

Africa Environment Outlook for Business

OUR ENVIRONMENT OUR WEALTH



Africa Environment Outlook for Business

OUR ENVIRONMENT OUR WEALTH



Funded by
the European Union

© 2023 United Nations Environment Programme

ISBN: 978-92-807-4060-8
Job Number: ROA/2558/NA
DOI: <https://doi.org/10.59117/20.500.11822/43127>

*This publication may be reproduced in whole or in part and in any form for educational or non-profit services without special permission from the copyright holder, provided acknowledgement of the source is made. The United Nations Environment Programme would appreciate receiving a copy of any publication that uses this publication as a source. No use of this publication may be made for resale or any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to **unep-communication-director@un.org**.*

Disclaimers

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory or city or area or its authorities, or concerning the delimitation of its frontiers or boundaries. Mention of a commercial company or product in this document does not imply endorsement by the United Nations Environment Programme or the authors. The use of information from this document for publicity or advertising is not permitted. Trademark names and symbols are used in an editorial fashion with no intention on infringement of trademark or copyright laws. The views expressed in this publication are those of the authors and do not necessarily reflect the views of the United Nations Environment Programme. We regret any errors or omissions that may have been unwittingly made.

Suggested citation:

United Nations Environment Programme (2023). *Africa Environment Outlook for Business: Our Environment Our Wealth*. Nairobi: United Nations Environment Programme. <https://doi.org/10.59117/20.500.11822/43127>

Published by:

United Nations Environment Programme (UNEP), Nairobi
URL: <https://wedocs.unep.org/20.500.11822/43127>

© Maps, photos and illustrations as specified

Front Cover: Ouarzazate Solar Power Station, Morocco | Photo credit: UNEP
Back Cover: Dandora dumpsite in Nairobi, Kenya | Photo Credit: UNEP
Waste Management Abidjan, Cote d'Ivoire | Photo Credit: UNEP
Women Adapt To Sudans Water Crisis | Photo Credit: UNEP

This report was funded by the European Union through SWITCH Africa Green.

Acknowledgments

PRODUCTION TEAM

United Nations Environment Programme (UNEP)

Charles Sebukeera
Patrick Mwesigye
Rhoda Wachira
Harrison Simotwo
Liana Archaia-Atanasova
Nora Mugita
Joyce Nyagah
Sylvia Munuhe

Technical Coordination - UNEP

Rose Mwebaza – Director and Regional Representative
Richard Munang – Deputy Regional Director
Frank Turyatunga (Retired)

Technical Support Team – UNEP

Stephen Ndeti
Wycliffe Ogweno
Timothy Shitagwa
Thomas Moore Ogola
Genevieve Print

Environmental Pulse Institute

Ashbindu Singh
Ruseh Oghenekaro
Monday Businge
Jayasurya Kalakkal
Carolita Smith Maraboli (Editor)
Prachi Joshi (Report layout and design)
Eugene Apindi Ochieng (GIS and remote sensing)

Centre for Environment and Development for the Arab Region and Europe (CEDARE)

Nadia Makram Ebeid
Ahmed Abdelrehim
Catherine Ghaly
Mona Daoud
Mayar Sabet
Mai Samir
Mr Yusuf Emad

HIGH-LEVEL REPRESENTATIVES

(Egyptian Government, Representative of the Minister in the Cairo meeting)

Ali Abo Sena

United Nations Economic Commission for Africa (UNECA)

Jean-Paul Adam
Charles Michael Akol

African Development Bank

Leontine Kanziemo
Jerry Ahadjie

SCIENTIFIC AND TECHNICAL REVIEW EXPERTS

NATIONAL REPRESENTATIVES/EXPERTS

Mrs Sellinah Angel Mogojwa – Department of Environmental Affairs, Ministry of Environment and Tourism, Botswana

