intravenous infusions fluids; surgical equipment; laboratory reagents and materials; methylated spirit) <p>Manufacturing: consumer goods cluster</p> <ul style="list-style-type: none"> Leather, leather goods and footwear Clothing and textiles

Green economy sectors and strategies		Blue economy concept note sectors		Industrialization sectors and prioritized value chains	
Waste	<p>WAS.1. Support the building and maintenance of wastewater and solid-waste management facilities</p> <p>WAS.2. Strengthen controls on the disposal of hazardous waste and e-waste and promote waste recycling</p> <p>WAS.3. Support the improvement and regional harmonization of municipal solid-waste management schemes</p> <p>WAS.4. Promote waste recycling, reuse and reduction</p>	<ul style="list-style-type: none"> Address the issues of invasive aquatic species from ballast water and hull fouling (taken from the "Shipping and port facilities" section below) 	-		
	<p>TR.1. Promote investment in climate-resilient transport infrastructure and the relocation of infrastructure exposed to climate change impacts</p> <p>TR.2. Promote green public transport networks and multimodal transport</p> <p>TR.3. Encourage regional trade for (energy-efficient) low-emitting vehicles</p>				



Green economy sectors and strategies		Blue economy concept note sectors		Tourism	Industrialization sectors and prioritized value chains
Tourism	<p>T.1. Promote the reduction of resource intensity in the tourism sector</p> <p>T.2. Support the protection of natural habitats and ecosystems</p> <p>T.3. Adapt the tourism sector to current and expected climatic changes</p>	Tourism	<ul style="list-style-type: none"> Ecosystem services are properly valued and incorporated into development planning Lower impact activities, such as ecotourism and nature-based tourism 	Tourism	
Human Settlements	<p>C.1. Support the reduction of urban resource consumption</p> <p>C.2. Discourage unsustainable housing and settlement practices</p> <p>C.3. Promote investment in public transport systems</p> <p>C.4. Reduce climate change impacts on cities</p>			(From the "Minerals and beneficiation" cluster)	<ul style="list-style-type: none"> Soda ash Cement

Source: SADC (2015, 2017a, undated).



4.1.2. Identifying sectors where micro-small and medium-sized enterprises are engaged in primary activities

Utility-scale energy, mining and much of manufacturing, in particular those value chains prioritized in the SADC industrialization action plan and strategy, such as pharmaceutical products, rely on large firms (given the capital, technology and skills intensity of their production). There is limited participation by micro-small and medium-sized enterprises in primary activities.¹⁶ It is possible that, in the future, more opportunities will be created for such enterprises as suppliers of inputs. This would require government policies to shift more towards the localization of inputs for renewable utility-scale energy and clean transport, and for sustainable production methodologies increasingly to take hold across manufacturing.

Based on the first and second steps identified above, the following sectors have been selected for analysis of opportunities for micro-small and medium-sized enterprises:

- Agriculture (including agroprocessing and food)
- Fisheries and aquaculture
- Tourism
- Bioeconomy, including forestry and bioprospecting
- Renewable energy

- Water and sanitation
- Waste and materials efficiencies (including the building materials aspect of human settlements)

Waste and water have been included as sectors offering potential for micro-small and medium-sized enterprises, despite only being a focus in the SADC green economy strategy. The reduction of waste and water use underpins the critical environmental and social dimensions of sustainable development across all industries and for this reason warrants inclusion. In addition, in the case of waste, this sector already demonstrates enormous potential for innovation by micro-small and medium-sized enterprises, of which there are countless examples.

Manufacturing is critically important for sustainable industrialization. For this reason, an industry case study has also been included on the clothing and textiles industry as it is prioritized within the SADC industrialization action plan. In addition, in the analysis of the renewable energy sector, reference is made to the potential of micro-small and medium-sized enterprises in the utility wind energy value chain. Furthermore, processing case studies are included in the agriculture, fisheries, bioeconomy and waste sectors. General recommendations from a recent ECA report on the greening of manufacturing in Africa are also shown below in box 4.

¹⁶Data on companies in the African, Caribbean and Pacific group of countries demonstrate that manufacturing and chemical and chemical products are more reliant on large companies (ITC and WTO, 2014).



Box 4: Recommendations on manufacturing

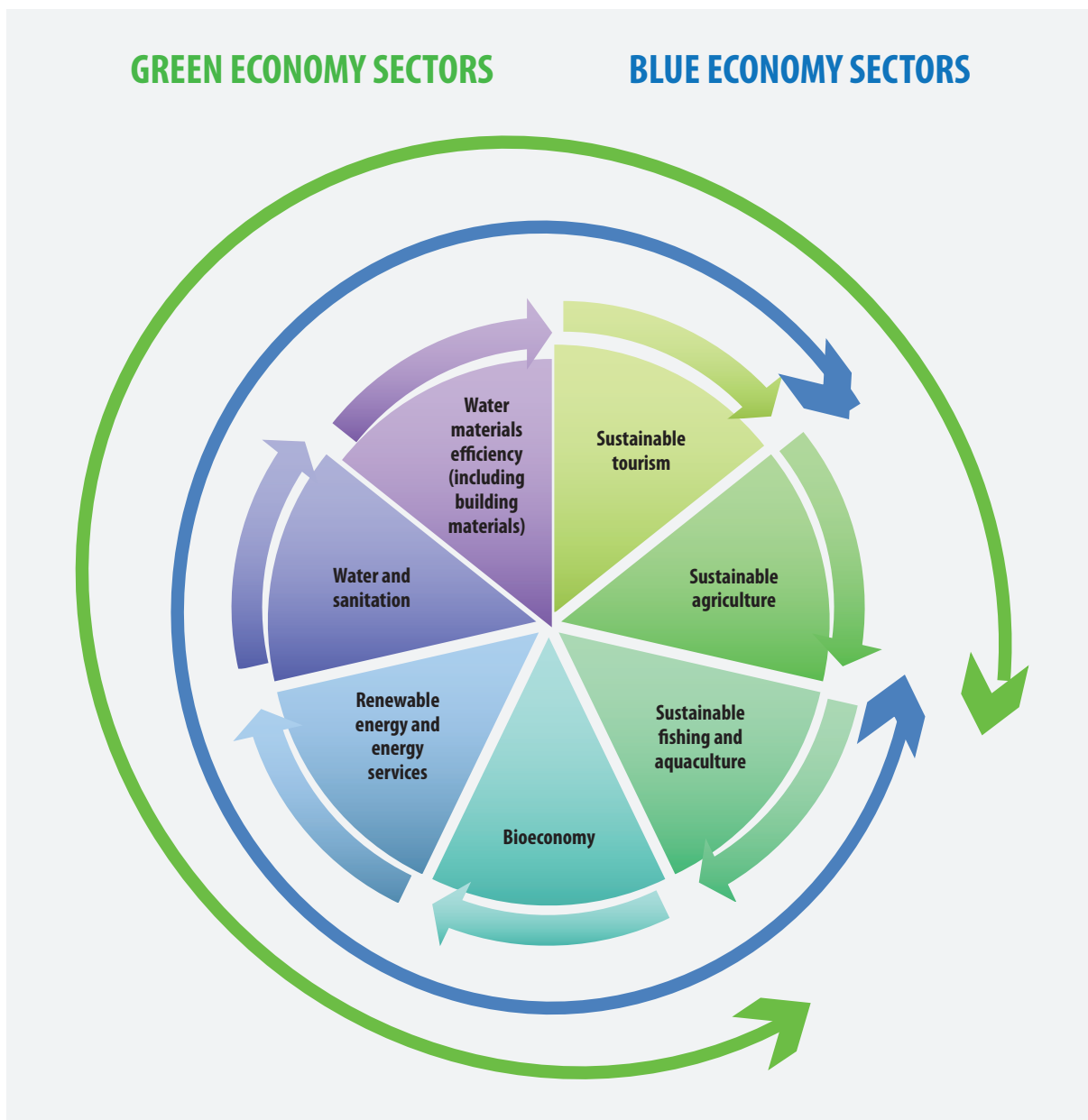
- Develop policies to help incentivize the adoption of circular business models among private sector firms through economic and market-based instruments and strategies, such as providing these firms with easier access to finance and tax incentives, developing procurement policies that include resource-use efficiency criteria, and enabling industrial symbiosis
- Develop voluntary or binding mechanisms to help mainstream circularity in business models through the promotion of design and material reuse standards, certification schemes, labelling requirements, and extended producer responsibility
- Provide institutional support to circular business models by developing indicators and targets for resource efficiency, harmonizing regulations on the use of waste and materials, developing skills, enabling partnerships between key resource users, and conducting research and development
- Ensure occupational health and safety in the processing of waste and promote research on material flow patterns and international best practices
- Make use of behavioural insights to facilitate greater demand from consumers for resource-efficient products and services, including through green labels, consumer awareness and education campaigns, and feedback mechanisms
- Promote the practical aspects of green industry, such as by adopting cleaner, more resource-efficient production methods; green and circular economy manufacturing practices; waste and by-product exchange through industrial symbiosis; pollution prevention measures; eco-efficiency measures; and the 4R philosophy of reducing, reusing, recovering and recycling waste
- Establish the green technology databanks that will accelerate clean technology transfer to the region's manufacturing sector
- Work towards the conversion of traditional and wasteful industrial parks into green, circular, and resource-efficient eco-industrial parks that adhere to green growth principles and that provide such sustainable infrastructure solutions as clean-tech renewable energy solutions in the form of solar, wind and biomass applications

Source: Summarized from Khisha (2020).

All the sectors selected for analysis of their micro-small and medium-sized enterprises have relevance to both the green and blue economies, apart from sustainable agricul-

ture, which is exclusively a green economy sector, and fisheries and aquaculture, which is exclusively a blue economy sector.

Figure VII: Green and blue economy sectors included in the analysis of micro-small and medium-sized enterprises



Source: Author's compilation.

4.2 Sustainable agriculture

4.2.1 Context

Agriculture contributes 16 per cent to the GDP of Africa and remains the dominant sector for livelihoods and employment in most

areas (African Development Bank, 2019). Many farmers in SADC countries are small-holders and struggle with inputs, water and access to market. Although women participate in agriculture in SADC countries and make up about half the labour force in agriculture and agroprocessing (UNDP, 2020d),



they seldom control assets or make decisions (Tizora, 2021).¹⁷

Food imports have been on the rise and, simultaneously, agriculture has become a significant source of export earnings for many SADC countries. Agricultural exports already operate under existing regional free trade agreements, such as the Southern African Customs Union and SADC.

With rapid urbanization under way, consumers are purchasing more processed goods and doing more of their shopping at supermarkets. Kaplinsky and Morris (2019) point to the growth of South African supermarket chains in the region as an area of potential for increasing regional trade among micro-small and medium-sized enterprises. Although these stores are still supplied mainly with products from South Africa, local supply is steadily increasing. Governments are pressurizing the supermarket giants to expand their domestic supply from local firms and farms. It is not clear, however, how green these value chains are. For more detail on supermarkets in the region and the potential for local suppliers, see annex V.

It is estimated that African agriculture is responsible for 90 per cent of deforestation on the continent and two thirds of its greenhouse-gas emissions. For this reason, climate-smart agriculture and nature-based solutions must be prioritized. The COVID-19 pandemic has highlighted the central role of integrated food systems that are resilient and

adaptive. Furthermore, these require strong governance and well-connected farm and market infrastructure (ECA, 2021a).

Sustainable agriculture can produce multiple agricultural products and improve land health, reduce water use and create climate resilience to increasing variability in rainfall. Developing broader and deeper markets in SADC countries is also an essential part of mitigating the risks associated with climate change. Nurturing these agricultural markets requires an understanding of the facilitating investments required for each product value chain in irrigation, storage, transport, insurance, financing and price discovery (Paramoer, 2018).

Furthermore, the water-energy-food nexus is a critical consideration in planning for agriculture, which currently accounts for the bulk of freshwater withdrawals in SADC countries. Improved water productivity is required, which means reducing water use and water losses in agriculture. Smallholder farms can use rainwater harvesting and farming methods that conserve water in the soil, for example intercropping. Microirrigation systems also offer potential, as does investment in ecological infrastructure and small dams (Mabhaudhi and others, 2018).

Sustainability trends in agriculture in the region include:

- An increasing focus is being placed on soil health, with a move towards

¹⁷ For example, in Malawi and Mozambique, women and young people are the main contributors to primary agricultural production and value addition but have little decision-making power. In Zambia, women also have limited control over farming and restricted access to land, training and financial services. In South Africa, women have greater opportunities to participate in agricultural value chains as industry associations on commodities often offer training and business development to stakeholders, including women (Tizora, 2021).



conservation agriculture,¹⁸ regenerative agriculture, mixed cropping and intercropping. These farming methods increase soil health through water-holding capacity, soil carbon, soil organic matter and microbial activity (GreenCape, 2020).

- Landscape management and agriculture are intertwined. Rangelands management for cattle has been adopted in a number of SADC countries as an approach to landscape improvement. One example is a Conservation International project introduced in Botswana to provide social and economic benefits and improve the health of its ecosystems, as well as to reduce the country's greenhouse-gas emissions. Announced in April 2021, it will service so-called "last-mile communities", which farm on non-tenured village grazing areas. A rangeland stewardship portal will be developed to collect a range of data for decision-making (Green Climate Fund, 2021). Similarly, a successful intermediary business in South Africa provides extension services, cheaper inputs (through bulk purchasing),

training, online auctions and other services to rural cattle farmers to promote enhanced rangelands management (Meat Naturally, 2021).

- A shift of focus to agroforestry – an ancient practice – is also being supported for increased resilience to climate change. Agroforestry systems are deliberate combinations of at least two differing plant types or, in the case of silvopastoral systems, of plants with animals, in which one component is always a woody perennial (Sheppard and others, 2020).
- Undercover farming¹⁹ is increasing, with rapid growth in the use of netting²⁰ and tunnels, in particular for export fruit (GreenCape, 2020).
- Urban agriculture is critical, as food is needed to fuel expanding cities and towns. While there are a few examples of more technologically advanced urban agriculture,²¹ such as hydroponic rooftop production,²² there are many examples of both larger- and smaller-scale urban farming in various SADC countries, from food gardens to

¹⁸ A green jobs assessment model developed by the International Labour Organization showed that investments in conservation agriculture in Zimbabwe would create up to 30,000 jobs for every 1 million United States dollars invested (Lee, 2021).

¹⁹ There are opportunities for manufacturers and suppliers of: steel; plastic (especially polyethylene, which is mostly used in South African tunnel production); netting; hydroponic equipment, including pumps and pipes; growth medium (such as gravel, sawdust and peat); air conditioning and lighting; and automation systems and ICT solutions (GreenCape, 2020).

²⁰ Over the period 2017–2018, an additional 2,822 hectares of shade netting was added in the Western Cape Province of South Africa (GreenCape, 2020).

²¹ A South African business that manufactures and supplies container farms to smallholder farms, refugee camps and disaster agencies also manufactures market-leading full-spectrum LED growth lamps for controlled-environment farms, both locally and abroad. More than 2,000 tons of food was grown under the company's lamps in 2020, and the company had received more orders from local players supplying some of the largest food retailers in South Africa (Silicon Cape, 2021).

²² An urban agriculture business grows premium-quality, fresh wet hops hydroponically for the restaurant, craft brew and oil extract markets (SEED, 2021f).



farms.²³ Regulations should support urban agriculture.

- Precision agriculture is emerging as a farming approach that requires expert advisory services, including software development and such remote technology as sensors, drones and satellite imaging (GreenCape, 2020).
- In addition to digital solutions for precision agriculture, digital technologies can also establish end-to-end connection²⁴ of the supply chain using Internet of things sensors and radio-frequency identification tagging. They can provide automating equipment in operations and generate accurate weather, crop, planting, cultivating, harvesting and pricing data, and they can share critical agricultural assets (United Nations, 2021a).
- Wildlife ranching for game meat is big business and can support the sustainable utilization of wildlife. Challenges include the shortage of definitive studies or up-to-date and accurate data on the industry and the seemingly large illegal game meat market, in which the food is sold without complying with sanitary and phytosanitary standards and other standards and regulatory requirements (Snyman and others, 2021).
- Different kinds of marketplaces exist for food sales, including informal traders who provide food close to home and are part of the fabric of urban life in many SADC cities but who are often highly vulnerable (Raimundo and others, 2020). In addition, other marketplaces are also emerging and many are digitally enabled and online.
- Global movements against synthetic chemicals, as well as regulations relating to certain pesticides in some countries, mean that major food multinationals are requiring their suppliers to move towards sustainable agricultural practices (GreenCape, 2020).
- The business case for renewable energy sources and renewable inputs for agriculture is driven in part by declining costs (GreenCape, 2020).
- There is growing recognition of the economic opportunities associated with agricultural waste as organic fertilizer, an energy source, material for bioplastics and other by-products, and animal feed. This circular economy approach to waste is increasingly being adopted. Case studies based on organic waste may be seen in section 4.8.
- Food waste is a major global issue. Precise data are not available for

²³ The Assessing and Planning City Region food system of the Food and Agriculture Organization of the United Nations indicates that, in Lusaka, 60 per cent of food is produced in the city-region area. Recommendations include shifting to conservation agriculture, stable access to inputs, an improved transport network, better storage facilities, on-farm processing facilities, strong controls over brokers, a multi-stakeholder body to oversee the food system, and the inclusion of women and young people (FAO and RUAF, 2019).

²⁴ For example, food traceability can allow producers and manufacturers to track items for supply-chain management purposes.



SADC countries, but in South Africa much of the food waste is generated in the supply chain before it reaches the consumer. This indicates that improvements are needed in refrigeration, transport, labelling, warehousing and other such segments of the food chain. One innovative business with seven retail outlets in South Africa sells non-perishable food that is past its best-before date but is still safe for consumption, thereby diverting it from disposal as waste (Rivett-Carnac and von Bormann, 2018).

- Certified organic agriculture has been a fast-growing global business. Many small-scale farms in SADC countries are organic by default, as they use few external inputs, but do not have access to the growing organic market owing to certification costs (Sanches-Pereira and others, 2017).

4.2.2 Case studies

The case studies that follow include cashew trees for reforestation, sustainable soya farming, agroprocessing, regenerative agriculture, extension services and intercropping.

Table 8: Sustainable agriculture case studies

Name of case study	Country	Product or offering	Type of micro-small and medium-sized enterprise or micro-small and medium-sized enterprise opportunity	Technology used
1. Mootoo Cashew Suppliers Ltd.	Zambia	Reforestation using farmers conversion to cashew trees	Small business supporting the conversion of farmers from charcoal production to cashew trees	Hybrid cashew trees
2. Walali Company Ltd.	Mauritius	Food processing factory	Small business undertaking agroprocessing, providing market offtake to multiple small-scale fishers and farmers	Agroprocessing using retort pouches Solar water heating at the factory Encouraging rainwater harvesting among farmers and fishers
3. Sustainable soya bean farming	Mozambique	Sustainable soya farming	Small-scale farmers supported by lead farmers	Cell phones Bicycles Training
4. Farmer Angus	South Africa	Regenerative agriculture	Established small and medium-sized enterprise	Regenerative farming Pasture management Carbon sales
5. East African Fruit Farm and Company	United Republic of Tanzania	Food processing, marketing access for farmers and extension services	Intermediary supporting small-scale farmers	Solar power Biodiesel
6. Biogenesis Organic Sweet Potatoes	Zimbabwe	Organic products	Intermediary providing market access, inputs, skills, etc., to female outgrowers and running a sales business	Conservation agriculture Biofortified vines Tissue-cultured planting
7. Sehatry ny Mpamokatra Landy Ifotony (Organization of Wild Silk Producers – SEPALI), a community-based silk producers associations	Madagascar	Intercropping and forest protection through silk production requiring indigenous trees	Intermediary working with farmers and microenterprises and providing training and market access	Unique non-spun silk textiles



Case study 1: Mooto Cashew Suppliers Ltd – cashew trees (Zambia)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
Zambia	Cashews	Reforestation with hybrid drought-resistant cashew trees Converts charcoal burners to cashew farming	Intermediary services – selling trees to assist with reforestation	Product replacement

Mooto Cashew Suppliers Ltd. sells hybrid cashew tree seedlings with an early maturity period and very high yield. This has won them a large market from local farmers and the Government.

The project is being implemented in the Western Province of Zambia, which is highly affected by deforestation caused by charcoal burning, the main source of livelihoods in the area. It is aimed at reforesting the area with hybrid drought-resistant cashew trees with an early maturity. This will enhance the region's ecosystem and provide a viable alternative livelihood to its resident communities.

Cashew farming offers an alternative livelihood to charcoal burners. Since 2015, some 500 trees have already been planted, absorbing 24,000 pounds of carbon dioxide per annum and supplied 3,000 trees to government-funded local farmers, absorbing 144,000 pounds of carbon dioxide per annum. As at 2021, the company employed 26 part-time staff and helped to generate income of about \$1,346 per annum for each farmer.

Source: SEED (2021a).



Case study 2: Walali Company Limited – food processing (Rodrigues, Mauritius)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
Mauritius (Rodrigues island)	Agroprocessing of octopuses and red beans	Contracts with small-scale suppliers include sustainability requirements Food processing preserves the product	For small-scale suppliers and fishers (50 artisanal octopus fishers; 10 red bean farmers) Agroprocessing	Retort pouch technology Solar water heater at processing facility Rainwater harvesting at suppliers

Walali Company Limited creates a value chain for agroprocessing on the island of Rodrigues. Octopuses and red beans are purchased and processed locally. Contracts are established with individual small-scale suppliers who meet sustainability criteria and ensure a secure market and guaranteed prices for these suppliers.

The retort pouch technology increases the availability of these perishable goods and reduces production and shipping costs. Adding value to bean-based products promotes organic agriculture and the preservation of local food traditions.

Walali Company stimulates the local economy in a variety of ways, including by:

- Promoting artisanal fishing, preserving traditional bean production and creating local production jobs in values-based businesses

- Providing income opportunities for the local community in the production factory and as suppliers of raw materials

- Strengthening Rodriguan identity by preserving the traditional cultivation of beans

- Increasing local the availability of a seasonal grocery

- Encouraging sustainable fishing and lagoon protection by respecting octopus recovery times and relying on artisanal fishing methods

- Tackling water scarcity by promoting rainwater harvesting among suppliers

- Fighting climate change by using a solar water heater for the production site

- Supporting stimulation of the local economy and independence from the main island of Mauritius by contracting local suppliers-- 50 for octopuses and 10 for beans

- Reducing shipping costs and energy needs through the introduction of the new retort pouch technology

Source: SEED (2021b).



Case study 3: Sustainable soya bean farming (Mozambique)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
Mozambique	Soya bean	Sustainable soya farming	Small-scale farmers Lead farmers	Cell phones Bicycles Lead farming training Local demonstration plots

Demand for soya beans – one of the priority value chains in the industrialization strategy of the Southern African Development Community – is growing in Southern Africa. Soya production and use in Mozambique are increasing rapidly, but farmers often lack access to inputs and knowledge on the production practices needed to improve productivity.

Grow Africa; the sustainable trade initiative IDH; and Solidaridad set up a programme across Angonia and Gurué districts in Mozambique to support smallholder farmers by promoting soya and soya seed production and by strengthening the local supply chain through engagement with smallholder farmers for improved social and economic development. Training will be held on finance literacy, business skills, seed multiplication, sustainable soya production and the sustainable use of pesticides.

Lead farmers will be the key conduits for upgrading of capabilities. After receiving training, farmers transfer knowledge to others in the group. Each lead farmer has a demonstration plot and mentors an average of 40 other farmers. The lead farmers receive inputs and additional support for land preparation and weeding control, as part of their compensation, and they are equipped with a bicycle and a smartphone to keep records of their farming activities.