Ms Mokgadi Monamati - Principal Natural Resource Office, Department of Environmental Affairs Projects and Programmes Division, Ministry of Environment and Tourism, Botswana

Mr Desiré Ouedraogo, Advisor to Minister of Environment, Water and Sanitation Technical, Minister Office, Ministry of Environment, Water and Sanitation, Burundi

Mr Ali Gamane Kaffine, Coordonnateur du Projet AMCC+Tchad, Projet AMCC+Tchad, Ministère de l'Environnement, de la Pêche et du Développement Durable, Chad

Mr Soihibou Mhounadi, Head of Department, Planning, Monitoring & Evaluation, Fundraising, General Directorate of Environment and Forests Comoros

Mr. Roger Mpan, Ministère de l'Environnement, du Développement Durable et du Bassin du Congo, Republic of Congo

Ms Stenlevie Ngala, Point focal Plan National d'Action pour l'Environnement, Ministère de l'Environnement, du Développement Durable et du Bassin du Congo, Republic of Congo

Mr Georges Kouamé Kouadio, Conseiller technique, Ministry of Environment and Sustainable Development, Cote d'Ivoire

Mr Idriss Ismael Nour, Deputy Director, Department of Environment and Sustainable Development, Ministry of Environment and Sustainable Development, Djibouti

Dr Ali Abo Sena, CEO, Egyptian Environmental Affairs Agency (EEAA) Ministry of Environment, Egypt

Mr Mohamed Meatemed Eissawy, Assistant Minister for Planning, Investment, and Institutional Support, Ministry of Environment, Egypt

Mr Amr Abdel Aziz ALI, Director, Mitigation Department, Ministry of Environment, Egypt

Ms Lydia ELEWA, General Manager, General Department of Climate Change Technology and Research, Ministry of Environment, Egypt

Ms Mohamed Ahmed, Climate Change Senior Expert, International Telecommunication Union, Egypt

Ms Maha Moawed, Environmental Researcher, Egyptian Environmental Affairs Agency, Egypt

Dr Alaaeldin Ewase, Research Scientist, Climate Change Central Department, Ministry of Environment, Egypt

Mr Moustafa Mourad, Head of Environment Quality Sector, Ministry of Environment, Egypt

Dr Reham Lotfy, Environmental Health Director, Egyptian Environmental Affairs Agency, Egypt

Dr Ayman El-Maazawy, General Manager of Technical Office of the Environmental Quality Sector, Ministry of Environment, Egypt

Mr Mahmoud Sedek, Environmental Researcher, Egyptian Environmental Affairs Agency, Egypt

Dr Wael Omar, Environmental Researcher, Ministry of Environment, Egypt

Mr Pelagio Mangué Mbomio Mbengono, Licenciado Medio Ambiente Direccion General de Medio Ambiente, Ministerio de Bosque y Medio Ambiente, Equatorial Guinea

Mr Thabiso Nzuzi, Chief Financial Officer, Finance, Administration and Environment Fund Eswatini Environment Authority, Eswatini

Ms Abena Ayensu, Ag/Director, Legal Department, Environmental Protection Agency, Ghana

Mr Peter Justice Dery, Director, Environment Division, Ministry of Environment, Science, Technology and Innovation, Ghana

Mrs Letitia Abra-Kom Nyaaba, Ag. Director GNCP, Ghana National Cleaner Production Centre, Environmental Protection Agency, Ghana

Mr Henry Kwabne Kokofu, Executive Director, Environmental Protection Agency, Ghana

Mr Ahmadou Sebory Toure, Ex. Directeur Général Du FSE, Ministry of Environment and Sustainable Development FSE, Conakry, Guinea

Mr Jacob Ndirangu Kimani, Deputy Director, Directorate of Waste Management and Pollution Control, Ministry of Environment, Climate Change and Forestry, Kenya

Mr Steve Onserio Nyamori, Deputy Director, Kenya National Cleaner Production Centre (KNCP), Kenya

Mr Mohamed Hamouda, Technical Advisor, Natural Environment, Ministry of the Environment, Libya

Mr Michael Jeffrey Richard Makombera, Deputy Director Environmental Affairs Department, Ministry of Natural Resources and Climate Change, Malawi

Mr Rajiv Beedassy, Ag. Deputy Director, Department of Environment, Ministry of Environment, Solid Waste Management and Climate Change, Mauritius

Mrs Nisha Devi Manic, Ag. Divisional Environment Officer, Department of Environment, Ministry of Environment, Solid Waste Management and Climate Change, Mauritius

Mr Avinash Venkama, Consultant, Sustainability & Best Practices, SAG Focal Point, Mauritius

Ms Rezia Laura Jose Cumbi, Director, Tourism and Sustainable Use Services, Mozambique

Mr Leonardo Candido Caliche Guiruta, Director, RECP, MNCPC, Mozambique

Ms Hamsatou Amadou Harouna, Directrice, Direction Générale de l'Environnement et du Développement Durable, Direction de la Promotion de l'Economie Verte et de Développement des Chaines de Valeur, Niger

Mr Edmund Kelechi Mbah, Principal Scientific Officer, Pollution Control & Environmental Health, Federal Ministry of Environment, Nigeria

Mr Emmanuel Rushema, State of Environment Officer, Advocacy & Multilateral Environmental Agreement Monitoring Unit, Rwanda Environmental Management Authority/REMA, Rwanda

Mrs Sylvie Mugabekazi, Ag. Chief Executive Officer, Technical Assistance and business advisory service in RECP, Cleaner Production and Climate Innovation Centre (CPCIC), Rwanda

Mr Amadou Moctar Ndiaga Dieye, Expert Associé, Département Technique Centre de Suivi Ecologique (CSE), Senegal

Mrs Laurice Codou Faye, Sustainable Development Office Coordinator, Department of Environment and Classified Establishments. Ministry of Environment, Sustainable Development and Ecological Transition, Dakar, Senegal

Mrs Ass Tall Sarre, Chef de Division, Division des Installations classes Ministère de l'Environnement et du Développement Durable, Dakar, Senegal

Mrs Cindy Clair, Chief Programme Coordinator, Climate Change and Environment Ministry of Agriculture, Climate Change and Environment, Seychelles

Mr Denis Matatiken, Chief Programme Coordinator, Ministry of Environment, Energy and Climate Change, Seychelles

Mr Sheku Mark Kanneh, Director, Environment Protection and Management, Environment Protection Agency, Sierra Leone

Mr Said Mohamed Ali, Deputy Minister, Ministry of Environment and Climate Change, Somalia

Dr Jenitha Badul, Senior Policy Advisor, Sustainability Programme, Department of Forestry, Fisheries and the Environment (DFFFE), South Africa

Mrs Phathutshedzo Ndifelani Maggie Matumba, Senior Project Manager, National Cleaner Production Centre of South Africa (NCPSCA), South Africa

Ms Anam Ngoma, Project Coordinator, Sustainability Programmes and Projects, Department of Forestry, Fisheries and the Environment, South Africa

Mr Samuel Gwamaka Mafwenga, Director General, National Environment Management, Tanzania

Mr Cleophas Lukanazya Chitende Migiro, Chief Executive Officer, Cleaner Production Centre of Tanzania (CPCT), Tanzania

Ms Angela Japhet Mwatujobe, Environmental Management Officer, Morogoro Rufiji Zone, The National Environment Management Council (NEMC), Tanzania

Mr Romanus Wilhadi Tairo, Senior Environment Management Officer, Environmental Research and Management, The National Environment Management Council (NEMC), Tanzania

Mr Nehemiah Arnold Ayazika Waiswa, Director, Environmental Monitoring and Compliance, Kampala, Uganda

Mr Richard Mugambwa Mukasa, SAG Focal Point, Environment Monitoring and Compliance, National Environment Management Authority, Uganda