Source: African Union Development Agency (2021)



Case study 4: Farmer Angus – regenerative agriculture (South Africa)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
South Africa	Primarily beef	Regenerative farming Processing	Farmers	High-density grazing Carbon credits as one source of finance

Farmer Angus is one of two producers of beef from grass-fed, pasture-reared cattle in the Western Cape Province. Biodynamic and regenerative agricultural principles and practices are applied in the raising of the farm animals, which include cattle, pigs and laying hens, as well as in vegetable growing and winemaking. Situated on 126 hectares of irrigated pasture at the Spier Wine Estate near Stellenbosch, their charcuterie, made by Gastro Foods, is the only charcuterie in South Africa cured without added nitrates or nitrites.

All Farmer Angus products are 100 per cent free from growth hormones and routine antibiotics; the pig and chicken food is glyphosate-free. According to its website, the vineyards have been certified organic every year for the past 8 years. The owner of the business achieved a world first in 2013 when he became the first person in the world to sell carbon credits after he increased the carbon content of the pastures where his cattle graze. The sensitive pasture management of the farm is based on a high-density grazing methodology. The pastures were established with a variety of perennial summer and winter legumes, herbs and grasses. Once an area has been grazed, the animals are moved, giving the pasture and soil time to regenerate and fully recover. A minimum of six weeks passes before the pastures are grazed again. The cattle are moved three times a day, the pigs once a week and the laying hens, which are accommodated in constructed egg-mobiles, are moved daily.

Source: Farmer Angus (2021).

Case study 5: East African Fruit Farm and Company – agroprocessing (United Republic of Tanzania)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
United Republic of Tanzania	Fruit and vegetables	Processing and intermediary services	Agroprocessing	Solar power Biodiesel Borehole Greenhouses

East Africa Fruit Farm and Company buys fruits and vegetables from smallholder farmers and processes them in cold storage facilities and through professional handling. The company uses solar power and biodiesel for irrigation and greenhouses, cooling and transportation. Some farmers work on their own land; others participate in a small-scale franchise model, cultivating the enterprise's ready-prepared land, which uses drip irrigation.

The enterprise generates income for communities by employing 20 local staff and working with 70 farmer families. It also provides access to water for local communities through a drilled borehole and greenhouses.

Source: SEED (2021c).



Case study 6: Biogenesis-- organic sweet potatoes (Zimbabwe)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
Zimbabwe	Organic sweet potatoes	Organic product Conservation tillage Crop rotation Plant cover Vermicompost	Outgrowers and sales teams Actively supports women and young people	Biofortified vines Tissue-culture planting materials Vermicomposting from earthworms

Biogenesis Organics Sweet Potatoes sells through multiple channels, including door-to-door sales, farmers' markets, supermarkets and roadside stalls. Vines are sold directly to other farmers for their cultivation. The company also provides the opportunity for women and young people to become outgrowers of sweet potatoes.

The enterprise practices conservation tillage, crop rotation, and uses plant cover and vermicompost from earthworms.

Source: SEED (2021d).

Case study 7: SEPALI silk production supporting forest protection (Madagascar)

Country	Product or offering	Sustainable agricultural practice	Type of micro-small and medium-sized enterprise opportunity	Technology used
Madagascar	Silk Specialty textiles	Moths from indigenous trees Restoring forest health Intercropping	Farmers Community-based groups Actively supports women	Intercropping Processing of silk for non-spun textiles

SEPALI provides technical and financial assistance to farmers and community-based enterprise groups in Madagascar. Wild silk is derived from moths raised on indigenous trees. This encourages local farmers to conserve biodiversity and also creates incomes.

SEPALI teaches farmers how to intercrop the host plant for wild silk moths on their farms, how to rear the larvae and how to process the silk and produce unique, non-spun textiles.

These silks are sold as speciality textiles in the European Union and the United States. This creates jobs along the value chain and at the same time rehabilitates damaged areas in the border forests of the Makira Protected Area through the planting of host plants for the silk moths.

Women participate in this project and are able to access the opportunity without owning farmland. Land degradation is halted thanks to a viable income source provided by intercropping and the moths.

Source: SEED (2021e).

Sustainable agriculture									
Main points	micro-small and medium-sized enterprise opportunities								
<p>1. Rural infrastructure programmes are needed to provide smallholder farms with irrigation, transport access and storage, among other services. Access to irrigation and resilient seed varieties will be critical to protect farmers from climate change.</p> <p>2. Regulations are needed to support urban agriculture, regulate wildlife ranching (once data sets are in place), and support informal food traders. Policymakers can also do more to support the diversion of organic waste from landfills and farms to suitable organic composting sites. Country and product research is necessary to propose the best context-specific ways to support diversion and beneficiation of agricultural waste and determine which standards, if any, might need to be introduced (together with supporting conditions). Agricultural waste has the potential to be diverted into a range of products. For non-perishable food, obsolete stock can be sold at highly discounted rates. Biodiesel and bioethanol can be used for energy sources. Organic compost can be produced and sold back to farmers and other markets.</p> <p>3. There is a range of extension services operating in the region as private businesses and as donor-funded programmes. Farming associations and cooperatives also play a role. These services are also opportunities in their own right for micro-small and medium-sized enterprises, where innovative business models can be developed.</p> <p>4. In terms of market access, the expansion of regional shopping centres might increase access to markets for local producers, but this will require support services to help local suppliers to meet new standards and requirements. Other markets also present opportunities: informal markets for small-scale traders remain important, and online markets operate in areas where digital access and uptake are available along with distribution services.</p> <p>5. A number of specialist skills are needed to support many of the newer higher-tech forms of sustainable agriculture. There is an opportunity to support the development of service-based micro-small and medium-sized enterprises that can provide these skills in the region, while also upskilling farmer networks and working with lead farmers in communities and developing other ways of transferring these skills. A programme to coordinate skills development in universities and technical schools across the countries of the Southern African Development Community could improve the development of skills in those countries (thus reducing the need to import such expertise).</p> <p>6. Various inputs are required, and opportunities exist for micro-small and medium-sized enterprises to provide these. This includes everything from seed production and storage to netting, organic fertilizer production, tissue cultures, and possibly even orchard tractors, including electric models. In addition to their manufacture, the installation, servicing, leasing and maintenance of these inputs also provide a number of opportunities for micro-small and medium-sized enterprises.</p> <p>7. ICT systems and digital services offer the potential to monitor crops, manage inventory and trace agricultural and food goods. Micro-small and medium-sized enterprises can offer the services.</p>	<table border="1"> <thead> <tr> <th>Examples: inputs</th> <th>Examples: services and skills</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> Containers for farming LED lamps Hydroponics Improved seed production and conservation Netting and tunnels Pumps, pipes, growth medium ICT solutions Automation Seed and grain storage systems Rainwater harvesting and conservation Biofortification Tissue-cultured planting Packaging technologies Microirrigation and drip irrigation – including sprinklers Local integrated pest-management technologies Traceability systems Drones </td> <td> <ul style="list-style-type: none"> Agricultural extension services Advisory services for cooperatives Plant clinics – disease diagnosis services Mobile veterinary services Farmer associations Online aggregator platforms Digital peer-to-peer farming networks Food processing factories Data sciences Microgrid and minigrid water installation expertise </td> </tr> <tr> <th>Examples: market access avenues</th> <th>Examples: approaches</th> </tr> <tr> <td> <ul style="list-style-type: none"> Regional supermarket expansion in SADC countries Informal vendor fresh produce markets Digital and online markets and payment and ordering services Online and physical auctions Obsolete stock retail Meal kits Food delivery services </td> <td> <ul style="list-style-type: none"> Regenerative farming Urban farming Urban forestry Wildlife ranching Conservation agriculture Precision farming Rangelands management Mixed cropping Agroforestry Afforestation and reforestation </td> </tr> </tbody> </table>	Examples: inputs	Examples: services and skills	<ul style="list-style-type: none"> Containers for farming LED lamps Hydroponics Improved seed production and conservation Netting and tunnels Pumps, pipes, growth medium ICT solutions Automation Seed and grain storage systems Rainwater harvesting and conservation Biofortification Tissue-cultured planting Packaging technologies Microirrigation and drip irrigation – including sprinklers Local integrated pest-management technologies Traceability systems Drones 	<ul style="list-style-type: none"> Agricultural extension services Advisory services for cooperatives Plant clinics – disease diagnosis services Mobile veterinary services Farmer associations Online aggregator platforms Digital peer-to-peer farming networks Food processing factories Data sciences Microgrid and minigrid water installation expertise 	Examples: market access avenues	Examples: approaches	<ul style="list-style-type: none"> Regional supermarket expansion in SADC countries Informal vendor fresh produce markets Digital and online markets and payment and ordering services Online and physical auctions Obsolete stock retail Meal kits Food delivery services 	<ul style="list-style-type: none"> Regenerative farming Urban farming Urban forestry Wildlife ranching Conservation agriculture Precision farming Rangelands management Mixed cropping Agroforestry Afforestation and reforestation
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Source: Adapted from Khisha (2020); GreenCape (2020a); UNEP and Technical University of Denmark (2021); University of Stellenbosch Business School Careers Services (2020).



4.3 Sustainable tourism

4.3.1 Context

Travel and tourism is an important source of foreign exchange earnings, jobs and micro-small and medium-sized enterprise opportunities for most SADC countries. Overall in 2019, travel and tourism in SADC countries contributed a total of 7.2 per cent to GDP, along with 6.9 million jobs. Seychelles is the country in the area in which the sector contributes the highest share of GDP (40 per cent in 2019), followed by Mauritius, Namibia, Botswana and Lesotho, in that order (see table ix9:). South Africa, the leading tourist destination in the region in terms of total visitor expenditure, earned \$9 billion from tourism in 2019 (World Travel and Tourism Council, 2020).

In SADC countries, like elsewhere in the world, micro-small and medium-sized enterprises dominate the tourism landscape. These enterprises create an enormous variety of experiences and facilities for a range of tourists for multiple kinds of travel (business trips, holidays, visits to friends and relatives, and so forth) and for many different interests and budgets. Parts of the tourism value chain, such as informal food vendors, craft workers and tourist guides, present relatively low barriers to entry for entrepreneurs.

Statistics from South Africa show that women tend to dominate employment in the accommodation, food and beverages and handicraft industries in tourism, but are less likely

to own businesses than men. Young people are active in the creative industries, providing art and other cultural experiences and products. Men dominate employment in the tourist passenger transport industry, particularly ground transport.

Many leisure tourists travel to SADC countries to experience nature-based tourism, and tourism is a particularly important source of income for protected areas, helping to fund biodiversity conservation. In total, the value of the wildlife safari industry in Africa is estimated at between \$12.4 billion (direct) and \$42.9 billion (total) (Snyman and others, 2021).

The SADC Tourism Programme 2020–2030, approved in 2019, includes a programme on transfrontier conservation areas (SADC, 2019).²⁵ Transfrontier conservation areas exist in most SADC countries, including the South-West Indian Ocean islands (although work on the Western Indian Ocean marine park is still at the conceptual stage). The conservation areas reflect the shared conservation value of natural assets that straddle international boundaries and can contribute to the conservation of biodiversity and the welfare and social and economic development of rural communities. They also demonstrate regional integration, including through tourism itineraries and trips (SADC, 2021b). For this reason, they represent a very good example for green and blue economy tourism in action across borders.

²⁵ Considerable planning and infrastructure development work has already gone into developing the 18 transfrontier conservation areas in SADC countries. The conservation areas are at different stages of development. This territorial approach is driving integration by using shared ecosystems as the basis for geographical logic and has great potential to support subregional tourism offerings. A common tourist visa for all SADC countries would further promote subregional packages.



Table 9: Economic impact of tourism in the countries of the Southern African Development Community, 2019

Country	Contribution of travel and tourism to the economy in 2019 (percentage of gross domestic product, including indirect and induced impacts)	Jobs in 2019	Percentages	International visitor impact (millions of United States dollars)
Angola	3	436 300	(3.6)	276.
Botswana	12.6	92 300	(10.9)	1 100
Comoros	10.1	22 700	(10.4)	79
Democratic Republic of the Congo	1.8	464 500	(1.8)	36
Eswatini	5.5	17 300	(5.8)	11
Lesotho	12.3	92 900	(12, 6)	24
Madagascar	11.8	752 900	(12.2)	943
Malawi	6.7	525 900	(6.8)	433
Mauritius	18.8	104 200	(19.1)	2 017
Mozambique	6.6	667 600	(6.7)	2445
Namibia	14.7	114 600	(15.4)	443
Seychelles	40.5	20 600	(43.8)	642
South Africa	7	1 483 000	(9)	9 000
Zambia	7	469 700	(7.2)	849
Zimbabwe	6	160 700	(6.2)	197
United Republic of Tanzania	10.7	1 550 100	(11.1)	2 666

Source: World Travel and Tourism Council (2021).

Recreational or sport hunting is a specific tourism market. It is linked to wildlife ranching and game meat sales and represents an important market in SADC countries, where it generates considerable income for businesses and communities alike. Legal hunting plays an important role in supporting communal conservancies in a number of SADC countries, including Mozambique and Namibia (Snyman and others, 2021).

4.3.2 Coronavirus disease and tourism

In 2020, tourist arrivals to Africa declined by an estimated 75 per cent (World Tourism Organization, 2021). Restrictions on travel between countries saw many borders closed for some time, although they began to open up in 2021. Many countries introduced quarantine rules for departing or arriving travellers, requirements on recent negative polymerase chain reaction tests, travel bans and red lists in an effort to limit the spread of COVID-19. The travel bans, travel advisories and red lists



constituted non-tariff barriers of sorts and overtook visa requirements as disincentives to travel. These major barriers to tourism should have been dealt with bilaterally and multilaterally.

South Africa is the gateway for air passengers travelling to the southern mainland SADC countries, with many flights from outside the region landing at O.R. Tambo International Airport, in Johannesburg. The huge impact of COVID-19 globally, including in South Africa – and more recently, the negative publicity regarding the 501Y.V2 variant, which was first described by South African researchers (Karim, de Oliveira and Loots, 2021) resulted in a period of negligible foreign business or leisure tourism in the country, beginning in March 2020.

As a response to the huge decline in tourism incomes in and around protected areas in SADC countries, a new initiative was launched by the World Wide Fund for Nature and the Global Environment Facility. The initiative brings together African nature-based tourism enterprises, conservation areas and local communities and is expected to provide crisis funding²⁶ (Vorwerk, 2021).

4.3.3 Other trends

The following trends may also be identified in tourism in SADC countries:

- Tourists are increasingly seeking connections with natural places, as well

as authentic and responsible travel. COVID-19 seems to have amplified this trend. This presents an opportunity for SADC countries that offer extensive nature-based experiences.

- Adoption of responsible tourism practices (for green and blue economy tourism) is increasing, as is the measurement of such practices by a number of government standards and by voluntary tourism certification schemes. For example, Botswana Tourism, a government agency, undertakes sustainable tourism certification, as does an equivalent body in Seychelles and private sector bodies in Namibia and the United Republic of Tanzania. The Governments of Mauritius and South Africa each have formal standards for sustainable tourism. Other private certification and tourism labelling schemes also exist in SADC countries (Spenceley, 2018).
- Tourism transport businesses rely heavily on fossil fuels. Aviation is associated with high greenhouse-gas emissions. SADC countries that rely on long-haul tourist markets may in time become more expensive or less attractive, owing to a combination of carbon taxes and eco-conscious market sentiment (Gössling and Higham, 2020). Hospitality operations have negative effects, since they generate

²⁶ The project implementers will mediate between enterprises and communities and funders. Components include data collection (including through an online data clearing house that collates data on the situation and makes it available), enhanced knowledge-sharing, the facilitation of proposal development and the submission of the proposals to donors. It is hoped that the project will mobilize at least \$15 million. Botswana, Kenya, Malawi, Mozambique, Namibia, Rwanda, South Africa, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe are the included countries and community-based natural resource management partners will be partners in each of these countries to provide access to information and on-the-ground support.



large volumes of food waste and use large amounts of plastic. Water use by accommodation enterprises can also be heavy: tourists typically consume far more water per capita than local people, in particular in the developing world (Becken, 2014).

- Nature-based tourism is often located far away from infrastructure services and many lodges at beaches or in wildlife areas have had to provide their own infrastructure. Some of these enterprises rely on rooftop solar power, off-grid waste systems, and boreholes and rainwater tanks. In some areas, wildlife lodges also use electric safari vehicles and boats, which provide the added benefit of being quieter than diesel-powered vehicles.
- The need to diversify tourist markets in Africa includes attracting different overseas source markets, building and supporting regional markets, encouraging domestic tourism markets and targeting high-growth market segments in all the above. The African Continental Free Trade Area has the potential to open up markets and support regional tourism and packages for regional tourists.
- Regional business tourism growth will be driven by the Area as trade and investment linkages increase across the continent, requiring travel for business purposes and for meetings, conferences and exhibitions (as the risks from COVID-19 are increasingly managed) (Sudarkasa, 2021).
- Diversification from high-end leisure tourism into other parts of the tourism market, such as self-drive regional leisure tourism, will be important for mainland SADC countries, in particular those that can attract travellers from South Africa.²⁷
- Developing regional tourist markets and experiences in SADC countries requires easier movements across borders, a single visa system for overseas tourists, simplification of rules relating to tourist guides crossing borders, and other infrastructure services such as better road and air transport infrastructure. In discussing the Protocol on Trade in Services of the Agreement Establishing the African Continental Free Trade Area, Ogo (2021) suggests that best practices and harmonization from the regional economic communities could serve as a guiding principle in this endeavour and points to the common tourist visa of the East African Community available in Kenya, Rwanda and Uganda and the Kaza visa offered by Zambia and Zimbabwe as best practices.
- Access to markets for many wildlife tourism offerings is created through specialized travel agencies and tour operators and these intermediaries

²⁷ South Africa is already an important market for its neighbouring countries, with outbound travel (for all purposes) valued at 84 billion rand in 2018 (Rivett-Carnac, 2021). It was an even more important market when travel restrictions were in place in many countries.



are likely to continue to play an important role in selling tourism to Africa. At the same time, a number of major online travel agencies and other major aggregators have disrupted these traditional market access models, as described below:

- ♦ A major international online broker for short-term accommodation provides assurance to potential consumers that the micro-small and medium-sized enterprises whose services they sell on their platform are credible. In so doing, it can disburse benefits and democratize the tourism dividend by enabling such enterprises to access markets and by providing an easier transaction capability. This is enabled digitally, as tourists are increasingly researching and booking holidays and trip components (flights, accommodation, etc.) online.
- ♦ A medium-sized business in South Africa has developed a significant market presence in South Africa by providing integrated inventory management and booking services for smaller accommodation properties, including bed and breakfast establishments, guest-

houses, guest farms, and so forth. It is currently expanding into other SADC countries.

- ♦ Marketing publications that target specific markets and products can also be developed by micro-small and medium-sized enterprises, which can derive income from advertising, sponsorships, commissions from bookings and so forth. Content producers are increasingly important, as many would-be tourists, in particular young people, follow influencers on social media. Business opportunities exist here too.

4.3.4 Case studies

The following case studies on sustainable tourism businesses in SADC countries are drawn largely from winners of the World Travel Market responsible tourism awards, as provided by the Responsible Tourism Partnership (2021). These businesses are recognized as global best performers in sustainability. The case studies include accommodation, attractions and activity providers. It is important to note, however, that many tourism businesses have been hard hit by the COVID-19 pandemic, so it is not clear that all the businesses featured in these case studies are currently operational or offering the same services.



Table 10: Sustainable tourism case studies

Case study	Countries	Sustainable tourism focus	Type of micro-small and medium-sized enterprise or micro-small and medium-sized enterprise opportunity	Technology used
8. !Khwatla San Culture and Education Centre	South Africa	San heritage centre – traditional knowledge	Heritage and cultural tourism	Traditional knowledge linked to the natural world
9. Dorobo Tours and Safaris	United Republic of Tanzania	Operation of small lightweight mobile camps and safari vehicles and generation of income for local villages	Business case for sustainable land management	Work with local village authorities Structured income agreements
10. Nkwichi Lodge	Mozambique	Solar-powered, plastic bottle-free lodge that supports lake protection and creates social and economic opportunities	Small lodge	Solar-powered, plastic bottle-free, and supporting sustainable agriculture and aquaculture in the area
11. Chobe Game Lodge	Botswana	Ec lodge, biogas, greywater recycling and electric vehicles, including safari viewing boats	Ec lodge and supporting technologies	Various green technology and local employment and outreach practices.
12. All Out Africa	Eswatini, Mozambique, South Africa	Volunteer tourism focused on ecological research, data generation and training	Tour operating with volunteer tourists	Data collection Intermediation
13. Book iBhoni tours	South Africa	Bicycle tours with local expertise	Bicycle tours	Bicycles Local knowledge



Case study 8: !Khwa ttu –San heritage site (South Africa)

Country	Service or experience	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Heritage attraction	Local knowledge	Visitor attraction based on unique heritage	Local knowledge

!Khwa ttu empowers and supports San people across Southern Africa through heritage and education initiatives. It is the only extensive heritage centre for San people and was entirely co-curated. Resident San elders and guides introduce performances and experiences. !Khwa ttu plays an important role in ensuring the maintenance and development of San knowledge, culture and traditions in the modern world. It has become a popular tourist attraction located one hour outside Cape Town, South Africa.

Source: !Khwa ttu (2021).

Case study 9: Dorobo Tours and Safaris – ecocamps and tours (United Republic of Tanzania)

Country	Service or experience	Sustainability practice	Nature of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
United Republic of Tanzania	Mobile camps and safari vehicles	Conservation through tourism income to communities	Tour operation	Community partnerships

Based in the north of the United Republic of Tanzania, Dorobo operates small lightweight mobile camps and safari vehicles. Over the years, the company has assisted community partners in securing 23,500 hectares of their land for traditional hunting and gathering. Along the Maasai steppe, over 27,000 hectares of grassland is being sustainably managed by the local communities for livestock and wildlife grazing. Communities are able to derive income, as the basis of the agreements is managed through legal certificates to the land and transparent tourism contracts. There are 14 contracts in place with local villages, which benefit more than 50,000 people. Communities earn this income, which helps them to address such issues as agricultural encroachment, charcoal production and settlement on the land.

The way in which the business works is through such local community structures as village governments. The tourism agreements are set up for five years and are in keeping with local laws and customs. Guaranteed annual income is one of the principles and this makes it possible for the community to engage in planning. In addition, in 2018, Dorobo Safaris was also able to create direct employment for community members in hosting customers in addition to other full-time employment posts that exist for locals in the company's operations.

Source: Responsible Tourism Partnership (2021a).



Case study 10: Nkwichi Lodge – ecotourism lodge (Mozambique)

Country	Service or experience	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Mozambique	Ec lodge	Solar-powered lodge Plastic bottle-free	Ec lodge	Various clean technology applications

Nkwichi Lodge is located in Mozambique on Lake Malawi. The operations are completely solar-powered and plastic bottle-free. The lodge helps to conserve the lake – the world’s most biodiverse freshwater lake – and 120,000 hectares of lakeshore and escarpment. This is achieved through partnerships with 16 villages. The lodge supports locals in their work to produce sustainable agriculture and aquaculture farms where skills are built and where produce is cultivated for the lodge and community. Other social and economic projects supported by the lodge are a maternity clinic, schools, a boarding house for girls, and community sports teams.

Source: Responsible Tourism Partnership (2021b).

Case study 11: Chobe Game Lodge – ec lodge (Botswana)

Country	Service or experience	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Botswana	Ec lodge	Greentech and socioeconomic empowerment	Ec lodge operations Technology providers	Greywater recycling Biogas, recycling Electric vehicles Local training and employment

This lodge is located inside Chobe National Park. It caters for travellers with disabilities, practises greywater recycling and other recycling (including crushing glass to manufacture bricks on site), and has a biogas plant and a boardwalk constructed from recycled timber and plastic. The youth development programme has trained nearly 200 young people, of whom 55 have been employed by the lodge. The lodge runs a profit-share scheme for staff and a programme of donations to 20 local initiatives. The women’s empowerment programme has been particularly successful: As at 2021, 65 per cent of all staff are female, including an all-female team of professionally qualified guides. To date, over half the lodge’s safari boats and vehicles have been converted to solar: four safari boats, three electric game-drive vehicles, and a utility vehicle. The guests enjoy a silent and less intrusive game drive with reduced carbon emissions.