Mr Chikumbi Chungu, Technology Transfer Specialist, Technology and Marketing, National Technology Business Center, Zambia

Mr Alexander Museshyo, Principal Research and Projects Officer, Planning, Research and Information, Zambia Environmental Management Agency, Lusaka, Zambia

Mr Andrew Chinyepe, Senior Research Scientist, Environmental Sciences Institute, National Cleaner Production Centre, Zimbabwe

Mr Steady Kangata, Director, Environmental Management Services, Environmental Management Agency, Zimbabwe

Mr Liévin Ndayizeye, Data Management Officer, Office Burundais pour la Protection de l'Environnement (OBPE), Centre d'Informations Environnementales (CIE), Burundi

INTERGOVERNMENTAL ORGANISATIONS AND NON-STATE EXPERTS

Dr Fagr Abdelgawad, Deputy Director of the Centre of Excellence for Research and Applied Studies on Climate Change and Sustainable Development, Head of Water Pollution Research, National Research Centre, Egypt

Mr Jean-Paul Adam, Director, Technology, Climate Change and Natural Resources Technology, Climate and Natural Resources, United Nations Economic Commission for Africa (UNECA), Ethiopia

Mr Jerry Ahadjie, Chief Minerals Officer, Abidjan, African Development Bank (AfDB), Cote d'Ivoire

Mr Ifeolu Kenny Adewumi, Professor of Environmental Engineering, Department of Civil Engineering, Redeemer's University, Ede, Nigeria/ARSCP

Mr Francis Ebuta Bisong, Professor/Advisor, Geography & Environmental Science, Faculty of Environmental Sciences, University of Calabar/ African Green Growth & Development Forum, Nigeria

Ms Monday Businge, Environmental Law & Policy Specialist, Kenya

Mr Thierry Yerema Coulibaly, Assistant Professor, Kyushu University, Japan

Prof. Islam Abou El-Magd, National Authority for Remote Sensing and Space Sciences (NARSS), Advisor to the Minister of Higher Education and Scientific Research on African Affairs and Space Technologies, Egypt

Mr Peter T. Gilruth, Senior Advisor, World Agroforestry Centre, Nairobi, Kenya.

Mr Anderson Kehbila, Programme Leader, Energy and Climate Change, Energy and Climate Change, Stockholm Environment Institute, Nairobi, Kenya

Mr Gountieni D. Lankoande, Executive Director, GRAAD Think Tank, Burkina Faso

Ms Pamela William Levira, Policy Officer, Climate Change, Department of Agriculture, Rural Development, Blue Economy, and Sustainable Environment (DARBE), African Union Commission, Addis Ababa, Ethiopia

Mr Alphayo Inyende Lutta, Research Scientist, Natural Resource Management and Climate Change, Stockholm Environment Institute, Nairobi, Kenya

Mr Kimani Muturi, Managing Director, Agribusiness, Afribanana Products, Kampala, Uganda
Mr Danny Mwangi, Environmental Consultant, Environmental and Social, Ecowise Solutions Limited, Lusaka, Zambia

Mr David Ongo Nyang'acha, Geospatial Expert, Geospatial Services Directorate, Regional Centre for Mapping of Resources for Development (RCMRD), Nairobi, Kenya

Mr George James Onyango, Leather Development Officer, M and EKLDC, Nairobi, Kenya

Dr Philip Osano, Director, Africa Centre, Stockholm Environment Institute (SEI), Nairobi, Kenya

Ms Leontine Kanziemo, Advisor, Natural Resources Management, African Natural Resources and Investment Centre, African Development Bank (AfDB), Abidjan, Cote d'Ivoire

Mr Peter Katanisa, Coordinator, Africa NCA Community of Practice, Environment, Natural Resources, and Blue Economy (ENB), World Bank