Source: Responsible Tourism Partnership (2021c).



Case study 12: All Out Africa – responsible ecotourism of the kind known as “voluntourism” (Eswatini, Mozambique, South Africa)

Countries	Service or experience	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Eswatini, Mozambique, South Africa	Volunteer placements	Data collection, training and development related to nature conservation	Specialist volunteer tour operator	Data collection, education and training

All Out Africa contributes to research and education on habitats and species. For more than 10 years, All Out Africa has supported 500 international volunteers in their efforts to further conservation through data collection. It has also supported and trained more than 100 local students in field-based conservation and ecological research.

Its activities range through Eswatini, Mozambique, and South Africa. All Out Africa has supported the education of 15 local students at MSc level and more than 1,000 undergraduate students at local and international universities.

Source: Responsible Tourism Partnership (2021d).

Case study 13: Book iBhoni Tours – local bicycle tours (South Africa)

Country	Service or experience	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Bicycle tours	Local tourist experience in a township using clean transport	Small-scale tours	Bicycles Local guides and insights

The company Book iBhoni (iBhoni is local slang for bicycle), based on the famous Vilakazi Street in Soweto, runs a combined walking and cycling tour experience through Soweto, with a 10 per cent discount offered to cyclists who donate a book. The books are donated to community libraries. About 700 books have already been donated so far.

The interactive tours run by Book iBhoni include stops at such prominent heritage sites as Nelson Mandela House Museum, Hector Pietersen Museum, the house of Desmond Tutu and local shops. They end with a traditional South African “braai” – or barbecue.

Source: Book iBhoni (2021).

Sustainable tourism	Micro-small and medium-sized enterprise opportunities	
Main points	Examples: tourism business opportunities	Examples: inputs
<p>1. Opportunities exist across the conventional tourism industries: accommodation, food and beverages, attractions, and activities and events, intermediaries (travel agents, tour operators, meetings and events planners, online travel agencies and booking platforms), transport providers and retail.</p> <p>2. Young people have a strong presence in the heritage, culture, music, fashion, design and digital innovation industries. Supporting efforts by these industries to recover from the COVID-19 pandemic is critical to youth entrepreneurship.</p> <p>3. Water-based and marine experiences are significantly underdeveloped in many parts of the region and offer potential for tourist and recreational markets alike. Developing unique experiences requires collaboration between research institutions and tourism operators.</p> <p>4. There are opportunities to build deliberate supply chains for tourism from across the region, building on specific national and subnational capabilities and specialties: vanilla-based products for food and beverages from Madagascar; perfume-based oils from the Comoros for regional spas; fresh fish from Southern Africa for restaurants (in particular for landlock countries that do not have access to local fish supplies); many exceptional, cultural handicraft products from different countries; contemporary music from across Southern Africa. In addition, bedding, linen, towels, curtains and other inputs into accommodation could be produced by textile operators in Lesotho, Madagascar and Mauritius, where these capabilities exist. Furthermore, as tourism businesses employ clean technology, small-scale renewable energy and water services, products and advisory services could be supplied from South Africa and other countries that have expertise and manufacturing capabilities.</p> <p>5. Micro-small and medium-sized enterprises can also look for opportunities that arise in catering to different tourist segments, including those in the categories of intrepid tourists, repeat travellers, foreign language tourists requiring specific translation and other services, and emerging domestic and regional market segments.</p> <p>6. The production of own inputs also has potential in the case of agriculture, aquaculture and fishing. Equally, certain waste streams from tourism businesses can be benefitted.</p> <p>7. Tourism industry associations and tourism enterprise development programmes can play an important role in supporting and engaging new micro-small and medium-sized enterprises in the tourism sector in building market share, collaborating with other businesses in the destinations where they operate, and packaging (and pricing) for new and underserved markets.</p> <p>8. While well-established global online booking systems exist for tourists, there is potential for regional offerings providing targeted online marketing and transactional capabilities for certain industries that are underrepresented. Partnership with local information technology firms and associations also present an opportunity for regional business expansion for online planning, booking, information provision, regional market data and analytics.</p> <p>9. Governments, industry associations and donors all have a role to play in mapping new and underserved market segments, supporting digital infrastructure and services, and identifying local supply opportunities.</p>	<ul style="list-style-type: none"> • Ecolodges • Homestays • Shared economy accommodation • Camping, glamping and caravanning • Guesthouses and guest farms • Remote off-grid stays • Stays with local artists for workshops • Catering: foods and dishes • Indigenous cultural and food-based experiences and products • Food-foraging activities • Food-preparation experiences • Open-air meals • Shark diving and shark viewing • Boat-based whale and dolphin viewing • Diving and snorkelling • Activities such as canoeing, kayaking, kitesurfing, swimming, recreational angling and hiking • Activities such as game viewing and walking safaris • Bicycle tours and local transport 	<ul style="list-style-type: none"> • Agricultural produce, including food, beverages and spices • Linen, bedding and textiles • Crafts and other merchandise • Biofuels for transport • Electric vehicles • Bicycles • Marine-based transport, including traditional dhows • Equipment for experiences and attractions, including bungee jumps, hiking trails and sports • Building materials • Renewable energy; water efficiency; water generation and water storage; waste separation, reduction and beneficiation • Essential oils and massage oils • Furniture • Marketing material • ICT systems • Finance • Buildings • Fashion, design and art
	<p>Examples: specialist skills</p> <ul style="list-style-type: none"> • Online inventory managers and booking tool developers • Sustainable tourism advisers • Renewable energy advisers • Marine biologists and scientists • Ecologists • Food garden and foraging experts • Cultural and heritage specialists • Trainers and facilitators • Route and cluster developers • Fourth industrial revolution technologists 	<ul style="list-style-type: none"> • Providers of online marketing services • Virtual reality, augmented reality, and robotics experts • Exhibition designers • Interpretative specialists • Attraction designers • Information technology specialists • Content and online magazine producers • Visitor experience designers • Community engagement specialists



4.4 Bioeconomy, including forestry and bioprospecting

4.4.1 Context

The term “bioeconomy” describes the products, processes and principles that are based on biological resources (Birner, 2018). The wildlife economy is a similar concept: it involves the use of plants and animals (marine and terrestrial) to derive value in a manner that is compatible with conservation and sustainable development (Snyman and others, 2021). It has linkages with nature-based tourism (considered under section 4.3 on sustainable tourism), hunting (considered under section 4.3), wildlife ranching (considered under section 4.2 on sustainable agriculture), non-timber forest products (considered in the present section). The marine bioeconomy is also included in this notion and is a relatively new area of the bioeconomy.

Bioprospecting is the search and sustainable use of chemical and genetic components of biodiversity and indigenous knowledge that can lead to the creation of economic and social benefit for the country and the region at large (Fouche, Moodley and Maharaj, no date). Biotechnology is a related concept that refers to a set of scientific methods that make useful products, improve plants or animals or develop microorganisms for specific purposes from nature (ECA, 2015). Between 1981 and 2013, an average of 30 per cent of worldwide drug developments were based on natural products (Wynberg, 2015). There is also a growing world market for nature-based food and beverage products, fibres, botanical uses, biopesticides and organic personal care prod-

ucts (Laird and others, 2010; GVR, 2019).

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity creates greater legal certainty for providers and users of genetic resources by establishing clear and transparent procedures for access to genetic resources and by helping to ensure the sharing of benefits once genetic resources leave the provider country through its new obligations related to compliance (Rosa and Martius, 2021). Similarly, the biotrade initiative of UNCTAD, launched in 1996, promotes trade and investment in biodiversity-derived products and services. The trade label “Bio-Trade” is awarded only to those products that are certified against rigorous sustainability criteria (UNCTAD, 2021).²⁸

The BioInnovation Africa project is a recent European-African project set up to support Cameroon, Madagascar, Namibia and South Africa in concluding benefit-sharing agreements between African providers of raw biological materials and ingredients, and European users. The partnerships are based on high ethical, social and environmental standards (German Agency for International Cooperation, 2021b).²⁹ In South Africa, the value chains chosen for support are marula, buchu, rooibos and honeybush plants for essential oils (Department of Environment, Forestry and Fisheries, 2021b).

A number of bioeconomy-related policies and initiatives, including collaborations with international partners, exist in SADC countries.

²⁸ See <https://unctad.org/topic/trade-and-environment/biotrade>.

²⁹ See www.giz.de/en/worldwide/78516.html.



South Africa has a bioeconomy policy; Namibia has a policy relating to biotechnology; Mauritius has started to focus on bioprospecting policies; the United Republic of Tanzania is included in a macroregional bioeconomy strategy for East Africa (Wynberg, 2015); Eswatini, Malawi, Zambia and Zimbabwe also have policies on biotechnology or biosafety; and the Democratic Republic of the Congo has a draft policy in place (ECA, 2015).

Traditional knowledge and its links to indigenous bioeconomy products, including medicinal plants, are a major part of life and the economy in SADC countries. Typically, biotechnology development requires significant investment in capacity and skills. Commercialization of these plants requires support from a range of research and other entities, together with enabling laws and, critically, access and benefit-sharing mechanisms.

In Africa, the top 10 medicinal plants, in descending order by estimated value, are as follows (Snyman and others, 2021; the main producing country or countries of each plant is shown in brackets):

- Gum arabica (Chad, Nigeria and Sudan)
- Bitter and Cape aloes (Lesotho and South Africa)
- Artemisia (Cameroon, Ethiopia, Kenya, Mozambique, Uganda, United Republic of Tanzania and Zimbabwe)
- Rooibos (South Africa)

- Indian pennywort or Asiatic pennywort (Madagascar and South Africa)
- Madagascar periwinkle (Madagascar)
- Honeybush (South Africa)
- Devil's claw (Angola, Botswana, Namibia, South Africa, Zambia and Zimbabwe)
- Bitter melon (27 countries in tropical Africa)
- Umckaloabo (Lesotho and South Africa)

The SADC pharmaceutical business plan includes a strategy to establish a regional databank of traditional medicines and medicinal plants and procedures and to ensure their protection, in accordance with regimes and related intellectual property rights governing genetic resources, plant varieties and biotechnology (SADC, 2017).

South Africa has 10 per cent of the world's plant species and presents enormous biodiversity. Indigenous medicinal plants are used by more than 70 per cent of South Africans in their health-care needs or cultural practices. Approximately 3,000 species are used by 200,000 traditional health practitioners (Fouche, Moodley and Maharaj, undated). The Council for Scientific and Industrial Research in South Africa has for some time been researching the medicinal properties of a number of plants.³⁰

³⁰ The Council has signed agreements with the Traditional Healers Committee and the South African San Council as the owners of the indigenous knowledge. The bioprospecting group at the Council has received more than 250 claims for



Recently, the Government of South Africa announced that it is conducting research into *Artemisia afra*. Processes are also under way at the South African Health Products Regulatory Authority for the establishment of dedicated structures for African medicines regulations, the evaluation of clinical trials of African medicines and the registration of such medicines for commercial and clinical application. A natural indigenous products fund has also been created under the BioProducts Advancement Network South Africa initiative. It is hoped that these initiatives lead to the creation of small and medium-sized enterprises owned by indigenous knowledge holders (Businesstech, 2020).

4.4.2 Forests and the bioeconomy

Forests are one part of the bioeconomy. They provide essential ecosystem services, including hosting biodiversity and providing shade, wood and non-timber forest products, such as edible fruits and nuts. Non-timber forest products include extractive products, such as gums and resins; edible products, such as nuts and seeds; bee products; other animal products, such as game meat; carvings; handicrafts; biofuel; and fibres (Timko and others, 2011 and Ahenkan and Boon, 2011). Charcoal is a major non-timber forest product in SADC countries. Although it provides energy, it also drives deforestation and contributes to greenhouse-gas emissions. Charcoal is considered in more detail in section 4.6 on renewable energy of the present report.

The East and Southern African Forest Observatory is a new European Union-financed ini-

tiative by the Centre for International Forestry Research to provide a platform for sharing data and information related to the forests of East and Southern Africa (Centre for International Forestry Research and Regional Centre for Mapping of Resources for Development, 2021).

4.4.3 Marine bioprospecting and bioeconomy

Marine bioprospecting, which is the exploration of biological material in the marine environment for commercially valuable genetic and biochemical properties, is a rapidly expanding research and commercial activity (Wynberg, 2015). The marine environment presents important economic opportunities owing to its high levels of biodiversity and endemism. Among other areas, research is focused on the potential of marine microalgae, especially in the food and cosmetics industries (Martins and others, 2014). Fish waste by-products, sea grasses and seaweeds can also all be benefited, in addition to the more high-tech sciences involved in certain marine biotechnologies (Rotter and others, 2021).

Marine biotechnology is growing and may create as many as 40 million full-time equivalent jobs by 2030 (Rayner and others, 2019). Typically, however, investments in marine bioprospecting are extremely costly and risky: deep-sea research sampling is expensive, there are relatively low chances of success and regulatory approvals are onerous. For now, SADC countries are more likely to benefit from the scientific engagement and technology transfer from marine bioprospecting

cures based on medicinal plants and has identified at least 80 claims for which the therapeutic concepts have been established for different diseases. These include asthma, arthritis, malaria and HIV. They have tested samples for at least 33 claims, of which 16 demonstrated positive results and are in further development. One of the leading such claims is BP4, a novel herbal extract from *Siphonochilus aethiopicus* for the treatment of asthma and allergies.



than to enjoy major commercial opportunities, although this may change (Wynberg, 2015). A number of South African universities are already collaborating with global partners on marine bioprospecting research.

Policymaking needs in marine biotechnology include the harmonization and standardization of processes, protocols and definitions, and the production of ethical guidelines for access benefits and sharing. Furthermore, partnerships must be facilitated across stakeholder groups, including scientists, industry and governments. Sustained investment is needed in ocean observations and support should be provided to open up science to cre-

ate access to scientific research (Rotter and others, 2021). With marine biotechnology in its infancy, Rotter and others (2021) suggest that regional national and transnational initiatives be supported to set up long-term inventories of marine biomaterial, with open access, providing taxonomies and geographical information. This will support collaboration across stakeholder groups.

In the selected case studies of micro-small and medium-sized enterprises that follow, honey, biological cleaning products, processing of marula and melon seeds, kelp beneficiation, and a shark barrier designed using natural processes (biomimicry) are all considered.

Table 11: Bioeconomy case studies

Case study	Country	Bioeconomy focus	Type of micro-small and medium-sized enterprise or opportunity for the enterprise	Technology used
14. Honey Product Limited	Malawi	Local beekeeping value chain	Beekeepers, processing, community stores	Equipment, training, quality testing and labelling
15. Optimus Bio	South Africa	Biodegradable and biological products for cleaning using indigenous beneficial bacteria	Manufactured cleaning products with multiple uses	Licensed technology using bacteria to produce a green, sustainable product
16. Eudafano Women's Co-operative	Namibia	Processing of marula and melon seeds	Sustainable harvesting and processing of natural products	Local harvesters across 27 associations Oil pressers
17. Kelp Blue	Namibia	Harvesting of organic kelp for various inputs into different industries	Beneficiation of kelp into various applications and sustainable kelp harvesting	Research and development to derive new biotech from kelp, including textiles
18. Shark Safe Barrier	South Africa	Shark barriers to encourage coastal tourism	Manufacture of natural barriers	Magnets and kelp-like barriers



Case study 14: Honey Products Limited – beekeeping and honey (Malawi)

Country	Bioproduct	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Malawi	Honey	Beekeeping	Beekeeping Agroprocessing	Beekeeping equipment Processing Labelling

Honey Products Limited trains young people to own and operate business outlets located in specific geographical locations via a franchise model. These outlet managers provide beekeeping equipment and training to local smallholder farmers. The raw honey is collected, tested for quality and purchased by the outlets. From there it is transported to the factory, where it is processed and labelled. It is then distributed to shelves in community stores. This process supports resilience among smallholder farmers and creates access to markets. It is estimated that market access has been created for 2,500 smallholder beekeepers.

Source: SEED (2021g).

Case study 15: Optimus Bio – biodegradable cleaning products (South Africa)

Country	Bioproduct	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Bioderived cleaning products	Biodegradable indigenous bacteria	Cleaning applications	Licensed biotech

OptimusBio, a South African firm operating under a license from the Council for Scientific and Industrial Research, develops and manufactures a wide range of biodegradable and biologically active products with wide applications, including across urban and rural sectors. This includes sewage treatment, rural sanitation, aquaculture and agriculture products, and a diverse range of biologically active, biodegradable cleaning products.

The firm's technology uses indigenous beneficial bacteria and environmentally friendly processes based on technology that has been licensed by the Council for Scientific and Industrial Research to produce sustainable green products. The bacteria preserve the environment and have properties that clean surfaces, systems and water by reducing waste such as ammonia, nitrite and phosphate and by digesting solid material found in water. Certain products can also be used to improve fish health and aquaculture productivity.

The cleaning properties of the technology help to remove dirt and grime. A new product recently launched by Optimus Bio is a face wash with natural clay and Ethiopian sandalwood, both sustainably sourced, and also moringa, argan, vitamin E, orange and grape-seed oils.

Source: Optimus Bio (2021).



Case study 16: Eudafano Women's Co-operative – biooils (Namibia)

Country	Bioproduct	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Namibia	Marula and Kalahari melon seed oil	Pressing of sustainably harvested natural products	Harvesting Processing Marketing	Presser

The Eudafano Women's Co-operative in Namibia operates a manufacturing plant in Ondangwa that is supplied with marula kernels and Kalahari melon seeds by 2,000 members of a cooperative from 27 associations. The pressed seeds are used to extract oil, which is exported and sold to the local cosmetics industry. Barriers include the cost of sending samples of products to remote customers and the shortage of machines for further processing and value addition. The shortage of accredited laboratories for product testing and variable demand are also challenges experienced by the organization.

The marula tree (*Sclerocarya birrea*) has many uses and is found in several countries in Southern Africa, including Namibia. Oil is extracted from the kernel for cooking or for cosmetic purposes, the juice and pulp are extracted to make marula wine (known locally as omagongo) and the tree bark can be fed to livestock. A regional workshop was organized in 2019 by Access and Benefit Sharing Compliant Biotrade in Southern Africa to discuss possible uses of bioproducts derived from marula trees.

Source: Shigwedha (2020).

Case study 17: Kelp Blue – seaweed harvesting and beneficiation (Namibia)

Country	Bioproduct	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Namibia	Kelp	Kelp harvesting Beneficiation	Harvesting Processing Marketing	Research and development for various industrial applications

Kelp Blue is a Namibian business that operates in Lüderitz. The company harvests organic kelp (a seaweed) to produce ingredients for agriculture, fertilizers, pharmaceuticals and textiles. Kelp is highly effective at sequestering carbon dioxide and has a number of other positive effects on the ecosystem. The business plans to turn kelp into agrifood products, fertilizers and biostimulants, including for soil health, and to process kelp for further manufacturing, given its properties.

Kelp Blue is also exploring the use of kelp to produce fabric, since it possesses cellulose fibres. The company is investing in the development of a kelp-based textile with additional material benefits, such as ultraviolet protection and fire-retardant properties, and is working with a number of technology and textile partners.

Source: Kelp Blue (2021).



Case study 18: SharkSafe Barrier – biomimicry (South Africa)

Country	Service or experience	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Shark barrier	Eco-friendly shark barrier	High-tech innovation	Bicycles Local guides and insights

SharkSafe Barrier biomimics the visual effects of a kelp forest and combines this with a series of permanent magnetic stimuli to form a barrier that dissuades sharks from passing through.

It does not interrupt marine life such as seals or bony fishes that naturally use kelp forests as effective refuge areas. It has been extensively tested and the findings have been published in peer-reviewed scientific journals. Pilot tests on prototypes in the Bahamas and South Africa have confirmed that sharks will not pass through the barrier.

The barriers can be used at different depths and can be built in different sizes that are flexible enough to allow boats and divers to pass through.

Source: SharkSafe Solution (2021).

Bioeconomy	
Main points	Micro-small and medium-sized enterprise opportunities
<p>1. Micro-small and medium-sized enterprises are already active harvesters and users of natural products from the sea and from forests and other terrestrial ecosystems. Working together as associations or cooperatives is one approach that harvesters can follow.</p> <p>2. Appropriate laws from Governments in the countries of the Southern African Development Community can support the sustainable use of bioeconomy products; fair access and benefit-sharing, transparency and technological transfers through partnership agreements, sustainable consumption and production. The commodification of bioeconomy products and the formalization of processing, marketing, licensing, benefit-sharing and intellectual property protection will require Governments to put in place appropriate regulations that are not too onerous and, where permitting requirements and other procedures are supported by adequate capabilities, to transparently and promptly process enterprise registrations, permits and other formalities.</p> <p>3. There are further opportunities for micro-small and medium-sized enterprises in the processing, marketing and distribution of non-timber forest products. These downstream services are critical to growing the industries and adding value. A collective approach linked to access to beneficiation through processes can formally channel products to new markets outside the local area.</p> <p>4. Biotech is generally a skills- and capital-intensive sector in which foreign and local scientific institutions enter into partnerships with the private sector. Highly specialized skill requirements include chemistry and DNA sequencing. Marine biotechnology presents significant opportunities but requires substantial investment in skills and in hard infrastructure such as laboratories, specialist equipment, data centres and so forth. Regional programmes should be expanded to support this. African countries require steady, demand-driven capacity-building to be able to apply cutting-edge biotechnology while keeping up with rapid technological advancement.</p> <p>5. Multiple opportunities exist for partnerships between producers and users of biotech in many sectors, such as energy, agricultural feed, pharmaceuticals, cosmetics, and restaurants that offer unique foods from the local area. Developing a cross-sectoral programme, with industry conferences and exhibitions and, industry associations could galvanize a range of interesting partnerships.</p> <p>6. Certification of certain bioeconomy products based on sustainable harvesting principles can provide market access benefits, but the costs of such certification should not be exorbitant or be co-funded by donors and governments.</p> <p>7. The bioeconomy and the associated traditional knowledge need to be protected through firm-level intellectual property and also national trade positions and the use of geographical indications of origin.</p>	<p>Examples: sources</p> <ul style="list-style-type: none"> • Seaweed and seagrass • Fish waste (by-products) • Microalgae • Gum Arabic • Bitter and Cape aloes • Artemisia • Rooibos • Indian pennywort • Madagascar periwinkle • Honeybush • Devil's claw • Bitter melon • Pelargonium soidoides <p>Examples: specialist skills</p> <ul style="list-style-type: none"> • DNA sequencing • Metabolic engineering • Big data • Computational sciences • Big data storage • Enzyme discovery • New culture approaches • Diving and vessel-operated sampling equipment and techniques • Circular biorefineries <p>Examples: processes, services</p> <ul style="list-style-type: none"> • Ocean observation • Biodiversity studies • Sequencing and profiling • Selection, cultivation and breeding • Harvesting and isolation • Laboratory applications • Sustainable sourcing and supply • Production and processing of biomass • Sustainable forest management: agroforestry, community forestry, etc. <p>Applications and uses</p> <ul style="list-style-type: none"> • Energy • Cosmetic • Medicinal • Animal food • Wastewater purification • Cleaning products • Food • Nutraceuticals • Handicrafts • Packaging • Biochemicals • Biofertilizers • Bioremediation, restoration and climate mitigation • Bioenergy • Building composites

Sources: Snyman and others (2021); Khisha (2020); ECA (2015).



4.5 Sustainable fisheries and aquaculture (including mariculture)

4.5.1 Context

African waters have been known historically for their abundance of fish resources. Three of the six large marine ecosystems of Africa rank among the four most productive such ecosystems in the world (Snyman and others, 2021). Furthermore, the South-West Indian Ocean has three of the five countries with the longest coastlines in Africa (Madagascar, Mozambique and South Africa) (Bolaky, 2020). It also has four of the five countries with the largest exclusive economic zones (South Africa, Seychelles, Mauritius and Madagascar) and three of the five with the largest continental shelves (South Africa, Madagascar and Mozambique).

In 2010, total fish production in Africa was just over 9 million tons and the sector (including aquaculture) employed about 12.3 million people : 50 per cent as fishers, 42 per cent as traders and processors and 8 per cent as fish farmers (de Graaf and Garibaldi, 2014). Fish is an important source of protein, amino acids and essential fats and minerals.

Women are involved in small-scale fisheries in the SADC countries but may encounter prejudice and have limited control over their work conditions and pay (du Preez, 2018). Family responsibilities often prevent women from taking full advantage of opportunities in the sector and women typically have less decision-making power than men. There are inadequate data on the roles and needs of

women in fisheries and fishing communities, which limits women's empowerment programmes.³¹

With the overexploitation of fish stocks, the costs of fishing have increased, translating into a shift from subsistence to artisanal fishing (de Graaf and Garibaldi, 2014). But the value of the artisanal fishing sector, where the landed value reached \$4 billion in 2010, has been declining since 2004, despite an increasing fishing effort (Snyman and others, 2021).

It is estimated that the continent loses between \$2 billion and \$5 billion annually from illegal, unregulated and unreported fishing. Such catches of tuna in the Western Indian Ocean are a huge economic and environmental problem (Obura, 2017). In recent years, the Indian Ocean Tuna Commission, of which Seychelles is a member, has imposed limits on the catch of yellow-fin tuna (UNDP, 2020c). Angola, Eswatini, Lesotho, Mozambique, Namibia, South Africa, the United Republic of Tanzania and Zambia are also drawing up a plan of action on monitoring, control and surveillance methods to address illegal fish landings, trans-shipment at sea, violations of catch limits, and the deployment of illegal equipment (Oirere, 2020c). The plan of action was expected to be delivered in June 2021 but has been delayed.

Linked to this, a regional fisheries monitoring control and surveillance coordination centre is planned, to be based in Mozambique. This body requires ratification by the SADC countries. In addition, SADC and the Indian

³¹ A 2017 study on fishing practices in Zanzibar, the United Republic of Tanzania, stated that seagrass harvesting, predominantly performed by women, was considered domestic work (de la Torre-Castro and other, 2017).



Ocean Commission are likely to align the regional plan for fisheries surveillance with the SADC monitoring, control and surveillance processes.

Fisheries subsidies also have a harmful impact on sustainable levels of trade and need to be addressed in trade negotiations in parallel with sectoral market access negotiations (Commonwealth, 2014). Fisheries negotiations had been ongoing at the World Trade Organization for a number of years to address these issues. Finally in June 2022, the WTO Agreement on Fisheries Subsidies was reached at the twelfth WTO Ministerial Con-

ference. It is an agreement that delivered new rules to clamp down on subsidies in order to combat over-fishing and constitutes the first multilateral agreement of WTO to support sustainability.

4.5.2 Trade and investment in fish, fish products and aquaculture

There is significant trade in fish products in SADC countries, where fish products accounted for 19 per cent of the total volume of agricultural exports in 2013 but only 5 per cent of their total value. Most of the trade is informal cross-border trade (Hara and others, 2017).

Box 5: Negotiations on fisheries subsidies at the World Trade Organization

Globally, fisheries subsidies are estimated to range from \$14 billion to \$54 billion per year, which props up unprofitable fishing fleets. Members of the World Trade Organization finally reached an Agreement on Fisheries Subsidies in June 2022, that state that:

- (i) No Member shall grant or maintain any subsidy to a vessel or operator engaged in illegal, unreported and unregulated (IUU) fishing or fishing related activities in support of IUU fishing (Article 3);
- (ii) No Member shall grant or maintain subsidies for fishing or fishing related activities regarding an overfished stock (Article 4).
- (iii) No Member shall grant or maintain subsidies provided to fishing or fishing related activities outside of the jurisdiction of a coastal Member or a coastal non-Member and outside the competence of a relevant Regional Fisheries Management Organisation/ Association.

Provisions have also been made for special and differential treatment for developing and least-developed countries. This will also cover technical assistance and capacity-building; notification and transparency; institutional arrangements; dispute settlement; and final provisions.

This focus on fishing and subsidies has relevance for many coastal countries in the Southern African Development Community, and small island developing States. Resolving overfishing will relieve pressure on critical stocks, but stricter application of licences and reductions in subsidies might reduce the fees that the latter receive from fishing.

Source: WTO (2020a).



Namibia and the United Republic of Tanzania are largely fish-exporting countries. Mauritius is the largest importer of fish among the SADC countries, followed by Angola³² and South Africa (which imports nearly 50 per cent of the volume of its exports) (Hara and others, 2017).

South Africa imports sardines and processes them for export to the region and also for local consumption. Other low-value fish products, such as Chinese tilapia and other fish from African countries, are increasingly important to meet demand from African migrants living in South Africa. Furthermore, some South African companies have obtained fishing rights in Namibia and process and export the fish caught under such rights to benefit from the preferential trade agreement for exports of fish from Namibia to the United Kingdom under the Lomé Convention (Hara and others, 2017).

Zambia and Zimbabwe have committed themselves to improving the management and development of the fishery resources of Lake Kariba. This is partly in recognition of the potential of a freshwater aquaculture value chain. In 2019, various decisions were taken, including a reduction in the number of fishing rigs operating on Lake Kariba and a reduction in fishing nights. There were also plans to ban certain destructive fishing gear and to implement a joint monitoring system to improve surveillance and control. Furthermore, recommendations were made to develop and implement joint protocols and programmes on artisanal and industrial fisheries manage-

ment, among other areas (Hlatshwayo and Schmidt, 2020). Lessons from the decisions reached on Lake Kariba could be applied to other shared inland water resources.

Fishing is a particularly important economic and subsistence sector in the small island developing States of SADC. Mauritius has joint ventures and also high seas fishing interests. In recent years, Mauritius has developed into a seafood hub and a centre for the fisheries sector in the Western Indian Ocean. It has integrated shipping, chartering of reefer vessel, quay space, cold storage, and seafood processing, marketing and distribution into a special zone (WTO, 2021). Mauritius has recently launched a plan to support small-scale fishers and aquaculture with finance, a better daily rate for bad weather allowances, a proposed online and physical auction market, a special label, and greater access to SADC countries and the United States (Oirere, 2020b.).

In Seychelles, in April 2020, the Ministry of Fisheries, the Seychelles Fishing Authority and the Seychelles Trading Authority entered into an agreement with small-scale fishers and boat owners to purchase and stock the excess supply of commercial species at fixed prices for the season in response to the COVID-19 pandemic. Seychelles also has some capacity to process fish, and major logistics operators for purse seiner tuna and other fish are developing their own tuna processing quays (UNDP, 2020c). Artisanal fishing is practised by more than 1,700 fishers.

³² A national green export review of Angola has identified opportunities for aquaculture production (in tilapia and catfish), and also opportunities to expand supply chains and add value across the entire product line and establish cold chains (UNCTAD, 2019).



Mozambique is investing in its aquaculture. The International Fund for Agricultural Development announced in February 2020 that it would provide a \$49 million line of finance for small-scale aquaculture businesses. The Fund plans to support at least 88,000 small aquaculture farmers. Among other aims, the programme is intended to use sustainable fish production technologies and to improve the market structure for fish feeds and fingerlings (Oirere, 2020a).

4.5.3 Sustainability trends and challenges

The following principal trends and challenges relating to sustainability may be identified in SADC countries:

- Oil spills pose potential risks to marine ecosystems, with major oil tankers traversing the waters (Obura, 2017). The 2020 oil spill in Mauritius is a case in point.
- Mangrove coverage is diminishing in most countries in the Western Indian Ocean. Coral reefs are also under pressure, mainly from climate events and human effects. Coral reefs, mangroves and seagrass beds provide critical functions in their ecosystem services, as a nursery for fish species. They are also important for biodiversity, shoreline protection (from climate events) and tourism destination offerings, while also playing a critical role as carbon sinks (Obura, 2017).
- Western Indian Ocean countries have protected about 2.4 per cent, or 155,500 km², of their marine area. New marine protected areas have recently been announced in Seychelles (Oceanographic, undated). South Africa has also recently announced new marine protected areas. A new climate initiative was launched to improve the sustainable management of the Benguela Current Large Marine Ecosystem, which flows along the coasts of Angola, Namibia and South Africa (Save our Seas Foundation, 2019).
- National fisheries policies are beginning to address standards issued by the Food and Agriculture Organization of the United Nations for ecosystem-based management and regional connectivity among fish stocks, fishers and industrial fleets.
- The value of access rights that the so-called distant water fishing nations pay to be allowed to fish in other countries' national exclusive economic zones is considerable for several African countries, and industrial fishing operations are also an important source of income and employment. This access to fishing licenses and rights is controversial, however, and remains contested³³ (Coalition for Fair Fisheries Arrangements, 2020). Certain fishers do not observe their fishing quotas and overexploitation is a major challenge. There are also major disputes between foreign countries holding fishing rights and local fisheries regarding access to fishing rights and li-

³³ The Government of Madagascar has signed two protocols allowing access to Malagasy waters for around 30 vessels belonging to Chinese investors. This has led to concern from small-scale fishers.

censing³⁴ (European Union, 2017) and also about small-scale subsistence for artisanal fishers.

- Aquaculture is fairly new in SADC countries and is growing quickly. As at 2019, aquaculture accounted for 8 per cent of the 12.3 million Africans employed in the fisheries sector (Obiero and others, 2019). Kenya, Madagascar, Malawi and South Africa have nascent aquaculture industries, as does the United Republic of Tanzania, which mostly cultivates seaweed (de Graaf and Garibaldi, 2014).
- Mariculture involves the culture of marine species in seawater. Prawn farming takes place on an industrial scale in Madagascar, Mozambique and the United Republic of Tanzania. Other farmed marine species include finfish, shellfish and sea cucumbers (Obura and others, 2017).

- A range of digital tools have the potential to measure, monitor and manage fishing. Some of these are collaborative in nature and include vessel monitoring systems and automatic identification systems. Non-collaborative tools include optical or radar satellites. Potential also exists for the use of blockchain, big data, smartphones, artificial intelligence and drones, along with smart weighing at sea, radio-frequency identification and on-board cameras (Obura and others, 2017).

The case studies cover a number of micro-small and medium-sized enterprises in the fisheries sector and mangrove and seaweed programmes in SADC countries.

Box 6: Aquaculture and sustainability

There have been some impressive gains, with finfish and crustacean systems improving their environmental performances, either independently or in response to government regulation, private and public sector standards. Nevertheless, the aquaculture sector still faces serious sustainability challenges and market incentives, with many aquaculture systems not meeting sustainability criteria because their target markets do not reward producers through improved prices or access. At the same time, molluscs, filter-feeding finfish, and seaweeds have sustainable characteristics, particularly because they do not rely on aquafeed, but instead remove nutrients from the water column.

Source: Summarized and adapted from Naylor and others (2021).

³⁴ In 2017 the Comoros was sanctioned by the European Union for insufficient cooperation in fighting illegal, unregulated and unreported fishing (European Union, 2017).



Table 12: Sustainable fisheries case studies

Case study	Countries	Sustainable fisheries focus	Type of micro-small and medium-sized enterprise or micro-small and medium-sized enterprise opportunity	Technology used
19. Lake Victoria sustainable capture fisheries	United Republic of Tanzania	Sustainable capture fisheries linked to Naturland certification for export markets	Market access for local small-scale fisheries businesses	Sustainable fishing gear, catch limits and certification
20. Vezo sustainable octopus farming	Madagascar	Closures which recovered octopus stocks, sustainable octopus fisheries	Sustainable fishing of octopus	Recovery of octopus stocks Partnership with export companies that pay premiums
21. Blue Carbon	Kenya (included for illustrative purposes)	Restoration of mangrove forests Income streams generated by carbon credits	Mangrove rehabilitation Ecosystem services	Carbon quantification and trading
22. Abalobi app	South Africa and Seychelles	Data management, access to market, traceability	Performance improvements for small-scale fishers	An app that includes a log book and builds market access through traceability
23. C-Weed – seaweed farming	Zanzibar (United Republic of Tanzania)	Seaweed farming and support for local harvesters	Harvesters	Training on sustainable practices



Case study 19: Lake Victoria sustainable capture fisheries

Country	Product	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
United Republic of Tanzania	Sustainable capture fisheries	Sustainable fishing practices linked to certification and market access	Market access for small-scale fisheries businesses	Sustainable fishing gear, catch limits and certification

In 2018, Naturland announced that it was joining forces with a seafood importer, a processing company, the German Agency for International Cooperation and a consulting agency in the Bukoba region (United Republic of Tanzania), on the western shores of the lake, to initiate a wild fish pilot project.

Using the general standards for sustainable capture fisheries of Naturland, new standards that were appropriate to the local context were developed and included:

- Strict requirements on the type of fishing gear used
- A limit on the number of fish allowed to be caught
- Fair working conditions
- Price transparency and fair trade relationships between fishers and export companies
- Safety measures such as life vests
- Kindergartens and schools in the fishing villages
- Comprehensive health care

These project-specific standards for Nile perch sustainable capture fishery in Lake Victoria are checked annually. Certification by Naturland is proof that the standards have been successfully implemented. Close to 850 local fishers have been supported under the programme.

Source: Naturland (2020).



Case study 20: Vezo sustainable octopus farming

Country	Product	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Madagascar	Octopus fisheries	Sustainable octopus fishing	Small-scale producers	Closures of certain fishing areas to allow species to recover Premiums paid for sustainable octopuses

In 2004, the Vezo community of fishers in Madagascar created a local project to address the need for sustainable octopus fishing after a decline in catches. Locally managed marine areas used traditional knowledge to support the recovery of octopus stocks.

A number of local and foreign partners supported the project and the involvement of export companies enabled a premium to be obtained for the octopuses.

Source: Okafor-Yarwood and others (2020).

Case study 21: Blue Carbon – restoration of mangrove forests (Kenya)

Country	Product	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Kenya	Mangrove restoration	Ecosystem services	Mangrove co-management by communities	Carbon quantification and credits

Mangroves play a critical role in sequestering carbon and provide other ecosystem services. Mikoko Pamoja (“Mangroves together”), based in Gazi Bay in Kenya, is the first payment for ecosystem services project in the world related to mangroves. The project was supported by scientists from the Kenya Marine and Fisheries Research Institute in Mombasa, who helped to quantify the carbon potential, and the project is accredited by the Plan Vivo system and standards to trade in 3,000 tons of carbon dioxide.

A total of 117 hectares of natural and planted mangrove forests are managed jointly by communities who protect the forest and receive benefits in the form of support for community projects financed from traded carbon credits.

Source: Okafor-Yarwood and others (2020).



Case study 22: Abalobi – digital applications for small-scale fishers (Seychelles and South Africa)

Country	Product	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Applications for fishing logging and traceability, allowing for market access	Better fishing data, product traceability and market access	Improved small-scale fishing	Digital application

Abalobi was founded in 2015 and is currently used by 271 small-scale fishers along the coast of South Africa. It is also part of a pilot in Seychelles, through the Seychelles Conservation and Climate Adaptation Trust.

The main function of this application is as a personal logbook for fishers, to improve business performance, including recording catches, income and expenditure. The Abalobi Marketplace application makes it possible to build traceable value chains and connect with end-markets directly. A number of high-end restaurants in South Africa now source from Abalobi and educate their restaurant customers about the application. In all, there are five different applications in use: Abalobi Fisher, Abalobi Monitor, Abalobi Manager, Abalobi Coop and Abalobi Marketplace. Abalobi has won a number of awards for its work, and its pilot study in Seychelles uses data-driven tools and satellite and information and communications technology.

Source: Abalobi (2021).

Case study 23: Seaweed – sustainable farming (Zanzibar)

Country	Product	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Zanzibar (United Republic of Tanzania)	Seaweed farming	Sustainable seaweed harvesting	Improved small-scale seaweed operations and market access	Training and market access Production of carrageenan

This recently announced aquaculture project will be run on both Unguja and Pemba islands. Seaweed is the third-largest source of income for Zanzibar, after tourism and clove production, but many of its harvesting practices are unsustainable.

Farmers will receive comprehensive training so that they can boost the quality and quantity of their yields, including in how to design their sites, select seed stock, identify markets and harvest and dry their crops. Farmers will then become village mentors and implementors.

Partners include a global food giant. The product will be sourced by a leading seaweed production and development company that works with more than 20,000 farmers across 25 villages in Zanzibar. The seaweed is used to make carrageenan, an emulsifying agent found in food, pharmaceutical and beauty products.

Sources: Antoni (2020); C-Weed Corporation (2021).

Sustainable fisheries and aquaculture	
Main points	Micro-small and medium-sized enterprise opportunities
<p>1. Small-scale sustainable fishing can be supported for growth and improved livelihoods. A number of programmes in the region are already doing this. Elements include market access, preferential finance and processing facilities.</p> <p>2. Women in fisheries and fishing communities must be supported in gaining access to decent work and fair and equivalent remuneration. Women may be better able to take advantage of fish farming and aquaculture (which allows them to work closer to home) as they are often expected to carry out the bulk of household and family work.</p> <p>3. Approaches that incentivize communities to manage marine resources, such as mangroves and octopuses, offer a sustainable option for long-term marine area protection. Financial incentives need to be provided that are linked to climate finance or improved market prices (due to sustainability).</p> <p>4. Investments are required in the value chain – processing, refrigeration, distribution, market places and marketing.</p> <p>5. With an increasing focus on illegal, unregulated and unreported fishing, more will be done to monitor, track and manage fishers and a range of technology-enabled devices and skills are required to do so. Information technology can support the acquisition of the information required to manage fishing resources and support small-scale fishers. This presents opportunities for micro-small and medium-sized enterprises that provide ICT infrastructure and services, including apps and data science.</p> <p>6. Aquaculture has great potential and there are a number of small-scale projects already under way. Attention needs to be paid to the sustainability of feeds and environmental impacts.</p> <p>7. Given that fish products are extensively traded by informal cross-border traders, special consideration needs to be given to their trading needs, such as through appropriately flexible standards and trading regimes, and to permits that promote the improved and efficient delivery of nutritious human food.</p> <p>New information and monitoring technologies can support fisheries management</p>	<p>Examples: approaches to fishing</p> <ul style="list-style-type: none"> • Subsistence fishing • Artisanal fishing • Commercial fishing • Fish-processing plants • Harvesting • Sustainable sourcing and supply • Production, processing and packaging • Sustainable mangrove management • Cooperative ventures • Labelling schemes • Local marine protected areas managed by communities • Low-impact fishing equipment • Sustainable fish and aquaculture feeds <p>Examples: technology applications</p> <ul style="list-style-type: none"> • Traceability • Inventory management • Online auctions and sales channels • Vessel monitoring systems • Automatic identification systems • Satellites • Drones, artificial intelligence <p>Examples: market access</p> <ul style="list-style-type: none"> • Labelling and certification • Online auctions • Traditional marketplaces • Supporting infrastructure: refrigeration, distribution, etc. • New product development • Packaging for longevity • Cross-border trade • Processing <p>Examples: fishing products</p> <ul style="list-style-type: none"> • Seaweeds and seagrass • Fish waste (by-products) • Fish • Fish by-products • Aquaculture • Octopus farming • Mangroves for sequestration

Sources: Hara and others (2017); Girard and du Payrat (2017).



4.6. Renewable energy

4.6.1 Context

Inadequate electricity is a major obstacle to businesses and to export-led growth for many countries in Africa, including SADC member States. Electricity supply challenges and power outages persist (Asiama and Avenyo, 2020). Much of the SADC area is still unconnected to electricity grids: electricity access sits at about 48 per cent for the SADC countries as a whole, and 32 per cent in rural areas. There is however high variability across the SADC countries. The Southern African Power Pool is a regional energy trading pool formed in 1992 that partly addresses generation and demand for energy in SADC countries. Angola, Malawi and the United Republic of Tanzania are the only SADC member States in mainland Africa that are not part of this energy scheme (Ren21, 2018).

SADC countries other than Mauritius, Seychelles and South Africa still rely heavily on traditional biomass fuels, which include wood, charcoal and some animal waste. These fuels are used primarily for cooking and heating in the domestic sector. In South Africa, coal, paraffin and liquefied petroleum gas dominate heating. The Democratic Republic of the Congo, Madagascar, Malawi, Mozambique, the United Republic of Tanzania and Zambia use mostly charcoal, often produced in small, low-efficiency earth kilns in rural areas. Botswana, Namibia and Zimbabwe tend to rely more on wood (Ren21, 2018). Women typically source the biomass, which is often far from where they live. This has a negative impact on women, who travel long distances on foot and carry heavy loads of firewood, affecting their health. Women

can also be harassed or at risk when collecting biomass for domestic energy.

Energy could be a key driver of the pandemic recovery and is needed to address gender imbalances, secure food supplies and enable other sectors. In this regard, renewable energy generation has enormous potential (United Nations, 2021). Globally, there is massive growth in renewables, in particular wind and solar power, the cost of which has decreased significantly in the last 10 years, making these sources of energy increasingly attractive. This trend is also playing out in the SADC countries, where renewables accounted for about 28.7 per cent of power generation in 2018 and significant projects are in the pipeline (Muñoz Cabré and others, 2020). Hydroelectric projects dominate the renewable energy mix in the SADC countries. Of the 16 nationally determined contributions, all but one includes renewable energy contributions.

The SADC Centre for Renewable Energy and Energy Efficiency, based in Windhoek, was established in 2015 and promotes the use of renewable energy, energy-efficiency technologies and energy services. The Centre is driving the implementation of the action plan it has adopted (SADC Centre for Renewable Energy and Energy Efficiency, 2021).

4.6.2 Utility-scale renewable energy developments

South Africa is the most advanced SADC country, with its utility-scale renewable energy programme – the Renewable Energy Independent Power Producers Procurement Programme, established in 2011. Other countries in the region are advancing in this domain, including the United Republic of Tan-



zania and Zambia, which are developing feed-in tariffs, with a guaranteed price at which energy producers can sell their energy back to the grid, under the guidance of the Global Energy Transfer Feed-in Tariff programme, and capacity auctions under the guidance of the Scaling Solar programme, of the World Bank. Namibia is also implementing feed-in tariffs

and net metering in the development of its substantial renewable energy efforts (Morris and others, 2020a). Angola, Botswana, Eswatini, Lesotho, Malawi and Seychelles are also increasing the role of renewable energy in their power supply systems.³⁵ Wind energy has potential for a regional value chain.

Box 7: Potential for a wind energy value chain

The total wind energy potential of the countries of the Southern African Development Community (SADC) is estimated at 800 terawatt-hours per year. Only eight countries have current or planned wind energy capacity: Lesotho, Madagascar, Mauritius, Mozambique, Namibia, Seychelles, South Africa and the United Republic of Tanzania (Ren21, 2018). Planned renewable energy commitments across the region are also highly uneven: 70 per cent by 2030 for Namibia, 5 per cent for the United Republic of Tanzania (Ren21, 2018).

In South Africa, some 2,100 wind energy installations were operational by 2020.

- Around 33 wind farms exist with 1,365 wind turbines and an installed capacity of 3,672 (some still under development).
- The procurement programme has required local content in these utility-scale projects. As a result, a number of manufacturers emerged to supply components, but some have since closed owing to a lack of sustained demand resulting from delays in the governance of renewable energy auction windows.

The potential for scaling up utility wind energy projects in SADC countries could lead to more local sourcing by original equipment manufacturers and the opportunity to grow smaller turbine exports to microgrid and off-grid schemes. It would also support the emergence of a SADC-wide tradable services capability linked to wind energy.