Mr Ashbindu Singh, Director, Environmental Pulse Institute (EPI), VA 20120, USA

Ms Edith B. Tibahwa, Programme Manager, Climate Change Programme, Common Market for Eastern and Southern Africa (COMESA), Lusaka, Zambia

Dr Ahmed Abdelrehim, Regional Programme Director, Knowledge Management Programme, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt

Dr Omar Elbadawy, Regional Programme Director, Land Resources Management Programme, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt

Ms Catherine Ghaly, Regional Programme Specialist, Knowledge Management Programme, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt

Dr Mona Daoud, Regional Programme Specialist, Knowledge Management Programme, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt

Ms Mayar Sabet, Regional Programme Specialist, Knowledge Management Programme, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt

Mr Yusuf Emad, Research Assistant, Knowledge Management Programme, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt

Mr Ashraf Atef, Regional Director, Administration, Finance and Human Resources, Centre for Environment and Development for the Arab Region and Europe (CEDARE), Egypt.

Acronyms

AEO	Africa Environment Outlook
AfCFTA	African Continental Free Trade Area
AfDB	African Development Bank
AI	Artificial Intelligence
AMCEN	African Ministerial Conference on the Environment
ARE	Alliance for Rural Electrification
AU	African Union
AUC	African Union Commission
BSDC	Business and Sustainable Development Commission
CAP	Common African Position on the Post-2015 Development Agenda
CEDARE	Centre for Environment and Development for the Arab Region and Europe
CEPF	Critical Ecosystem Partnership Fund
CFS	Committee on World Food Security
COP	Conference of the Parties
DFI	Development Finance Institution
ECA	Economic Commission for Africa
ESG	Environmental, Social and Governance
EPI	Environmental Pulse Institute
EU	European Union
EVs	Electric Vehicles
FAO	Food and Agriculture Organization
GBF	Global Biodiversity Framework
GDP	Gross Domestic Product
GHG	Green House Gases
GMOs	Genetically Modified Organisms
GSMA	Global System for Mobile Communications Association
GWEC	Global Wind Energy Council
ICT	Information and Communication Technology
IEA	International Energy Agency
ILO	International Labour Organization
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
ITU	International Telecommunication Union
LED	Light Emitting Diode
LDCs	Least Developed Countries
LDN	Land Degradation Neutrality
MENA	Middle East and North Africa region

MIF	Mo Ibrahim Foundation
MSMEs	Micro, Small and Medium Enterprises
NAPs	National Action Programmes
NbS	Nature-based Solutions
NDCs	Nationally Determined Contributions
NGFS	Network for Greening the Financial System
NTBs	Non-Tariff Barriers
OECD	Organization for Economic Co-operation and Development
PAPSS	Pan-African Payment and Settlement System
PAYG	Pay As You Go
SCP	Sustainable Consumption and Production
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SLM	Sustainable Land Management
SME	Small and Medium Enterprise
TCFD	Task Force on Climate-related Financial Disclosure
TNFD	Task Force on Nature-related Financial Disclosure
TSVCM	Taskforce on Scaling Voluntary Carbon Markets
UNCCD	United Nations Convention to Combat Desertification
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children’s Emergency Fund
UNSCN	United Nations System Standing Committee on Nutrition
VCM	Voluntary Carbon Market
CCM	Compliance Carbon Market
WEF	World Economic Forum
WMO	World Meteorological Organization

Table of Contents

<i>Acknowledgments</i>	<i>iii</i>
<i>Acronyms</i>	<i>viii</i>
<i>Table of Contents</i>	<i>x</i>
<i>Foreword</i>	<i>xii</i>
<i>Executive Summary</i>	<i>xv</i>

CHAPTER 01: Introduction

1.1 Background and scope	4
1.2 Africa: a natural resources treasure trove	6
1.3 Objective	8
1.4 Target audience	9
1.5 Methodology	10
1.6 Report production process	10
1.7 Chapter breakdown	11