Options exist for innovative bilateral deals between South Africa and other SADC countries:

- Investment support and energy purchases in exchange for the renewable energy component and input-supply agreements for services
- The African Continental Free Trade Area can expand the Expansion of the wind energy value chain, through the African Continental Free Trade Area, to African countries outside the SADC area that have large wind energy programmes, such as Ethiopia and Kenya.

For South Africa to take advantage of these opportunities, it must extend its wind energy programme and link it to a more substantive green industrialization plan.

Source: Adapted from Morris and others (2020b).

³⁵ The Eswatini Energy Regulatory Authority has recently published the results of a tender for the construction of new solar power plants, available at www.afrik21.africa/en/eswatini-globeleq-and-sturdee-to-build-two-30-mwp-solar-power-plants/. In Seychelles, the Islands Development Company is commissioning two solar photovoltaic power plants to provide electricity to the people and businesses of Astove and Farquhar islands. These installations save on fuel costs.



The uptake of renewable energy in the transport sector has been relatively slow, although there have been some changes to biofuel regulations and incentives. In terms of public transport, Mozambique and the United Republic of Tanzania are introducing new pilots, while Madagascar aims to remove old vehicles from operation (Ren21, 2018).

4.6.3 Distributed renewable energy services

Distributed energy services are increasingly opening up in the SADC countries and minigrids and microgrids are being adopted. Examples of the distributed energy developments include:

- The Sustainable Energy for All initiative (supported by UNDP and the Global Environment Facility) is supporting minigrids in Mozambique through the national renewable energy organization.
- Madagascar has a minigrid programme funded by Power Africa that has awarded \$1.2 million in grants to minigrid developers (Power Africa, 2020).
- Angola is planning to roll out a minigrids programme with support from the African Development Bank (African Development Bank, 2020b).
- Biogas projects for local cooking and heating are being developed, and on the biomass side, there are efforts to regulate and reduce biomass consumption, in particular in terms of improving cooking stoves, including

through the use of locally made artisanal clay stoves and manufactured clay and metal stoves.

- Solar thermal technologies present a number of opportunities. Supported by the Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN), significant training on solar thermal technologies has been provided and a number of pilot demonstration projects have also been completed across Southern Africa. Solar thermal energy has particular potential for adoption within the food and beverages, textiles and chemicals industries (World Wide Fund for Nature, 2017).
- Solar technologies for small industrial vehicles such as electric orchard tractors and safari vehicles also offer potential and this is linked to local automotive manufacturing potential (Stroud and others, 2018).
- A SADC digital energy facility launched a call for projects on 6 April 2021. The objectives of the facility are to support the integration of renewable energy sources into the grid, increase energy access and improve the performance of power utilities to reduce technical and commercial losses. The programme is intended to help local start-ups to scale up their digital innovations.

The case studies that follow highlight micro-small and medium-sized enterprises involved in innovative energy services, including certification programmes.

**Table 13: Energy case studies**

Case study	Country	Sustainable energy focus	Type of micro-small and medium-sized enterprise or micro-small and medium-sized enterprise opportunity	Technology used
24. Certification of sustainable charcoal	Zambia	Community forest management for sustainable charcoal	Charcoal producers	Forest management Certification
25. Forest Stewardship Council certification of charcoal	Namibia	Community forest management for sustainable charcoal	Charcoal producers	Forest management Certification for export markets
26. Jirogasy	Madagascar	3D printed solar solutions	Energy box for households Solar computers Solar charging stations	Solar panels and 3D printers
27. Green Impact Technologies	Malawi	Solar energy access through pay-as-you-go services Move away from charcoal and deforestation	Local agents Installers Marketers	Solar technologies Pay as you go Mobile money Biogas plant from agricultural waste from restaurants is being developed.
28. SolarChill	Southern Africa	Solar-powered freezers and refrigerators	Local manufacture Local maintenance Refrigeration services for entrepreneurs, health-care workers, etc.	Solar-powered refrigeration



Case study 24: Sustainable charcoal production (Zambia)

Country	Energy	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Zambia	Sustainable charcoal production	Forest management Sustainable charcoal	Sustainable charcoal harvesting Preferential market access for charcoal	Certification and forest management practices

A pilot project is under way to develop a participatory guarantee system of certification for sustainable charcoal production in Zambia. A participatory sustainable charcoal production guideline was developed, drawing from government timber harvesting guidelines, principles for sustainable forest management, government forest research and community indigenous knowledge.

The participatory guarantee system is a locally focused quality assurance system built on a foundation of trust, social networks and knowledge exchange. The system represents an alternative to more expensive third-party certification schemes. Through the participatory guarantee system, the consumers and producers of a certain product agree on conditions for production and the way these will be verified.

Village-level participatory guarantee system action groups were established and trained to support implementation of the practices defined in the guidelines. A total of 15 people were trained as participatory guarantee system mobilizers from all the chiefdoms of Choma and awareness-raising was conducted for a total of 215 community members. The participatory guarantee system for charcoal will provide an incentive for approving charcoal production under community forest management and a tool for stakeholder participation in monitoring sustainable charcoal production. Preferential market access will also be created.

Source: Moombe and others (2020).

Case study 25: Sustainable charcoal harvesting certified by the Forest Stewardship Council (Namibia)

Country	Energy	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Namibia	Sustainable charcoal production	Forest management Sustainable charcoal	Sustainable charcoal harvesting Export market access for charcoal	Certification and forest management practices

Launched in March 2021, this project, certified by the Forest Stewardship Council, supports community forests to test suitable methods for harvesting and processing bush biomass in communal areas through sustainable charcoal production.

A six-month pilot project is intended to: promote the inclusiveness of the Namibian bush biomass and charcoal sector; increase the Council-certified production capacity for the potential export of Namibian bush biomass and charcoal; foster communal compliance with international environmental and social standards; promote collaboration with different stakeholders such as the former De-bushing Advisory Service (now merged into the Namibia Biomass Industry Group) and the Namibia Charcoal Association as key players in information-sharing and advising stakeholders on adhering to the Council standards; and test the viability and showcasing of sustainable bush control and biomass use in community forests.

Source: De-Bushing Advisory Service (2021).



Case study 26: Jirogasy – 3D printed solar applications (Madagascar)

Country	Energy	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Madagascar	Off-grid solar innovations	Solar energy	Innovative solar applications	Solar panels 3D printing

Jirogasy is a start-up in Madagascar that offers solar solutions that it produces on site using 3D printers. Based on its success, the young company intends to expand its activities to other countries by opening new plants on the mainland of Africa.

The solutions are adapted to the realities of the rural areas of Madagascar. Jirogasy is developing several autonomous solutions using solar energy, including a box that can supply energy to a household. Connected to a solar panel, this solution also has a storage system to provide lighting after sunset. It is also equipped with a socket for connecting devices, along with integrated multimedia terminals for listening to radio or music in general.

It has also developed solar-powered computers that are used in several schools and also in some health centres and clinics in remote areas. The computers are equipped with a Global Positioning System device and a data feedback box and are adaptable to remote maintenance. Jirogasy also manufactures solar charging stations for recharging tablets that are integrated into training programmes in Madagascar. For the moment, the company's main customers are non-governmental organizations that use them in their education or social development programmes.

Source: Kanali (2021).

Case study 27: Green Impact Technologies – pay-as-you-go solar (Malawi)

Country	Energy	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Malawi	Pay-as-you-go solar	Solar energy	Agents, installers, maintenance, marketing	Solar panels Mobile money

Green Impact Technologies has a unique model for last-mile distribution through energy kiosks and agents. It operates a pay-as-you-go business model in which last-mile customers pay local agents an installation fee and then send credit periodically via a mobile money system. The company also supports a network of agents, and it is developing a biogas plant that will generate energy from agricultural waste at Tsangano market for use by local restaurant entrepreneurs.

Source: SEED (2021h).



Case study 28: Solar-powered freezers and refrigerators (Southern Africa)

Countries	Energy	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Countries of Southern Africa	Solar	Solar energy for freezers and refrigerators	Local manufacture Local maintenance Refrigeration for entrepreneurs, health-care workers, etc.	Solar technology

Reliable cooling is essential for the shelf life of food and vaccines.

The SolarChill project develops solar-powered, environmentally friendly cooling devices that are affordable for the local population. The solar refrigerators are adapted to the climate conditions in Southern Africa and can cool food and vaccines for several days without being connected to the power grid. Around 400 devices are to be manufactured locally and delivered during the term of the project.

Currently, a solar-powered vaccine refrigerator has been developed and manufactured, and several training courses have been carried out (including in Eswatini). Two types of solar refrigerators have been developed and marketed. To test the vaccine coolers in the field, contact was made with rural health clinics in Kenya, and the idea of a mobile application linking parents and nursing staff was born.

Source: International Climate Initiative (2021b).

Renewable energy	
Main points	Micro-small and medium-sized enterprise opportunities
<ul style="list-style-type: none"> • Women are disproportionately affected by challenges associated with access to energy in Southern African Development Community (SADC) countries. Micro-small and medium-sized enterprise programmes (and other programmes) need to actively involve women in energy production, procurement, transport and distribution, in particular in rural areas. • Given the enormous investment already taking place in renewable energy in Africa, which is likely only to increase, a plan for the development and localization of key inputs in SADC countries should be considered. Green industrialization plans could create the impetus for major investment in capabilities and inputs for renewable energy, for example: <ul style="list-style-type: none"> ♦ At the utility scale there are opportunities in lead firms' supply chains for a range of types of micro-small and medium-sized enterprises, including input manufacturers, service companies, design companies, funders, and providers of installation and maintenance services (GreenCape, 2021d). Creating sustained demand for these input goods and services requires government-led procurement plans for renewable energy with the provision of local content, along with consistent demand from the programmes over time. ♦ The potential for scaling up utility wind energy projects in SADC countries could lead to more local sourcing by original equipment manufacturers and the opportunity to grow smaller turbine exports to microgrid or off-grid schemes. It would also support the emergence of SADC-wide tradable services capability linked to wind energy. With the African Continental Free Trade Area, the wind energy value chain – if supported for development in SADC countries – could be expanded to other African countries. • South Africa already has the potential to export some of the services it has developed as its renewable energy programme is rolled out to other SADC countries. These kinds of services need to be supported through the Area by low tariffs and non-tariff barriers (professional certification, etc.) with the service agreements. Industry bodies can play a role in this along with SADC Governments. • Micro-small and medium-sized enterprises can provide solar appliances and home systems, and also support stand-alone and grid-tied commercial and industrial systems, as well as minigrids and solar thermal installations. • Participation in sustainable charcoal certification schemes that create market access for small-scale producers should be encouraged to reduce deforestation. A number of more efficient stoves and kilns should also be supported. • A range of skills and input opportunities exist within renewable energy. These are shown in figure XX. For example, micro-small and medium-sized enterprises can provide services that leverage finance to purchase, install, rent and maintain solar energy for households and companies, as long as they have access to finance and inputs and as long as feed-in tariffs are supported. Pay-as-you-go schemes have been successful in East Africa. Skills development, qualifications and training should be put in place. 	<p>Examples: technologies</p> <ul style="list-style-type: none"> • Utility renewable energy inputs: solar photovoltaic, wave energy • Distributed renewable energy: wind, solar photovoltaic • Biogas • Biomass • Solar thermal technologies • Clean transport options • Electric vehicle manufacturing, inputs and assembly • Sustainable charcoal production • Efficient stoves <p>Examples: inputs</p> <ul style="list-style-type: none"> • LED lamps • Biofuel production and sales • Improved charcoal kilns • Panels • Smart meters • Assembly • Tooling • Components • Automation • Towers • Generators • Construction • Transport • Design • Efficient stoves <p>Examples: skills provisions</p> <ul style="list-style-type: none"> • Renewable energy specialist • Solar solutions engineer • Photovoltaic installer • Solar storage technician • Offshore wind technician • Wind turbine management • Electronics technician • Energy trading specialist • Power grid designer • Engineer • Tools specialist • Project structuring specialist • Certification specialist <p>Examples: services</p> <ul style="list-style-type: none"> • Solar panel sales and distribution • Solar panel installation and maintenance • Solar water pumping system • Wind energy installation • Biofuel production • Solar refrigeration system provider • Solar water heating systems • Energy auditor • Research and development • Solar thermal drying • Biogas production • Energy finance

Sources: Adapted from Khisha (2020); Morris and others (2020b); GreenCape (2021d); UNEP and Technical University of Denmark (2021); University of Stellenbosch Business School Careers Services (2020).



4.7 Water and sanitation services

4.7.1 Context

There is enormous variation in water sources, access and quality across the SADC countries. Only 61 per cent of the population has access to safe drinking water and 39 per cent to adequate sanitation facilities (SADC, 2021c). Woolfrey and Muller (2017) indicate that, apart from a few countries that face actual water scarcity (Angola, Botswana, Mauritius, Namibia, Seychelles and South Africa), the main issue is what may be termed “economic water scarcity” – that is, a lack of access to water sources due to the underdevelopment of water resources.

With 15 transboundary river basins, the SADC countries have an abundance of renewable water, but inadequate infrastructure limits the potential. Some 70 per cent of the water resources cross national boundaries, and therefore require transnational coordination and planning (SADC, 2021c). Furthermore, climate change is expected to affect the water supply and exacerbate droughts or flooding (Obura, 2017). Agriculture is heavily reliant on water for irrigation, but most smallholder farms have inadequate access to water. The water-energy-food nexus in the SADC countries is a critical consideration for planning for all three sectors. In 2020, a nexus governance framework document was approved by SADC ministers (Nexus, 2021).

As is the case with energy, in many parts of SADC countries, in particular in rural settings, women are expected to fetch water for domestic use. Women are severely compromised by a shortage of clean and accessible water, the time they need to fetch water

and the risks involved in doing so (Gender Links, 2020).

Addressing the multiple issues around water and sanitation requires interventions to support water source areas, including wetlands and catchment areas. The issues include water system and riverine system health, infrastructure and access to water (including by households, agriculture and industry) and dignified sanitation services. Part of the challenge around water also relates to water losses in the system, including non-revenue water, that is, leaks and water not purchased. Water markets are relatively undeveloped in most parts of Southern Africa and, while they can drive water-use efficiency, they can also exacerbate inequality and lead to overuse (Matchaya and others, 2019).

Acid mine drainage is a challenge for parts of Southern Africa and water quality is adversely affected by mining activities, posing major human health threats. There are also other serious water pollution and water quality issues arising from industry use. For example, agriculture has major impacts on water quality, and plastic pollution finds its way in water systems and ultimately lands up in the sea.

In a report by the Water Research Commission of South Africa on innovations in water in South Africa, published in 2018, a number of technologies and approaches to ensure water quality and water and sanitation access and efficiencies were identified. Many of these have been developed with or through universities or the Water Research Commission itself. At the time the report was published, few of the 18 case studies highlighted had received commercial funding and uptake,



despite successful pilots (African Centre for a Green Economy, 2018).

There is a need for efficient and affordable local water technologies that are appropriate for the different circumstances of each SADC country. For smallholder agriculture, small-scale water infrastructure services should be explored, including microirrigation and mini-irrigation, rainwater harvesting, small dams and investment in ecological infrastructure. Research into water-related micro-small and medium-sized enterprises indicates that there are far fewer such enterprises than other types of green and blue economy enterprises. This might be because water is typically a free or relatively cheap service and because traditional water and sanitation infrastructure is expensive and is historically provided by governments. In addition, the markets for water in SADC countries are undeveloped and funding appears to be limited for research and development and technology commercialization.

More could be done to open up the water market to micro-small and medium-sized enterprises. One way to boost local technologies is through government procurement programmes with local-content requirements. Among SADC countries, South Africa has some capabilities in water technologies and could explore exports to other SADC countries and further afield (Partnership for Action on the Green Economy, 2018). Expanding capabilities in water and sanitation is absolutely critical to sustainable industrialization, climate mitigation, food security and healthy, dignified livelihoods.

4.7.2 Case studies

The case studies that follow include water system management as a programme to generate opportunities for micro-small and medium-sized enterprises and a number of new water technologies.



Table 14: Water and sanitation case studies

Case study	Countries	Sustainable water focus	Type of micro-small and medium-sized enterprise or micro-small and medium-sized enterprise opportunity	Technology used
29. Business case for the eThekweni transformative riverine management system	South Africa	Investment in a riverine programme	Various: as service providers, or in recreation, agriculture or waste-related businesses	Stream cleaning Partnerships with private and traditional authority landowners.
30. Impact-Free Water	South Africa	Desalinated water produced using wave energy	Manufacturer; could be installed in various locations in SADC countries	Wave-energy reverse osmosis pump
31. SavvyLoo	South Africa	Waterless toilet	Transporters Manufacturers Service providers	Waterless sanitation
32. Clarus wastewater treatment units	Eight African countries (with more than 200 units)	Improved effluent quality	Licence holders and regional partners	Water treatment series
33. Sodium reduction unit	South Africa	Removal of sodium from reused irrigation water	For greenhouse growers	Sodium reduction unit



Case study 29: Business case for the eThekweni transformative riverine system management (South Africa)

Country	Water technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Water cleaning Partnership across landowners	Transformative riverine system management	Cooperative businesses to clean system Green economy and blue economy opportunities in waste, agricultural, biomass, recreation and tourism	Riverine system investments

eThekweni is a metropolitan municipality in South Africa that includes the city of Durban. It is home to nearly 4 million people and is drained by over 7,000 km of rivers, with 18 major catchments, some of which extend far inland from the municipal boundary. An approach to riverine management that limits land-use impacts on rivers and restores and manages riverine areas could reduce the city's exposure to climate change risks and improve a broad range of benefits that rivers can confer.

The municipality's Roads and Stormwater Management Department already has the Sihlanzimvelo Stream Cleaning Programme, which covers 450 km of rivers and has created about 600 jobs through 86 community cooperatives. By expanding the Sihlanzimvelo community cooperative model, at least 1,557 permanent jobs could be created through 234 cooperatives. Public and private investment of 7.5 billion rand over 20 years in transformative riverine management could unlock municipal and societal benefits of between 13 billion and 26 billion South African rand.

By spending 719 million rand over 20 years on transformative riverine governance, eThekweni Municipality could enable 4.5 billion rand in co-investment by private landowners, other government offices and third parties. Furthermore, green economy businesses could make productive use of solid waste and alien plant biomass, support recreation and tourist activities, and harvest natural resources. Sustainable agriculture and gardening could also take place along the rivers.

Source: Mander and others (2021).



Case study 30: Impact-Free Water – wave energy (South Africa)

Country	Water technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Water cleaning Partnership across landowners	Wave energy to produce fresh water	Small tech business	Wave-energy reverse osmosis pump

Impact-Free Water offers the wave-energy reverse osmosis pump, a system that uses wave energy directly to pump high-pressure feedwater into a reverse osmosis filtration system. This uses the motion of a passing wave to pressurize seawater and creates various products: fresh water from a permanent supply; electricity that is both environmentally friendly and more consistent than wind or solar power; and by-products that include mariculture. There is also the opportunity to earn carbon credits. Werops offer an alternative to diesel and coal-powered seawater desalination systems, which are dirty and expensive.

Implementation is configured in such a way as to ensure that the clients' needs are met, with the focus on fresh water, high volume seawater or electricity. Once installed, the only input required is the sea itself, and other than an annual service and any shore-based value added services, there are no costs. As the system is designed to last for at least 40 years, the capital cost can be written off over an extended period. It is particularly well suited to:

Remote and isolated coastal communities

Dry and increasingly thirsty islands

Water-intensive, brand-sensitive companies. Certain market leaders in the food, mineral, aquaculture, beverage, and manufacturing industries place a premium on reducing their water and carbon footprint

Consumers of bottled water

Source: Impact-Free Water (2021).



Case study 31: SavvyLoo (South Africa)

Country	Water technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Non-sewered sanitation	Waste neutralization; no water; no dig Non-sewered sanitation	Providing non-sewered sanitation	SavvyLoo Sensor integrated with a built-in geographic information system

Pennine Energy Innovation provides a full-scale service that ensures safe, inclusive, sludgeless, odourless, clean and accessible sanitation solutions to informal peri-urban families primarily serviced by portable sanitation service providers. Its SavvyLoo product is a non-sewered, no-dig, no-water, no-chemical, rapid-deployment, in situ waste-neutralization tool that can assist with meeting the needs of rapid urbanization. The product has a built-in geographic information system (being trialled) and real-time information monitoring tools, allowing for optimized service delivery, maintenance and intervention speed.

The solution cuts incumbent portable toilet service providers' logistics costs by at least 80 per cent. It can be rolled out through existing portable toilet service providers. Because it does not use water, and waste is separated, it provides a number of benefits: waste is neutralized and water, carbon and methane use are reduced.

Source: Summarized from two-page executive summary provided by Pennine Energy Innovation (2021).

Case study 32: Clarus wastewater treatment units

Country	Water technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Wastewater treatment units	Cleans wastewater for reuse	Green economy and blue economy opportunities in waste, agriculture, biomass, recreation	Wastewater treatment units

Clarus Fusion Series Treatment Systems are drop-in wastewater treatment units. They treat black and grey water and can provide access to flush toilets without potable water. Excess treated water can be used for irrigation purposes. The units are designed for decentralized applications where the effluent quality needs to meet or exceed water and sanitation standards. More than 200 units have been installed in eight different countries on the African continent.

Source: Maskam Water (2021).



Case study 33: Sodium reduction unit – removes sodium from reused irrigation water (South Africa)

Country	Water technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Removes sodium from reused irrigation water.	Ends eutrophication Reuse of water Nitrate and phosphates are kept in the greenhouse	For use in agriculture by greenhouse growers	Sodium reduction unit

By addressing the accumulation of sodium in the irrigation water of the greenhouse, the sodium reduction unit solves the problem of the discharge of nitrate and phosphate from greenhouses, reducing the problem of eutrophication of natural water sources.

For greenhouse growers, the discharge of nitrate and phosphate into the environment can be eliminated. The process allows growers to reuse 100 per cent of the nitrate and phosphate nutrients in the greenhouse. The process is based on ion exchange, the only technology that can completely separate nitrate and phosphate from sodium and keep them separate. The result is a full recovery of nitrate and phosphate and the cost-effective discharge of sodium from the greenhouse.

Source: Solar Impulse Foundation (2021).

Water and sanitation		Micro-small and medium-sized enterprise opportunities
Main points	Examples: technologies	Examples: inputs
<p>1. Water is a critical input into economic and social activities. Rainwater tanks, well points and boreholes, grey water systems and water efficiency mechanisms are expected to be increasingly sought by households and industry. There are likely to be further opportunities in the manufacture and installation – and financing – of these infrastructures as climate variability increases.</p> <p>2. Improving water access in underserved communities in rural and urban areas can create opportunities for women to participate in other activities. Design for appropriate water technologies and systems, and governance arrangements should draw heavily on women's experiences and needs and potential to participate.</p> <p>3. Multiple innovations are needed to provide the water services needed and to deal with backlogs. These may include decentralized wastewater management, rainwater harvesting, ecological sanitation, delegated management, reuse and recycling of wastewater, sustainable urban drainage, novel water business models and community involvement models.</p> <p>4. Riverine management and water catchment area management can also unlock many job and enterprise opportunities. This broad spatial and ecological system approach can drive system changes and unlock multiple benefits.</p> <p>5. Non-sewered sanitation systems can address the challenge of delivering sustainable sanitation services in new property developments, rural communities, and low-income and informal settlements.</p> <p>6. Where clean and safe water is not available and households are buying bottled water, private services can provide cheaper water in bulk from wells, boreholes or rainwater tanks or a combination thereof.</p> <p>7. Reducing non-revenue water losses is important for achieving water security and reliable supply, and also for recovering municipal revenue for maintenance and for offsetting future capital expenditure. Technologies exist for monitoring leaks.</p> <p>8. Regulations can help drive innovations. In South Africa, for example, beneficiation or alternative disposal solutions for wastewater sludges must be developed because of the national ban on liquid waste at landfills that was put in place in August 2019. Furthermore, the national waste strategy was developed to progressively limit solid organic waste to landfill over the next 10 years.</p> <p>9. A government-led procurement plan for water services with local-content provisions, and also consistent demand from such a programme, can support the green industrialization of water. In creating water markets, however, governments must carefully consider ways to address the danger of exacerbating inequality and compromising the right to free basic water.</p> <p>10. South Africa has some potential to export certain water services and inputs. Such services need to be supported through the African Continental Free Trade Area by low tariffs and the removal of non-tariff barriers (with the need for professional certification, quality testing and so forth being addressed).</p> <p>11. A water-energy-food nexus approach should be widely used for planning purposes.</p>	<ul style="list-style-type: none"> Water catchment areas and riverine management Flood-warning systems Water cleaning Rainwater harvesting Boreholes Improved water metering and monitoring Wastewater efficiency and reuse Alternative water systems On-site reuse systems Water-exchange networks Water conservation Sustainable urban drainage Ecological sanitation 	<ul style="list-style-type: none"> Leak monitoring equipment Rainwater tanks Pumps Grey water systems Wastewater treatments Water treatment technologies Water-efficient appliances Wave-energy reverse osmosis pump Recycling irrigation water Pipes Smart metering Plumbing Filters Irrigation equipment
	Examples: skills provisions	Examples: services
	<ul style="list-style-type: none"> Water resources engineer Leak detection specialist Pressure management technician Water flow consultant Smart water meter technician Water harvesting consultant Wastewater specialist Water resources analyst Water hygiene consultant Water treatment consultant Water sales engineer 	<ul style="list-style-type: none"> Water accounting Construction Engineering Installation Maintenance Sewage treatment Chemical recovery Big data Analytics Anaerobic treatment

Source: Adapted from Makoni (2018); Mander and others (2021); UNEP and Technical University of Denmark (2021); Mvulirwenande and When (2020); GreenCape (2021c); University of Stellenbosch Business School Careers Services (2020).



4.8 Waste and material efficiencies

4.8.1 Context

Many SADC countries face a range of interconnected waste management challenges that have a direct impact on human health and the environment (UNEP, 2018). Land-based waste often ends up in the sea and compromises ocean health, marine goods and services and the potential of the blue economy.

Major waste challenges include:

- Open dumping, usually associated with burning, produces methane and black carbon, with very negative greenhouse-gas impacts on the climate.
- Electronic waste often ends up in Africa, as do many end-of-life vehicles, yet there are few widely adopted effective e-waste recycling practices. Most are informal and pose risks to vulnerable groups. Most of the time, these traded goods – often traded illegally – end up as waste in dumpsites (UNEP 2018). The informal recycling of lead-acid batteries is also very dangerous and health-care waste in particular poses a serious risk to people and the environment. A regional approach to the management of secondary materials could be an important part of a green and blue economy strategy for SADC countries, some of which do not currently have adequate facilities to manage hazardous waste (UNEP, 2018).³⁶
- The emergence of new, often complex waste streams such as nanowaste require special waste management regimes.
- Plastic waste is growing in Africa and has high rates of leakage into the environment, since recycling is limited.
- Plastic pollution from shipping and maritime activities in all coastal SADC countries also contributes to marine litter. The pollution includes fishing gear. The International Union for Conservation of Nature and Natural Resources has launched its Marine Plastics and Coastal Communities project to reduce the amount of plastic waste that leaks into the marine environment. In Vilanculos, Mozambique, plastic waste materials are collected from waste pickers, microenterprises, and local residents and organizations. In South Africa, the Wildlands Conservation Trust is implementing a plastics project at Durban Port. This includes waste-trapping at key locations; developing upcycled ocean pavers out of various unrecyclable plastic waste and crushed glass; and a mobile app that the Blue Port team and the public can use to share waste collection data

³⁶ A study on e-waste indicates that one of the biggest challenges affecting the sourcing, operation and implementation of e-waste recycling technology is the low volumes of e-waste in South Africa. This has impacts on economies of scale, profits and the desire to invest further. E-waste recycling was found to be unprofitable as a stand-alone business for small firms, with 58 per cent of small businesses regarding e-waste recycling as a secondary activity, the more profitable aspect being e-waste refurbishment (making up to 60 per cent of revenue) (Lydall and others, 2017). There is potential for a regional economic approach to e-waste where economies of scale could be achieved (summarized from UNEP, 2018).



(International Union for Conservation of Nature, 2021).

- Waste dumping affects riverine and marine health, since rivers act as conduits. Blocked-up rivers also create an environment for urban flooding and for adverse health effects from water-borne diseases.
- Hull fouling³⁷ and ballast water from shipping are threats to the blue economy as they can pollute marine environments.
- Mines create enormous waste impacts, including acid mine drainage. Mine rehabilitation is likely to become an area that is increasingly important. There are certain research projects looking at technology options³⁸.

The potential value of waste streams – viable polymers, fibres, metals and nutrients – is of-

ten lost to the economy. Alternative uses for waste in Africa, such as energy generation, composting and recycling, are all capable of converting waste into valuable assets. Firms could operate at far higher levels of efficiencies, reducing both their material inputs and their waste outputs.

Informal waste pickers provide a critical service of sorting and collecting waste. There were estimated to be between 60,000 and 90,000 waste pickers in South Africa alone in 2016. This number is likely to have grown during the COVID-19 pandemic, which destroyed many other sources of livelihood. Waste picking poses a health risk (CSIR, 2016) and more work is needed to achieve occupational health and safety in the processing of waste (Khisha, 2020).

Managing waste requires good data, but data are largely absent in SADC countries. For example, the definition of municipal solid waste varies considerably (UNEP, 2018.). Research

Box 8: Marine waste and pollution: biofouling

Marine biofouling occurs when microorganisms, algae and aquatic animals accumulate on structures that occur in seawater (Amara and others, 2018). This reduces water flow, leading to a significant increase in energy consumption. The transport delays, hull repairs and biocorrosion cost an additional \$150 billion a year (Schultz, 2007; Hellio and others, 2015). There is also a risk of invasive fouling species from these accumulations, which can threaten indigenous aquatic life forms (Martins and others, 2018). Antifouling paints include chemicals, which are known to leach into the water and create a further set of risks for marine life (Yebara and others, 2004; Amara and others, 2018).

Source: Adapted from Rotter and others (2021).

³⁷ A South African company has developed a prototype underwater drone that inspects and cleans the hulls of ships.

³⁸ A cross-disciplinary research team at the University of Cape Town, South Africa, has been investigating the potential of using fibrous plants (bamboo, hemp, kenaf and the like) to remediate degraded mining land, and to develop downstream industrial value chains that use fibrous plant material as a key input (for example, non-woven textiles can be made from kenaf fibres, which can then be used to make automotive parts such as parcel shelves). Outputs from the first phase of this project may be seen at www.resilientfutures.uct.ac.za/CoP-outputs-list.

on material flow patterns and international best practices is also required. Circular-economy hub online platforms and marketplaces can provide information on sustainability education and resources and can match buyers of recovered resources with sellers (Khisha, 2020).

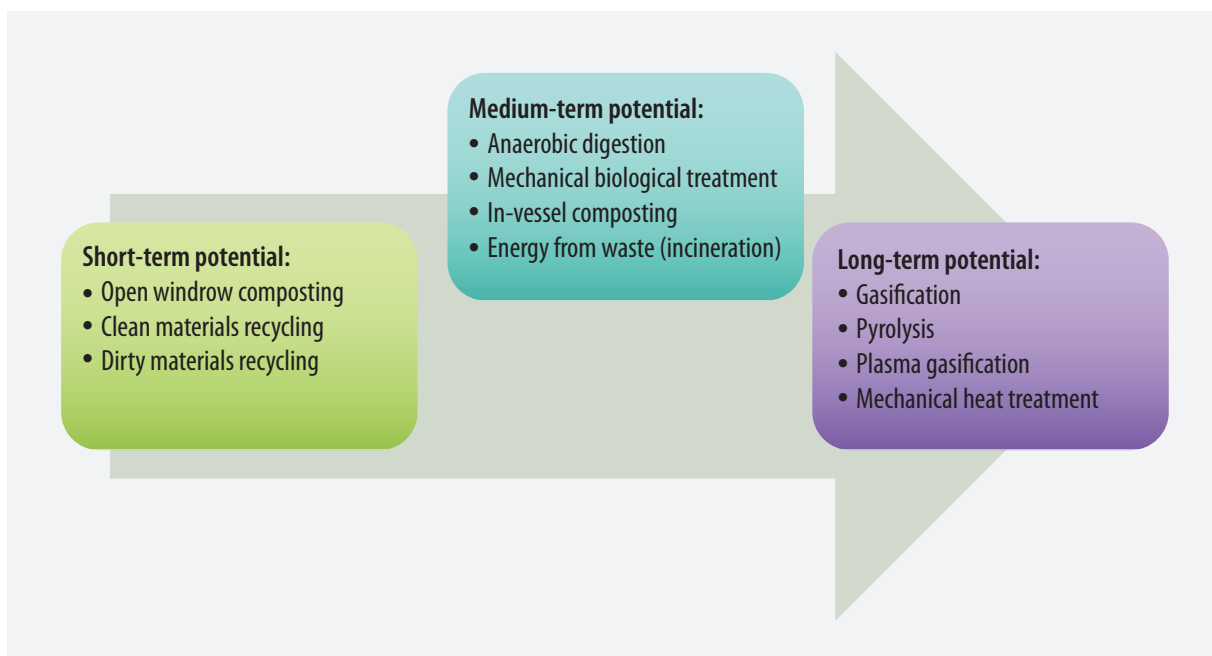
An appropriate regulatory environment is also required, including the incorporation of informal waste workers and producers. In 2020, South Africa replaced its national waste management strategy with a new policy that supports waste pickers and the entire informal sector. The 2020 strategy also promotes the design of packaging products that reduce the amount of waste in the environment and encourages reuse, repair and preparation for recycling through source separation.³⁹

SADC is taking steps to improve stakeholders' understanding of household, industrial, agricultural and electronic waste and their associated challenges. The SADC secretariat is developing a programme on waste management that is still being finalized.⁴⁰

4.8.2 Organic waste

An estimated 80–90 per cent of municipal solid waste in Africa could be diverted to alternative waste treatment technologies. High organic content requires context-appropriate technological solutions (UNEP, 2018). Organic waste has many possible uses: to generate energy, as a source of insect protein and to create organic composting.

Figure IX: Waste treatment technologies – potential in municipalities in South Africa



Source: Adapted from UNEP (2018).

³⁹ See www.afrik21.africa/en/south-africa-wasteaid-supports-innovation-in-waste-management/.

⁴⁰ See www.sadc.int/themes/environment-sustainable-development/waste-management/#:~:text=Waste%20management%2Cz%20pollution%2C%20inadequate%20access,development%20in%20the%20SADC%20region.&text=This%20coupled%20with%20poor%20enforcement,that%20is%20a%20common%20practice.



4.8.3 Biomaterials and biorefinery

Biomaterials are based on waste and plant matter but function like plastics and composites. The biomaterials industry has the potential to reinforce the existing chemicals sector and offer the fabrication of composites in the automotive and aerospace industries. South Africa has a Biocomposites Centre of Competence, which is exploring the production of various biomaterials.

Biorefinery pilot projects are also under way and are expected to result in the production of fuels, chemicals and agricultural products. The South African Council for Scientific and Industrial Research opened a 37.5 million rand biorefinery industry development facility in Durban in 2017, the primary aim of which is to serve as a venue for piloting and scaling up technologies, in particular for forestry, sugar, algae, non-food crop plant oils and microbial biorefineries based in rural areas (Partnership for Action on the Green Economy, 2019).

4.8.4 Plastics

Plastics are pervasive but they also provide value because of their strength, durability, versatility and relatively cheap cost (Sadan and de Kock, 2020). Plastic pollution, however, is an enormous challenge globally, including in SADC countries. It requires deep collaboration, accountability and transparency across the life cycle of plastics, from production to use and disposal. In South Africa, a Plastics Pact was launched in January 2020, marking the first such pact in Africa.

Other SADC countries have banned plastic bags. For example, the United Republic of Tanzania enacted regulations prohibiting plastic bags in June 2019, with some exclusions; Botswana, Madagascar, Mauritius and Seychelles have banned certain kinds of plastic bags; bans on bags introduced by Malawi have been challenged in court but upheld to date. In the Democratic Republic of the Congo, the Government has banned the manufacture of certain plastic bags. Various challenges to the implementation of such bans have been observed across SADC countries (Greenpeace, 2020).

4.8.5 Building materials and waste

With increasing urbanization, growing populations and the high-energy intensity of more conventional building materials (such as cement and soda ash), there is an opportunity for SADC countries to support the emergence of value chains with the use of recycled, reused and reconstituted building materials. Construction and organic and plastic waste offer many opportunities.

Many forms of waste (such as fly ash in South Africa⁴¹) provide options for building inputs, as do new biomaterials and combinations of traditional building productions with waste materials. There are new building techniques, too, using such products as timber, hempcrete, straw bales and rammed earth and hybrid engineered composite products, such as beams made of timber and steel in place of concrete and even recycled plastic bottles

⁴¹ Industrial waste streams of fly ash and slag can be used as aggregates in construction. Researchers at the Council for Scientific and Industrial Research are converting fly ash, a by-product of the South African pulp and paper industry, into heat-resistant geopolymers that can be used to protect metal surfaces against high temperatures in furnaces or kilns. It can also be used in a wide range of applications, such as supplementary cementitious materials in the production of Portland cement, in non-cementitious applications such as the synthesis of zeolites and in geopolymer applications. For further details, see www.csir.co.za/beneficiation-fly-ash-pulp-and-paper-mills-valorization-heat-resistant-geo-polymers.



stuffed with plastic film as substitutes for brick (Lowitt, 2020).

New and reconstituted materials require appropriate planning regulations, construction standards, maintenance programmes, materials standards, scalability of production and other such measures.

4.8.6 Materials efficiencies and innovation

The global focus on sustainable consumption and production requires that all materials, including energy and water (both considered earlier), be used more efficiently and that production processes become less wasteful. Industrial inefficiencies can be addressed by far better data, monitoring, the repair of broken equipment, the introduction of modern

equipment, and so forth. There are a range of technologies that assist with materials and process efficiencies. The term “lean manufacturing” refers to this concept of enhanced efficiencies, while “industrial symbiosis” refers to uses for underused or residual resources that can create value, often in a separate enterprise or separate business processes.

4.8.7 Case studies

A number of case studies follow, drawing on a range of waste-related examples involving micro-small and medium-sized enterprises. The examples include materials efficiencies. The first is an industry case study, drawn from examples of energy, water, industrial symbiosis and waste activities in the clothing and textiles industry.

Table 15: Waste and materials efficiency case studies

Name of case study	Country	Waste focus	Type of micro-small and medium-sized enterprise or micro-small and medium-sized enterprise opportunity	Technology used
34. Clothing and textiles industry study	South Africa	Various efficiencies in energy, water, waste and industrial symbiosis	Various in clothing and textiles and in the water, energy and waste services	Various: solar thermal and others
35. Data Prophet	South Africa	Machine learning to identify process inefficiencies in manufacturing	High-tech business	Machine learning Digitalization of processes Application of metrics System monitoring and learning
36. Green Ventures	Malawi	Organic compost from organic waste (smallholder farms)	Organic composting	Composting
37. Palleplast	South Africa	Plastic waste to industrial pallets	Reconstituted plastic products	Specialty moulding
38. AgriProtein	South Africa, and now global	Organic waste to insect or protein for animal feed	Reuse of organic waste	Three trademarked products
39. EcoAct	United Republic of Tanzania	Building materials: plastics and packaging turned into plastic timber	Plastics collectors and builders	Plastic timbers for building, furniture
40. Kudoti	South Africa	Waste marketplace, online	Plastics buyers and sellers	Online marketplace Digttech
41. Divine Recyclers	United Republic of Tanzania	Egg shells to calcium powder	Recycling New bioproducts	Calcium production
42. Envirocrete	South Africa	Scrap waste and recycled wood to green building materials; includes concrete extenders and alternative building processes	Reuse of waste products to produce green building materials and processes	Registered trademarks



Case study 34: Green economy focus on the clothing and textile industry in South Africa

Two of the prioritized manufacturing sectors in the industrialization strategy and action plan of the Southern African Development Community are clothing and textiles, and leather and footwear. A number of examples of green economy innovations exist in these sectors. The present industry case study draws on examples of innovations published by the National Cleaner Production Centre South Africa, GreenCape and the Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN). These intermediary institutions have focused on the clothing and textile industry as one where resource efficiency can be achieved. This demonstrates the potential of an industry-by-industry approach to the adoption of green economy methodologies and technologies.

Clean energy example

- The textile industry requires higher temperatures (above 160 °C) for processes in the polyester sector, but the processes for the other seven fibre types require a maximum temperature level of 140 °C. With support from SOLTRAIN and its partners, a sewing thread manufacturer and supplier in South Africa replaced its heavy fuel oil boilers with a solar water-heating system. The resulting savings totalled 317,000 rand per year in fuel costs. The payback period for the solar thermal systems was estimated at eight months. The system performed better than anticipated (World Wide Fund for Nature, 2017).

Energy efficiency examples

- At a fabrics manufacturer, improvements included improved control of feedwater quality for boilers; the training of boiler operators to standardize work practices and raise efficiency levels; the sourcing of an alternative coal supply, since the coal used at the time of the original assessment was of very poor quality; the changing of coal handling practices to reduce breakage levels and fines; and the installation of several new, energy-efficient production lines and the decommissioning of several older production lines. For details, see National Cleaner Production Centre South Africa, "Industrial energy efficient improvement project in South Africa. Case study – da Gama Textiles", 2021. Available at https://www.industrialefficiency.co.za/wp-content/uploads/2021/05/Case_Study_summary_DaGama_ESO.pdf.
- At a sock manufacturer that exports its goods, although the scale of the company's operations did not justify the recruitment of a maintenance engineer, an energy audit resulted in three efficiencies being introduced: a change of fuel type for boilers, optimization of the steam system, and optimization of compressed air. For details, see: <https://www.industrialefficiency.co.za/wp-content/uploads/2021/05/SME-Sokit-2014.pdf>.

Water improvement examples

- A sewing thread manufacturer has implemented fit-for-application initiatives through water pinch analysis, whereby water quality is matched to its intended use and cascaded through the system. Low-quality water is therefore reused for cleaning in place processes. This has reduced water consumption by 70 per cent over three years.
- An alternative water supplier installed a borehole system to feed its factory's high-use bathrooms, which will save 1.5 million litres of municipal water every year. This initiative complements the company's lean manufacturing model.
- An apparel design and manufacturing company has also invested in the use of borehole water for bathrooms and for rainwater harvesting.

Industrial symbiosis examples

- Thirty resource exchanges were facilitated to redirect waste and by-products to value-adding activities. The aforementioned thread manufacturer buys back thread spools from its customers for reuse at its manufacturing facility. Where spools cannot be reused, they are recycled. This has saved more than 740,000 rand for the company to date and the initiative provides income for local organizations, including the National Institute for the Deaf, which reuses by-products.
- Some clothing and textile businesses sell unused textiles to a material handling company that recycles them into fibres for carpet underfelts.
- One recycling company collects polystyrene waste at no cost from a waste management company and a packaging company, then cleans the waste and sells it to a fibre company that uses the product to manufacture denim jeans. For further details, see https://www.industrialefficiency.co.za/wp-content/uploads/2021/05/ISPCaseStudies_2016-18.pdf.



Case study 35: Data Prophet – machine learning to reduce process inefficiencies (South Africa)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Identification of process inefficiencies to reduce waste	Reduction of inefficiencies	High-tech	Machine learning Digitalization of processes, application of metrics, system monitoring and learning

Data Prophet, an enterprise in South Africa, uses machine learning to generate process efficiencies. Its technology is applicable across a number of manufacturing sectors, including foundries, glass, automotive, rubber processing, semiconductors, mineral processing, steel and aluminium.

Artificial intelligence proactively prescribes changes to plant control plans to continuously optimize production. This generates significant practical impacts, reducing the cost of non-quality by an average of 40 per cent.

Data Prophet has won a number of awards around the world. Perhaps best known for its work at Atlantis Foundries in South Africa, where it digitized two years of hand-written and electronic production history, it works across multiple processes to produce insights. For example, it also extracted, transformed and attached over 6,000 process parameters to quality metrics across an entire ore refinery, enabling the site for artificial intelligence process parameter control. This resulted in 0 per cent shipped defects at a grey iron foundry for three months, more than a 50 per cent reduction in stud weld defects and a 70 per cent reduction in spot weld defects.

Source: Data Prophet (2021).



Case study 36: Green Ventures – organic composting (Malawi)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
Malawi	Organic compost	Reuse of organic waste	Compost from waste	Organic waste recycled into compost.

Green Ventures collects organic wastes from smallholder farmers and households for recycling via composting into high-quality organic fertilizer. It then sells the nutrient-rich, eco-friendly, safe and affordable organic fertilizer back to smallholder farmers as an alternative to chemical and environmentally harmful fertilizers that acidify soils in the long term. The enterprise works in partnership with organic waste suppliers and local non-governmental organizations and intends to work with government field extension officers to enhance the opportunity for smallholder farmers to practise sustainable, eco-friendly agriculture. To that end, it performs the following functions:

Collects over three tons of organic waste from local farms and households

Sells more than 68 bags of organic fertilizer to smallholder farmers

Has increased harvest turnovers for 17 smallholder farmers and reduced fertilizer costs by 35 per cent on average

Has enabled more than 67 farmers and local households to generate income from farm waste

Source: SEED (2021).

Case study 37: Palletplast – recycled plastic (South Africa)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Pallets from recycled plastics	Reuse of plastic, a highly light and durable product	Recycling of plastic into new products	Specialty moulding

This new lightweight pallet has been developed in South Africa for growers, shippers and receivers. The high-tech product uses 12 litres of recycled plastic materials and is derived from a specially designed mould. All major retailers support the reconstituted plastic globally.

Made from as much as 97 per cent recycled polyethylene terephthalate, the pallet can rack-stack 1.2 tons. It is far lighter and more durable than wood, which still makes up the bulk of pallets. Annual demand for pallets in South Africa is estimated to be between 30 and 40 million units a year.

Source: Palletplast (2021).



Case study 38: AgriProtein – animal feed from organic waste (Global)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Insect protein from organic waste	Organic waste becomes insect larvae for animal and pet food	Using organic waste to make protein	Three trademarked products

Insect larvae are becoming an increasingly important source of protein in South African animal-feed and pet-food products. AgriProtein, based in Cape Town, South Africa, has been producing insect material to add to these foods for more than a decade. They take organic food waste from various sites and cultivate fly larvae that feed on the waste. Organic food previously destined for public landfill sites is thus diverted. Insect larvae-based products replace other sources of animal food, including fishmeal, which is a major driver of unsustainable fishing practices. AgriProtein built its first pilot plant and first commercial-scale factory in South Africa. By 2015, the plant could process 100 tons of food waste per day. In 2017, the company embarked on a global expansion, with new capital and new partners.

AgriProtein is now part of the Insect Technology Group. It has three products: a product made from black soldier fly larvae, a versatile oil that can also be used for aquaculture feeds and an organic soil conditioner.

Source: Sguazzin (2020).

Case study 39: EcoAct – building materials from plastic (United Republic of Tanzania)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
United Republic of Tanzania	Plastic to plastic timber for use in building	Reuse of plastic waste	New products from plastic waste	Chemical-free technology

EcoAct is a Tanzanian company that uses a chemical-free and energy-conserving technology to transform plastic waste and packaging materials into tough, long-lasting plastic timbers. The timbers can be used for construction and furniture-making.

The enterprise mitigates climate change not only by reducing plastic pollution, but also by reducing wood dependence and deforestation. It also has a medical insurance programme in which medical coverage is provided in exchange for household plastic waste. This microhealth insurance programme supports 50 low-income households and slum dwellers in exchange for plastic waste. Most of the programme's clients were previously from the tourism industry. Following the COVID-19 pandemic, it is now seeking to supply materials to the agricultural sector, for which purpose it requires seed funding.

Source: SEED (2021).



Case study 40: Kudoti – online waste platform (South Africa)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Online platform for monitoring and to connect buyers and sellers of waste	Industrial symbiosis Waste monitoring	Platform to sell or buy waste	Digitech Online platform

This online platform is a marketplace that connects waste producers and buyers. The easy-to-use digital platform is accessible through any connected device and is ready for immediate use after the initial sign-up process.

Step 1: Sign up and register

Step 2: Add and track your waste data

Step 3: Connect with buyers and sellers

Step 4: Trade recyclable waste

The platform enables direct collaboration across the network, matches supply and demand of recyclable waste in real time and effectively identifies investment needs, making recycling convenient, rewarding and profitable.

It helps waste collectors to find the best buyers, recyclers to identify suppliers, and brands and sponsors to monitor their waste and recycling data..

Source: Kudoti (2021).



Case study 41: Divine Recyclers – eggshells to calcium powder (United Republic of Tanzania)

Country	Waste technology	Sustainability practice	Type of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
United Republic of Tanzania	Recycling of egg shells for biocalcium powder	New product applications from organic waste	New bioproduct development	Crushing of egg shells

Divine Recyclers, in Dar es Salaam, recycles egg shells to produce biocalcium powder. The business seeks to address malnutrition. It also recognizes the many potential industrial applications of calcium. It is estimated that in Dar es Salaam alone there are 10 hatchery companies that recycle no fewer than 100,000 waste egg shells per week. Possible uses include:

- Pharmaceutical industry, agriculture sector, cosmetics industries and paper making industries
- Feed-mill companies, food industries, home applications, orthopaedics and dentistry industry
- Treatment of cancer patients

Divine Recyclers reduces the amount of waste that goes to landfill and creates awareness of the health benefits of egg shells.

Source: Adapted from the Sixth Tanzanian Urban Laboratory presentations received by email from Anton Cartwright, anton@carbon.org.za, 9 April 2021.

Case study 42: Envirocrete bioclimatic houses and building – green building (South Africa)

Country	Waste technology	Sustainability practice	Nature of micro-small and medium-sized enterprise opportunity	Technology used (if applicable)
South Africa	Use of scrap waste and recycled wood to make bioclimatic houses	New product applications from organic waste	New bioproduct development	Trademarked building materials, extenders and processes

Using mineralized woodchips, Envirocrete (Pty) Ltd. provides a system comprising three elements:

1. Envirocrete Raw is a special type of green, lightweight aggregate that provides the perfect combination of the structural properties of cement and the thermal insulation and acoustic properties of wood;
2. Envirocrete Mix is a special type of green concrete that, when batched with ordinary Portland cement ASTM-C150-Type-I and water, can be used to produce such concrete products as hollow core blocks, hollow core slabs, solid precast wall panels, lightweight floors, decking and roof systems;
3. Envirocrete Construction System is an innovative alternative building process that combines best practices used in bioclimatic architecture and engineering with off-site prefabrication industrial production technology.

Source: Envirocrete (2021).

Waste and materials efficiencies	
Main points	Micro- small and medium-sized enterprise opportunities
<p>1. Waste streams – viable polymers, fibres, metals and nutrients – may be used as various inputs, such as energy generation, composting, recycling and industrial symbiosis.</p> <p>2. Building data using digital tools and satellite imagery, along with other technologies, can support a structured approach to waste management. These data and technology services present a range of opportunities for micro-small and medium-sized enterprises.</p> <p>3. Appropriate laws and regulations that are developed together with stakeholders to ensure context relevance can create the environment for micro-small and medium-sized enterprise services, as can government procurement of waste services from micro-small and medium-sized enterprises.</p> <p>4. Waste pickers play a critical role in sorting and removing waste in SADC countries. Work for these informal businesses is hazardous but can also lead to opportunities to reclaim and repurpose goods. Helping these businesses to organize themselves into representative industry bodies can help to address their needs. Waste-services planning should incorporate informal waste services.</p> <p>5. Small-scale private waste transporters and sorting sites present an opportunity for micro-small and medium-sized enterprises, in particular where households are willing to pay for these services or where governments subcontract private services.</p> <p>6. Construction and demolition waste can be reclaimed and reused; plastic waste can be transformed into a variety of new products, including crates and building bricks. High- and low-tech opportunities exist here. New, extra-strong products can be created from recycled waste to replace other products (as in the case of pallets).</p> <p>7. Extended producer responsibility programmes should include informal micro-small and medium-sized enterprises that provide waste services so that these informal businesses are not marginalized.</p> <p>8. Organic waste can become compost, an energy source, biomaterials or animal feed. Surplus food can be diverted too.</p> <p>9. E-waste can have a high value if recycled, although this requires the correct facilities and adherence to environmental health and safety practices. An e-waste initiative involving various member States of the Southern African Development Community may be necessary to achieve economies of scale for effective recycling.</p> <p>10. Biomaterials and biofurneries can offer potential, but the cost of early discovery and piloting may be more appropriate for large companies in partnership with research houses.</p> <p>11. In time, as digital infrastructure becomes more widely available and take-up increases, online marketplaces might become one way to connect waste producers with waste users.</p> <p>12. Innovative solutions are required and could be pioneered by micro-small and medium-sized enterprises to address flooding and ocean waste caused by the build-up of waste in rivers.</p>	<p>Examples: sources and providers of waste</p> <ul style="list-style-type: none"> Organic scrap waste and food waste Electronic waste Metal waste Plastics Tyres Nanowaste Mine waste – degraded lands; water Forestry Sugar, algae and plant oils Fly ash and slag Egg shells Faecal waste Agricultural waste Fisheries waste Construction waste <p>Examples: skills provisions</p> <ul style="list-style-type: none"> Waste data skills – big data Information technology systems and online marketplaces Waste picker Beneficiation Waste route optimizer Organics consultant Building waste manager Waste robotics specialist Offshore plastics recovery Waste trader Dry sanitation provider Waste transporter Waste planner Green urban planning specialist <p>Examples: new product development</p> <ul style="list-style-type: none"> Building materials: biocomposites; timber; hemp; rammed earth Decor Food Animal feed New composites Woodchips Organic fertilizers Reclaimed furniture, electronics Art Energy <p>Examples: technology provision</p> <ul style="list-style-type: none"> Artificial intelligence monitoring Reuse and reclamation Open windrow composting Electronic waste refurbishment Biofurneries and biocomposites Clean and dirty materials recycling Anaerobic digestion Mechanical biological treatment In-vessel composting Energy from waste Underwater drones

Sources: Khisha (2020); UNEP and Technical University of Denmark (2021); University of Stellenbosch Business School Careers Services (2020).

Enabling the participation of micro-small and medium-sized enterprises in the green and blue economies

Chapter 2 addressed the main characteristics of micro-small and medium-sized enterprises in SADC countries; chapter 3 the drivers of green and blue economy uptake in SADC countries and the participation of these enterprises in that process; and chapter 4 the sector-specific opportunities for such enterprises in SADC countries. Taking into account the earlier findings, the present part of the document, chapter 5, includes recommendations for broad cross-sectoral interventions required by governments and industries to support the participation and growth of such enterprises in the green and blue economies of the SADC countries.

There are strong drivers of the green and blue economies and opportunities for the participation of micro-small and medium-sized enterprises. Nonetheless, many such enterprises are constrained by the following characteristics:

- They are livelihood-based microenterprises and informal enterprises that serve local markets.
- They employ mainly women, but are seldom women-led.
- Their participation in regional value

chains and global supply chains is limited and they require regional economic communities and the African Continental Free Trade Area to implement specific measures to protect, support and create opportunities for them to participate in export markets.

- They need targeted support to address their skills needs, market access and infrastructure requirements and to build economies of scale and diversified products and services.
- They struggle to gain access to tailored finance (with appropriate business development services), including cash-flow support.
- They are inhibited by a lack of energy, water, transport, digital and other hard infrastructure, and also soft infrastructure (such as skills) and market information.
- They can be disadvantaged by policies that exclude or marginalize them.

Given the economic importance of micro-small and medium-sized enterprises, the SADC industrialization action plan includes



a proposal for the establishment of support agencies for these enterprises (SADC, 2017a). These are intended, among other objectives, to facilitate the integration of the enterprises into regional and global value chains (SADC, 2017).

It is important to address the multiple requirements of micro-small and medium-sized enterprises. The requirements include access to finance, standards upgrading, market access, diversified goods and services and diversified markets (particularly important during the COVID-19 pandemic), enhanced supply-chain participation and the building of local cross-sectoral linkages. Coordinating the various requirements for the provision of support to these enterprises is best carried out by local, well-funded support agencies. The agencies can provide general business advice, but they can also incubate and accelerate the development of micro-small and medium-sized enterprises. They can also establish linkages with finance providers, technology agencies and other institutions.

Various models exist for green and blue economies and micro-small and medium-sized enterprise support organizations, which have a number of different configurations (see annex VI for examples). There are, however, relatively few dedicated, institutionalized micro-small and medium-sized enterprise programmes for the green and blue economies in SADC countries that support incubation and development over time and have access to secure funding for their operations. Further investments in national institutions are required to support these entities that work for the benefit of micro-small and medium-sized enterprises. A pragmatic approach could be

to build on the strengths of existing institutions, such as universities or innovation hubs, to add enterprise incubation services for green and blue economy micro-small and medium-sized enterprises. Sector-specific programmes for such enterprises in the green and blue economies, for example on distributed renewable energy or waste beneficiation, could also focus the approach. An ideal green and blue economy micro-small and medium-sized enterprise support agency would be able to accommodate a number of such sectoral initiatives and create synergies and linkages across programmes as appropriate.

Support packages for green and blue economy micro-small and medium-sized enterprises also need to accommodate rural enterprises. Section 4.2 on sustainable agriculture demonstrates that extension services, cooperative models and private sector businesses that support specific commodity upgrading all have a role to play here. Similar models exist for bioeconomy harvesters and fishers and for small aquaculture businesses, although there appear to be fewer such extension services in these sectors. In the tourism sector, micro-small and medium-sized enterprises tend to rely more on industry associations at a destination level. These associations can be actively supported by governments and donors to roll out micro-small and medium-sized enterprise programmes within the green and blue economies. Renewable energy, water efficiency and renewable water sources, waste reduction and beneficiation, the sourcing of local and regional inputs, clean local transport, and innovative marine and coastal offerings for regional markets could be focuses for tourism.



Informal microenterprises that sell goods and services to the so-called “bottom of the pyramid” customers play a critical role in livelihoods, employment and food security (SEED, 2020). They should also receive enterprise support. The examples given in the present report of informal cross-border traders and informal food traders are pertinent in this regard. Formalization of these micro-small and medium-sized enterprises should not necessarily be the primary goal in the short term. Rather, priority needs to be given to simplifying the environment in which such informal enterprises operate. This includes through removing red tape and addressing harassment by government officials. Support should be given to the development of trader associations to represent common interests and to help in advocating overall improvements in operating conditions. Small, affordable microloans to assist with cash flow could also be provided. Given that many informal traders are women, strategies must be gender-sensitive and gender-inclusive.

Governments of SADC countries should put in place appropriate standards and assist micro-small and medium-sized enterprises in meeting them and in ensuring that laboratories are available and equipped to test products for local sale and export. Governments have an important role to play after the pandemic in financing and driving the revival of the micro-small and medium-sized enterprises sector through stimulus packages and support. Governments can also provide project finance or guarantee finance for such enterprises through their development finance institutions, including risk finance for commercialization. This constitutes a gap for green and blue economy enterprises that

need to grow their early pilots into larger scale programmes.

The provision of reliable, affordable, accessible, context-appropriate public infrastructure, including digital infrastructure, is a critical function of governments that will improve the operating environment for micro-small and medium-sized enterprises and reduce costs. Furthermore, many of the specific opportunities for such enterprises in agriculture, fisheries and the bioeconomy require rural infrastructure programmes for irrigation, access to inputs (such as resilient seeds for agriculture), storage, refrigeration and transport, the provision of which can be supported by governments.

Skills development programmes could be developed with a SADC-wide focus in emerging areas of green and blue economy competencies. A number of these required competencies are identified in the sector analyses, including in renewable energy services, water services, agriculture and biotechnology. Where certain skills are highly specialized, research and development agencies, universities and technical schools should be supported by governments and donors alike to develop these technical skills that are in such high demand. This includes data science and associated ICT skills that have broad applicability across the green and blue economy sectors (and elsewhere in the economy).

Another important lever for governments to use in supporting micro-small and medium-sized enterprise growth is through government procurement programmes (SADC, 2017a). Governments can establish targets for the participation of such enterprises



(including specific targets for women and youth-led enterprises) in green and blue economy infrastructure provision. In this process, micro-small and medium-sized enterprises can be primary service providers or participate through local-content stipulations by providing goods and services to large lead firms that design and deliver infrastructure roll-out. A review of the literature shows that procurement can support intra-regional trade for women-owned businesses through the financing opportunities that it provides (UN-Women, 2019). Government initiatives and agencies and public-private partnerships⁴² can also provide regular market intelligence reports on green and blue economy sectors and link firms in and between sectors.

The private sector must also play a role in supporting green and blue economy micro-small and medium-sized enterprises. Information-sharing has an important role to play in this process, creating opportunities for collaboration with governments to address regulatory or infrastructure constraints. Industry commodity or subsectoral associations⁴³ should have targets to actively

include micro-small and medium-sized enterprises, in particular those that are women-led and youth-led. There is also an opportunity to support women's associations, or chapters in associations, in the green and blue economy sectors. Women's participation in collective action, self-help groups and other institutions is a key enabler of gender equality (du Preez, 2018). To support the participation of women-led micro-small and medium-sized enterprises in industry associations, interventions can be designed that anticipate and accommodate the multiple factors that have an impact on women's time, such as household and family work.

As already indicated, the green and blue economies have strong links with Goal 17, on partnerships for the Goals. Partnerships will be essential to successfully support micro-small and medium-sized enterprises in seizing opportunities in the green and blue economies. Regular, structured, transparent engagements should be established between government and the private sector in the green and blue economy sectors and across cross-cutting themes (such as technology, finance and trade).

⁴² See Annex VI.

⁴³ Improving and enabling cross-border associations could help small traders to gain access to information and comply with standards and to lobby for the simplified application of regulations and better conditions of trade, in particular for women traders (UN-Women, 2019).

Conclusion: proposals for the development of an action plan for the countries of the Southern African Development Community

In the present report, select drivers of the green and blue economies in SADC countries are explored and the opportunity these present for micro-small and medium-sized enterprises, including at a sectoral level, are indicated. For such enterprises to take advantage of this opportunity, they need to take certain actions. Proposed actions can be grouped into a number of categories:

- Micro-small and medium-sized enterprise system
- Industrial policy interventions
- Infrastructure enablement
- Trade support
- Pragmatic implementation

6.1 Micro-small and medium-sized enterprise system proposals

6.1.1 Deepen, institutionalize and fund the support system for micro-small and medium-sized enterprises in the green and blue economies

A number of institutions and programmes already exist to support the development of

micro-small and medium-sized enterprises in the green and blue economy. Given that the concept of the green and blue economies is relatively new, however, and given the formidable challenges experienced by these enterprises in SADC countries, there is a need for more institutionalized national and subnational entities that are well funded. These agencies, including incubators, should deliberately target participation by women- and youth-led micro-small and medium-sized enterprises.

Support agencies can provide ongoing advice, networking, finance, technical skills, market linkages, support in the area of standards and labelling, and motivation for policy and regulatory reform, among other services. For example:

- Micro-small and medium-sized enterprises can benefit from industry collaboration (and organization), co-location and clustering.
- Linked to this, national programmes that explicitly allocate preferential finance to micro-small and medium-sized enterprises in the green and blue economies can help to stimulate growth. This should be tied to



business development services. Support agencies can assist with both these roles.

- There is a critical role for technology innovation agencies, universities and other such institutions where research and development takes place. These capabilities can seed new commercial green technology (as in the case of biotechnology partnerships and water and sanitation innovations).
- Skills development programmes need to be targeted at growth areas linked to the green and blue economies. Here, new technologies are critical to production, as are new methodologies. The main tables for each sector considered in the present report provide examples of the kinds of skills that will be needed in the different green and blue economy sectors. SADC-wide programmes should be considered for certain skills.
- Building robust national and sub-national support agencies for micro-small and medium-sized enterprises in the green and blue economies will make it possible to provide continuous and consistent support services, partnership development and greater resource mobilization for such enterprises.

6.1.2 Invest in medium-sized firms

There is little literature on medium-sized firms within the broad category of micro-small and medium-sized enterprises in SADC countries, in particular within the green and blue economies. These more established firms are those

most likely to be able to scale up production, to trade, to invest in research and development, and to adopt new green technologies. They may already be integrated into value chains, active in industry associations, and compliant with laws and standards. Medium-sized firms could be particularly important in driving trade through the African Continental Free Trade Area in the short to medium term.

Like other micro-small and medium-sized enterprises, medium-sized firms require finance to grow. An initiative to create a line of concessionary or discounted finance for medium-sized firms for expansion could serve both to scale up these enterprises and to support more knowledge about them. While renewable energy has been the focus of a number of customized financial programmes and investment funds in SADC countries, there is an opportunity to establish similar funding programmes for other green and blue economy sectors. This should be subject to initial scoping of the size and nature of opportunity in each sector and mapping and alignment with other sources of finance and business support.

6.1.3 Include informal enterprises in green and blue economy sector programmes and policies

Informal enterprises play an important role in, among other purposes, serving so-called “bottom of the pyramid” customers with access to food. Informal enterprises require different enterprise support services from formal micro-small and medium-sized enterprises. These can include information and training, assistance with formalization, access to extension services, support to form regional or commodity trade associations, coordination for bulk input purchasing and marketing



and making the case to governments for policies to support them.

A particular requirement exists for more research into informal cross-border trade enterprises and the design of appropriate policies to enable such trade. Simplified border procedures can help these micro-small and medium-sized enterprises. Access to information on trade opportunities and on tariffs can also support their business growth. Where informal cross-border trader associations exist, Governments, together with their border agencies, should have regular engagements with the association to help the sector to operate legally and with ease.

6.2 Industrial policy proposals

6.2.1 Design and implement specifically urban industrial programmes for micro-small and medium-sized enterprises in the green and blue economies

While rural infrastructure is critical for micro-small and medium-sized enterprises in agriculture, fisheries, tourism and the bioeconomy, a complementary focus is also required for urban areas. Such a focus can take advantage of growth potential and densely populated cities:

- Inclusive green urban industrial programmes present significant economic opportunities, given that cities house millions of people who require goods and services. The scale of cities means that demand for micro-small and medium-sized enterprise services is greater and is growing more quickly than in many rural areas.
- Urban systems should be mapped to reveal the scope and potential opportunities for micro-small and medium-sized enterprises, including those that are informal, and the linkages and feedbacks between sectors.
- Inclusive green urban industrial programmes should be designed to support a range of micro-small and medium-sized service providers working in such sectors as renewable energy, waste, water and sanitation, urban agriculture and food, transport and low-cost housing.
- Regulations must support micro-small and medium-sized enterprises in their work to offer distributed energy, water and sanitation, waste services, building materials and transport services as part of government urban infrastructure programmes.
- Programmes to incubate micro-small and medium-sized enterprises that provide these services can support skills transfer, access to finance and innovative business cases.
- Governments can also provide centralized services and infrastructure, including, as appropriate, market intelligence, storage facilities, the clustering of different activities into special economic zones or commercial zones, appropriate municipal regulations to support small-scale enterprises, including food vendors, and so on.



6.2.2 Undertake detailed analysis of the value chains prioritized in the industrial strategy of the Southern African Development Community to identify and harness greening opportunities

Many of the value chains prioritized by SADC could benefit from greening, in other words, from renewable energy, water efficiency and reuse, waste reduction and reuse, and also from materials efficiencies or new input materials. These green technologies could confer trade advantages on the lead firms, in particular for market access to such destinations as the European Union, where border taxes are likely to be imposed on carbon-intensive products.

The industry case study on the clothing and textiles industry in South Africa (see case study 35 above) demonstrates the financial benefits and efficiency gains resulting from the adoption of green technologies. These technology upgrades were supported by a number of government and donor-funded programmes that provided advisory services and capacity-building, together with some concessional finance. This demonstrates the importance of support tailored to micro-small and medium-sized enterprises in the green and blue economies.

6.2.3 Devise and implement appropriate green local-content provisions linked to major government procurement programmes (for import substitution) to support the growth of local green and blue economy firms, including micro-small and medium-sized enterprises

One such approach could be to identify import substitution potential and link it to areas in which nascent manufacturing potential

exists. Research indicates, for example, that there is potential for a wind energy value chain for the SADC countries (Khisha, 2020; Morris and others, 2020a)

6.2.4 Build upon existing green and blue economy capabilities

Green and blue economy capabilities could be harnessed and built on through:

- Clustering development and industry organization in areas of existing capabilities and exploring linked opportunities for beneficiation in these industries, such as through further development and cluster development of fisheries and fish processing and of aquaculture and its associated processing
- Extending product and service capabilities into areas of green adjacent potential, including the bioeconomy and including emerging specialties in biotech and in water and sanitation technologies
- Deepening intersectoral linkages, in particular those between micro-small and medium-sized enterprises in the tourism sector and green and blue economy inputs in tourism operations, such as perfumes, spices, textiles, food and other products from SADC countries



6.3 Infrastructure proposals

6.3.1 Expedite access to affordable energy, water and sanitation, transport infrastructure, digital infrastructure and technology

Such infrastructure is critical to the growth of the green and blue economies in SADC, as detailed below:

- Taking a water-energy-food nexus approach is necessary to plan for how these three sectors interact in practice and the interdependencies between them.
- Green and blue economy micro-small and medium-sized enterprises demonstrate circular economy opportunities and enterprise responses to resource scarcity and interdependencies. These enterprises are already well positioned to provide renewable energy services, water and sanitation services, and sustainable food and fisheries practices, along with industrial symbiosis (such as between organic waste and organic compost, for example, and, in a similar fashion, with building materials). These micro-small and medium-sized enterprise business models should be supported for widespread adoption.
- Renewable energy should be expedited at both the utility and the distributed levels to provide access to clean energy for industry and enterprise growth. The renewable energy case studies outlined above demonstrate the many small-scale innovations already taking place, which should be adopted more broadly and supported through enabling regulations.
- Water is a sector that is critical for life itself and necessary for agriculture to support food security. Many smallholder farms do not have access to water and alternative small-scale water infrastructure services should be explored, including microirrigation and mini-irrigation, rainwater harvesting, small dams and investment in ecological infrastructure. Currently, however, there appear to be fewer micro-small and medium-sized enterprises operating in this sector than in energy and waste. Water services and integrated water management for farming and human settlements in particular require more research. For water innovations, support for commercialization is required, along with enabling laws.
- Waste offers huge potential, and there are many examples of innovations in this area, including linkages to green building materials, which should form part of the green industrial urbanization strategy. More data and better enabling regulations are required to manage risks and also to support efforts by micro-small and medium-sized enterprises to benefit from waste and to unlock more opportunities. More research is required on marine waste in SADC countries and on exploring the linkages between land-based and marine waste.



- Digital technologies are critical for the green and blue economies. Without broadly available affordable Internet, the digital divide will further marginalize certain micro-small and medium-sized enterprises in the green and blue economies, in particular informal businesses in rural areas. Programmes to support ICT networks and digital skills should be a priority area of support for such enterprises. These can provide particular career and entrepreneurial opportunities for young people.
- Micro-small and medium-sized enterprises in new green and blue economy sectors, such as those linked to bioprospecting, biotechnology and biochemicals, require access to very specific expertise and technologies. Technology partnerships and transfers will be key for SADC countries to benefit in an equitable fashion from the developments in these areas, such as marine biotechnology. Building regional skills and technological capabilities is critical. Investing in deepening existing capabilities and pockets of excellence can help these areas flourish, rather than just survive.
- Lowering tariffs on environmental goods and services for intra-African trade, in particular renewable energy technology inputs and also water equipment and devices
- Tracking trade in environmental goods and services in Africa to develop an understanding of import and export patterns and barriers in key environmental goods and services
- Applying a consistent approach to intellectual property rights, with commitments to build capacity in institutions that deal with such rights, and cooperating on important issues such as health
- Adopting provisions on intellectual property rights to protect traditional knowledge, genetic resources and folklore
- Using competition policy to discipline illegal, unreported, and unregulated fishing and to support broad participation in the region's blue economy more generally (UNDP, 2020d)
- Supporting micro-small and medium-sized enterprises in participating in trade by making information about trade more readily available, including information on tariffs and regulations
- Encouraging countries to report more deliberately on the participation of micro-small and medium-sized enterprises in trade, and also requiring them to consider potential effects on

6.4 Trade proposals

6.4.1 Design regional and continental trade agreements to support the green and blue economies and the micro-small and medium-sized enterprises within them

Operationalization of the African Continental Free Trade Area should include:



those enterprises prior to the introduction of new trade regulations and customs procedures, as well as access to finance and cross-border payments

- Putting in place simplified trade regimes and improved customs cooperation in order to reduce trade costs and incentivize the transition to formality, for informal cross-border trade, where appropriate
- Considering the designation of tariff lines as “sensitive” where they are dominated by small-scale producers and where they may suffer if imports quickly dominate and outcompete them (UN-Women, 2019)
- Supporting the harmonization of regional standards and accelerating the implementation of mutual recognition agreements while strengthening knowledge-intensive agencies to help firms to enter regional value chains and remain in them (Sawere, 2019)
- Expediting work on non-tariff barriers

6.5 Implementation proposals

6.5.1 While building greater policy coherence, advance pragmatic implementation

A comparison of the SADC industrialization action plan, the SADC green economy strategy and the SADC blue economy concept note reveals areas where there is little align-

ment. Actions are needed to better align implementation:

- It has already been recommended above that there needs to be a detailed green and blue economy analysis of existing prioritized regional value chains at the commodity level.
- A second recommendation, also made above, is that support for small-scale innovations in energy, water and sanitation and waste, which cut across all sectors, should be accelerated. Support should include legislative and regulatory enablement and incubation for micro-small and medium-sized enterprises, including access to appropriate finance.
- A third recommendation is to continue to build initiatives on green and blue economy priority areas that have been jointly agreed between SADC countries that have aligned policies – such as in emerging areas of biotechnology – as applicable to health, agriculture, bioeconomy, and marine and fisheries surveillance. This pragmatic approach will make it possible for other SADC countries to join as momentum builds and gains increase. A top-down cooperative approach involving all SADC countries is not always viable as a starting point. Incremental gains on specific issues between two or more countries could unlock development in the short term.

Interviews

Face-to-face or online interviews were held with the following persons:

- Anton Cartwright, 7 April 2021
- Matthew Cullinan, 12 April 2021
- Alexis Grosskopf, 15 April 2021
- Elize Hattingh, 14 April 2021
- Faizel Ismael, 5 May 2021
- Dudley Jackson and Theo Pistorius, 21 April 2021
- Rest Kanju, 26 April 2021
- Rethabile Melamu, 21 April 2021
- Najma Mohamed, 8 April 2021
- Gaylor Montmasson-Clair, 14 April 2021
- Angelique Pouponneau, 17 May 2021
- Lisa Scriven, 6 April 2021
- Roland Vorwerk, 22 April 2021

Southern African Development Community – main exports (United States dollars, 2019 value)

Product label	Exported value in 2016	Exported value in 2017	Exported value in 2018	Exported value in 2019
Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	34 790 100	47 014 789	52 312 837	45 611 094
Natural or cultured pearls precious or semi-precious stones; precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin	26 645 555	26 878 391	29 433 307	27 267 413
Ores, slag and ash	10 544 039	14 450 333	15 822 060	16 183 265
Copper and articles thereof	8 129 909	9 957 753	13 325 147	11 926 817
Vehicles other than railway or tramway rolling stock and parts and accessories thereof	9 412 629	10 049 105	11 244 126	11 701 641
Machinery, mechanical appliances, nuclear reactors, boilers; parts thereof	5 878 729	6 024 523	6 492 990	6 085 990
Iron and steel	5 524 111	6 533 493	6 785 767	5 846 295
Inorganic chemicals; organic or inorganic compounds of precious metals, of rare earth elements	2 531 768	6 201 197	12 124 498	5 302 177
Edible fruit and nuts; peel of citrus fruit or melons	3 405 557	4 150 262	4 075 634	4 005 798
Aluminium and articles thereof	2 429 282	2 998 559	3 374 770	2 860 288
Other base metals; cermets; articles thereof	1 051 397	2 304 801	3 962 033	2 247 768
Tobacco and manufactured tobacco substitutes	2 398 633	2 147 653	2 259 528	2 187 228
Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television	2 549 541	2 218 822	2 334 636	2 073 274
Fish and crustaceans, molluscs and other aquatic invertebrates	1 605 288	1 725 362	1 945 644	1 799 159
Sugars and sugar confectionery	1 167 310	1 273 515	1 420 281	1 662 680
Plastics and articles thereof	1 346 126	1 446 400	1 659 164	1 644 574
Beverages, spirits and vinegar	1 527 068	1 653 507	1 710 320	1 572 543
Miscellaneous chemical products	1 524 535	1 364 169	1 395 156	1 489 919
Articles of iron or steel	1 457 617	1 404 965	1 607 489	1 395 627
Essential oils and resinoids; perfumery cosmetic or toilet preparations	1 126 779	1 304 629	1 412 700	1 313 470

Source: ITC (2020).



Annex II

Eco Mark Africa eco-labelling scheme

Eco Mark Africa is a recent initiative to set up a shared trademark for African goods. Eco-labelling for African products was identified as an effective, market-based instrument for improving access to international markets. The mechanism was also conceived to include a large number of smallholder producers and small businesses in Africa. For this reason, there are plans to have a capacity-building programme to prepare producers and service providers for the certification process.

Progress includes:

- Four draft standards for the core sectors have been developed, along with a marketing concept, a logo and marketing materials.
- The brand registered with the European Union Intellectual Property Office and the World Intellectual Property Organization was successfully transferred to the African Regional Standards Organization in November 2017.
- Furthermore, nine national certification organizations and one private organization have expressed their interest in certifying according to Eco Mark Africa criteria and four of the five pilot countries (Kenya, Nigeria, Rwanda and Zimbabwe) have adopted the African Regional Standards Organization standards as their national standards through publications in law gazettes and national registers.
- A total of 87 auditors have been trained in the use of the Eco-Mark Africa criteria and have applied to be registered as Eco Mark Africa auditors in the database of the African Regional Standards Organization and Eco Mark Africa.

The first four standards address sustainability and eco-labelling requirements in four sectors:

- For agriculture, the standard sets requirements for the sustainable production, processing and trading of agricultural products, including food, beverages and non-food products; livestock, livestock products and bee products; wild harvested products; and agricultural fibre products
- For fisheries, the standard sets requirements for the sustainable harvesting of fish up to the point at which the fish are landed (marine and inland capture fisheries only)
- For forestry, the standard sets requirements for providing forest owners and managers with environmental, economic, social and cultural criteria, as well as requirements that support the sustainable management of forests (intended for application to any forests managed for the production of forest products and services)
- For tourism, the standard sets requirements establishing a common understanding of sustainable tourism, specifying the minimum measures that any tourism management services wishing to be sustainable should aspire to reach (the standard also promotes ecotourism)

Two main challenges were identified during the implementation of the standards by the African Regional Standards Organization:

- High costs associated with the certification process and other conformity activities
- Insufficient knowledge of and attention to the need for and importance of eco-labelling, in particular among government policymakers, industries and small and medium-sized enterprises, consumers and the general public

Source: German Agency for International Cooperation (2021a).

Technology needs assessments in countries of the Southern African Development Community

Mozambique	Zambia		
<p>Priority technologies for mitigation</p> <p>Agriculture</p> <ul style="list-style-type: none"> • Seed production and conservation and the promotion of low-cost seed and grain storage systems • Conservation agriculture • Rainwater harvesting and conservation <p>Coastal zone sector</p> <ul style="list-style-type: none"> • Flood-warning system • Restoration of mangroves 	<p>Priority technologies for adaptation</p> <p>Agriculture and food security</p> <ul style="list-style-type: none"> • Conservation farming • Mixed farming • Crop diversification and new varieties <p>Water</p> <ul style="list-style-type: none"> • Rainwater collection from ground surfaces, small reservoirs and microcatchments • Boreholes and tube wells to supply domestic water during droughts • Improved resilience of protected wells against flooding 	<p>Priority technologies for mitigation</p> <p>Energy</p> <ul style="list-style-type: none"> • Electricity generation: biomass combustion, geothermal, wind energy, biomethanation and photovoltaic utility • Biofuels: biodiesel from jatropha, and bioethanol from sugar cane, sweet sorghum and maize • Energy efficiency: energy management systems, industrial and commercial end-use efficiency, and household end-use efficiency • Improved cooking devices: improved charcoal stoves and improved firewood stoves and biogas for cooking • Improved charcoal production: brick kilns, improved traditional kilns and metal kilns • Off-grid systems: mini-hydro, biomass gasifiers and biogas digesters <p>Agriculture, land-use change and forestry</p> <ul style="list-style-type: none"> • Conservation agriculture 	

Madagascar	Malawi
<p>Priority technologies for adaptation</p> <p>Agriculture</p> <ul style="list-style-type: none"> • Resilient rice technology packages • Association of fruit crops and food crops along contour lines or with agroforestry • Production of high-quality organic fertilizers <p>Water resources sector</p> <ul style="list-style-type: none"> • Integrated water resources management • Gravity-fed drinking water supply • Drinking water supply by drilling, equipped with a hand pump or motorized pump 	<p>Priority technologies for mitigation</p> <p>Energy</p> <ul style="list-style-type: none"> • Large hydropower plant • Small hydropower plant • Light-emitting diode (LED) lamps <p>Industry</p> <ul style="list-style-type: none"> • Reduction of clinker-cement ratio by the addition of fly ash • Bioplastics • Industrial waste recycling (sawdust)
<p>Key technologies prioritized for adaptation</p> <p>Agriculture</p> <ul style="list-style-type: none"> • Landscape restoration for improved land productivity • Integrated crop-livestock-aquaculture-forestry systems • Community-based agricultural extension <p>Water</p> <ul style="list-style-type: none"> • Rainwater harvesting • Integrated river basin management • Integrated flood management 	<p>Key technologies prioritized for mitigation</p> <p>Energy</p> <ul style="list-style-type: none"> • Promotion of liquefied petroleum gas for household cooking • Promotion of biofuel as vehicle fuel • Biomass gasification technology • Lake Malawi hydrokinetic electric power technology • Promotion of improved charcoal production kilns • Solar photovoltaics <p>Forestry</p> <ul style="list-style-type: none"> • Forest landscape restoration • Efficient use of forest products • Urban forestry



United Republic of Tanzania		Mauritius	
<p>Priority technologies for adaptation</p> <p>Agriculture</p> <ul style="list-style-type: none"> • Improved variety seeds • Systems to intensify rice cultivation • Drip irrigation <p>Water</p> <ul style="list-style-type: none"> • Rainwater harvesting from rooftops • Water leakage reduction programmes • Water recycling and reuse 	<p>Priority technologies for mitigation</p> <p>Energy</p> <ul style="list-style-type: none"> • Minihydropower and microhydropower • Fluidized bed boilers • Rooftop solar farms <p>Forestry</p> <ul style="list-style-type: none"> • Sustainable forest management • Agroforestry • Mangrove conservation, rehabilitation and restoration 	<p>Priority technologies for adaptation</p> <p>Water</p> <ul style="list-style-type: none"> • Desalination • Rainwater harvesting • Hydrological model <p>Agricultural sector</p> <ul style="list-style-type: none"> • Scaling up of locally proven integrated pest-management technologies • Microirrigation (gravity-fed drip and mini- and microsprinkler irrigation) • Decentralized rapid pest and disease diagnosis service (plant clinic) <p>Coastal zone sector</p> <ul style="list-style-type: none"> • Restoring coastal vegetation • Wetland protection • Dune restoration • Rock revetment 	<p>Priority technologies for mitigation</p> <p>Energy</p> <ul style="list-style-type: none"> • Wind (utility scale) • Photovoltaics (>1 MW) • High-efficiency boilers (heat recovery)



Seychelles	
<p>Priority technologies for adaptation</p> <p>Coastal zone</p> <ul style="list-style-type: none"> • Mapping • Wetland restoration • Dune restoration <p>Water</p> <ul style="list-style-type: none"> • Rooftop rainwater harvesting with water treatment and safe storage • Water-efficient appliances • Ground surface rainwater harvesting 	<p>Priority technologies for mitigation</p> <p>Energy</p> <ul style="list-style-type: none"> • Waste heat recovery at the Roche Caiman thermal power plant for electricity generation • Waste-to-energy (centralized anaerobic digester) • Centralized utility-scale photovoltaics (with some battery storage) <p>Land transport</p> <ul style="list-style-type: none"> • Low-carbon private car fleet consisting of a combination of hybrid and electric cars • Victoria traffic management plan • Electric scooters

Source: UNEP and Technical University of Denmark (2021).

Hungry Cities Partnership: informal market food vendors (Maputo)

Country	Product or offering	Sustainable agricultural practice	Nature of micro-small and medium-sized enterprise opportunity	Technology used
Mozambique	Mainly vegetables	Informal markets	Small-scale food vendors	None

In most cities in countries of the Southern African Development Community, including Maputo, the informal food economy comprises a dense and diverse network of informal markets, suppliers, transporters, mobile traders, hawkers, retailers and street food vendors, making food more accessible and affordable in low-income areas.

Studies of the informal sector suggest that the opportunities and obstacles to successful informal entrepreneurship vary considerably by enterprise size, type and location, and also by the vendor's gender, migrant status, ethnicity, caste and access to microfinance, markets and support programmes.

National, regional and municipal policies geared towards informality and informal entrepreneurship vary from largely absent to attempts to control and eliminate informality, including criminalizing elements of informal entrepreneurship. Given its importance in the food system, for the informal food system to support innovation and entrepreneurship, policies need to be supportive of the environment.

Maputo's food markets play an integral role in the functioning of the urban food system and provide an abundant food source for the city's residents. The household food security survey of the Hungry Cities Partnership showed that markets are the most popular food source in Maputo. Over 90 per cent of sampled households regularly shop for food at the markets and over 50 per cent do so at least five days per week.

In all, 1,022 small-scale food vendors were surveyed in Maputo in 2017. The survey was conducted among food vendors with five or fewer employees in and around seven markets in the city of Maputo. The major findings include:

- Women make up 76 per cent of food vendors in the markets but men have more access to capital.
- Most informal food vendors have limited education.
- The primary motivation for entering the informal food sector is the need to make money to survive. However, even though the vendors appear to be necessity-driven survivalists, many have a strong entrepreneurial orientation. Although it is important to view these vendors as running microenterprises, they are not disconnected from their households.
- Food items are most often purchased from wholesalers, vegetables are the most common item sold and a wide variety of food is available.
- Rather than competing with other vendors through undercutting, vendors prefer to negotiate prices with their customers, give discounts to loyal customers and allow them to buy on credit.
- Competition with other vendors is the main challenge that they face.
- Fewer than 10 per cent said that lack of access to finance and lack of skills were the biggest challenges that they faced.
- Only a few vendors use mobile telephony as a strategy.
- In the market, vendors seem to be able to operate with relative safety, which is not the experience of other food vendors, in particular street vendors. Market environments are spaces in which food vendors can operate in relative freedom and safety.

Source: Raimundo and others (2020).

Annex V

Regional supermarket chains and local producers

Countries	Product or offering	Sustainable agricultural practice	Nature of micro-small and medium-sized enterprise opportunity	Technology used
Botswana, South Africa, Zambia, Zimbabwe	Various, including processed food.	Access to market, including regional markets	Market access to supermarkets for regional reach	Various

Supermarkets provide consumers with ready access to a wide range of goods. They can also provide access to market for producers. In the countries of the Southern African Development Community (SADC), supermarkets can assist suppliers in upgrading their capabilities. Supermarkets have a pivotal role in stimulating food processing and manufacturing. Botswana, South Africa, Zambia and Zimbabwe were considered in the study.

The growth of supermarkets in SADC countries provides potential to stimulate and revive industries and creates opportunities for local suppliers, as follows:

- Country policies and laws need to be harmonized. A specific approach could be adopted for the supermarket industry with shelf allocations. Food product standards could also be considered for harmonization. Suppliers could explore the use of South African trucks, which often return empty once deliveries have been made.
- Support needs to be provided to suppliers: supermarkets require cost-competitive, high-quality products, and reliability and scale of supply in their suppliers. Investments in machinery and barcoding capabilities could also support suppliers' entrance into supermarkets.
- More substantive long-term supplier development programmes should be introduced by supermarkets. These might require government support, including funding. Lack of finance and retail skills were cited as major barriers to expansion for suppliers.
- As suppliers upgrade their capabilities, competition authorities will need to monitor the emergence of large suppliers and possible anti-competitive behaviour. Fair competition is necessary for independent retailers, which tend to have less onerous standards and fewer additional costs imposed on suppliers, making them a potentially easier route to market. Distribution centres for newer or smaller retailers may also require government support.
- Private standards imposed by supermarkets can have additional costs. Voluntary codes of conduct are one approach to correcting this power imbalance and covering negotiations of trading terms (as in the case of house brands, for example). Appropriate retail space can be supported by governments in urban planning to encourage inclusivity, and open up markets.

Source: Summarized and adapted from das Nair and Chisoro-Dube (2016).

Examples of programmes and agencies to support the green and blue economies and micro-small and medium-sized enterprises

- GreenCape, based in the Western Cape Province in South Africa, was established in 2010. The company provides a range of services, such as an industrial symbiosis programme, training and capacity development (for example, to support the adoption by municipalities of small-scale embedded generation), project management for a new special economic zone, drought business support and a range of market intelligence reports. GreenCape operates an innovative finance scheme to support green entrepreneurs. It also serves as the secretariat for the Plastics Pact of South Africa and is a member of the International Cleantech Network (Greencape, 2020b).
- The Southern African Solar Thermal Training and Demonstration Initiative, known as SOLTRAIN, is a programme to support Botswana, Lesotho, Mozambique, Namibia, South Africa and Zimbabwe in using solar thermal energy to replace fossil fuels. SOLTRAIN was launched in 2009 and is currently in its fourth phase of cooperation with the aforementioned countries. The implementing agency works with local partners to improve access to solar thermal solutions. By the end of phase III in 2019, approximately 3,000 people had attended its 110 training courses and 326 solar thermal systems had been installed with a collector area ranging from 2 to 600 m² per system. National solar thermal road maps have also been developed through this initiative (Soltrain, 2023).
- Seychelles recognized the need for the sustainable use of fish stocks through improved governance and management of the sector. To meet the cost of this transition, the Government of Seychelles issued a \$15 million bond, known as the Seychelles blue bond. The proceeds of the bond would be used for three objectives: first, expanded sustainable-use marine protected areas; second, improved governance of priority fisheries; and third, sustainable development of the blue economy (such as investment in developing greater value addition from aquaculture; industrial, semi-industrial and artisanal fishing; and processing sectors). The proceeds of the blue bond are administered by the Seychelles Conservation and Climate Adaptation Trust, which disburses \$3 million in grants, and the Development Bank of Seychelles, which provides loans. The Trust has used the proceeds of the blue bond to fund 17 projects, including research projects, education and skills projects, pilot projects, internships, value chain analysis and mapping projects (Seccat, 2020).
- The Tanzania Urbanization Laboratory is a community of urban specialists from government, civil society, development partners, academic organiza-



tions, think tanks and the private sector, who convene to identify problems, risks and opportunities facing cities in the United Republic of Tanzania. In 2019, the Laboratory completed a two-year process of preparing the Tanzanian urbanization road map (Tanzania Urbanization Laboratory, 2019).

- OceanHub Africa seeks to accelerate innovative impact-driven start-ups in Africa with the aim of protecting the oceans. It convenes events to bring ocean stakeholders together and hosts an annual accelerator cohort of top entrepreneurs chosen from businesses through a competitive process. The first cohort was formed in 2020 and the second in 2021 (Oceanhub Africa, 2023).
- Founded in 2002 at the World Summit on Sustainable Development, SEED emerged from a recognition that the promotion of social and environmental entrepreneurship is critical. The organization works directly to support enterprises and entrepreneurs and provide a comprehensive SEED support package of business and capacity-building support, networking and profiling at the national and international levels. It also works with partners in the broader landscape, including local business development service providers. Indalo Inclusive South Africa, a separate entity, was launched in 2017 as the first institutionalized local organization hosting partner for SEED. It provides direct support to South African enterprises and aspiring entrepreneurs. Enabling the registration of this local institution is part of the SEED approach to building local capacity for eco-inclusive enterprise support (SEED, 2023).
- Innovation Hub is the innovation agency of the Gauteng Province of South Africa. The Hub supports economic development and competitiveness through fostering innovation and entrepreneurship. A number of business incubators provide support across prioritized sectors and industries:
 - ♦ The Maxum business incubators focus on fourth industrial revolution technology, including ICT, advanced manufacturing, gaming, animation and virtual reality.
 - ♦ The Climate Innovation Centre supports start-ups in the green economy, including in energy, water and waste.
 - ♦ The BioPark supports entrepreneurs in the bioeconomy.
 - ♦ Ekasilabs provides business development support in townships with ICT and advanced manufacturing, bioeconomy, green economy, creative economy and multimedia services.
 - ♦ Mlabs focuses on mobile technology innovations (The Innovation Hub, 2023).
- Indalo Inclusive is a non-profit company that functions as an entrepreneurial system for the green economy in South Africa. The Indalopreneurs Just Transition Enterprise Support Programme was launched in 2020 to



support innovative business ideas by existing or established enterprises in such areas as renewable energy, energy efficiency, food and agriculture, water, transport and industrial technology in the mining communities and value chains, starting in the Limpopo and Mpumalanga provinces of South Africa (Indalo Inclusive, 2020).

- Impact Hub Harare and Impact Hub Lusaka are part of a global community of impact hubs. Impact hubs provide learning and education, start-up support, institutional innovation, convening and system development (Impact Hub, 2023).
- New accelerator labs developed under the United Nations Development Programme are located in all member States of the Southern African Development Community except the Comoros. The accelerator labs are designed to close the gap between the current practices of international development in an accelerated pace of change. They model a new capability to make breakthroughs on the future

of development: inequality, decarbonization, the fourth industrial revolution and new forms of governance (United Nations Development Programme, 2023).

- Switch African Green is a programme implemented by the United Nations Environment Programme in participating countries, including the SADC countries Mauritius and South Africa. Since 2014, Switch Africa Green has been supporting African countries in their transition towards sustainable development. The programme is designed to support and contribute to the achievement of the Sustainable Development Goals – specifically Goal 12, on responsible consumption and production – in Africa. The programme is focused on four sectors: agriculture, manufacturing, integrated waste management and tourism. Within the priority sectors, specific actions address five cross-cutting themes: energy efficiency, labelling and standards, water efficiency, eco-innovation and sustainable trade (United Nations Environment Programme, 2023).

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