CHAPTER 02: Key Drivers for Sustainable Investment in Africa

2.1 Introduction	16
2.2 Favourable economic drivers and outlook	17
2.3 Uptick in demographic drivers	24
2.4 Climate change finance: drivers and opportunities	29
2.5 Harnessing digital transformation for disruptive innovation	31
2.6 Leveraging ESG for sustainability and competitive advantage	37
2.7 Conclusion	39

CHAPTER 03: Africa's Environmental Priorities

3.1 Triple planetary crisis and opportunities in Africa	42
3.2 Biodiversity loss and land degradation	43
3.3 Climate change: adaptation and mitigation opportunities	52
3.4 Pollution	61
3.5 Conclusion	66

CHAPTER 04: Green Business Opportunities

4.1 Climate smart opportunities for a net-zero transition	70
4.2 Sustainable resource management	95
4.3 Circular economy opportunities	112
4.4 Conclusion	128

CHAPTER 05: The SWITCH Africa Green and SwitchMed Initiatives

5.1 Introduction	132
5.2 SWITCH Africa Green	134
5.3 SwitchMed	159
5.4 Conclusion	170

CHAPTER 06: Financing for Nature and Private Sector Investments	
6.1 Introduction	175
6.2 Nature and financial institutions in Africa: opportunities and risks	176
6.3 Sustainable financing for nature-based solutions	190
6.4 African carbon market	208
CHAPTER 07: Leveraging the African Continental Free Trade Area (AfCFTA) for Green Businesses in Africa	
7.1 Introduction	220
7.2 High demand and growth potential sectors for green businesses	221
7.3 Challenges for green businesses in Africa	228
7.4 Trade and industrial policies to enable green business growth in Africa	230
7.5 Conclusion	235
CHAPTER 08: Strategies and Policies for Scaling Africa's Green Business	
8.1 Introduction	238
8.2 Green business opportunities	239
8.3 Barriers to scaling green businesses	240
8.4 Strategies for scaling green businesses	241
8.5 Conclusion	245
CHAPTER 09: Strategies and Policies for Minimising Risks	
9.1 Introduction	248
9.2 Risk management overview	249
9.3 Global risks and their potential impacts on African Businesses	251
9.4 Risks in Africa	252
9.5 Risk mitigation strategies	256
9.6 Conclusion	259
CHAPTER 10: Enhancing African business processes with Digital Transformation	
10.1 Digital transformation for Africa	262
10.2 Foundation pillars of a digital ecosystem	263
10.3 Digitisation gap contributions	274
10.4 Conclusion	275
<i>References</i>	279

Foreword

Africa, a continent of immense diversity and untapped potential, stands at a crucial crossroads in its pursuit of sustainable development. It grapples with formidable environmental challenges, encapsulated in the 'Triple Planetary Crisis' of biodiversity loss, climate change and pollution. Yet, within these challenges lie boundless opportunities for transformative and ecologically friendly business ventures that could drive economic growth and foster regional environmental stewardship and social progress.

This edition of Africa Environment Outlook (AEO) for Business sheds light on sustainable business opportunities that address the Triple Planetary Crisis. We place a particular focus on circularity, a model that embraces sustainable consumption and production, providing solutions that simultaneously tackle each of the three crises while also supporting social inclusiveness and contributing to economic prosperity. Through the lens of success stories and best practices, we aim to inspire entrepreneurs and businesses to embrace ecologically sound and disruptive innovations that will shape Africa's sustainable development trajectory by and beyond 2030.

Among the key contributors to circularity's proof of concept are the European Union-funded SWITCH Africa Green and SwitchMed programmes. These exemplify the viability of circular practices in Africa by targeting country-specific and sub-regional priority sectors, such as agriculture, waste management, manufacturing and tourism. By offering technical assistance and mentorship to over 3,000 micro-, small and medium-sized enterprises (MSMEs) in sub-Saharan and North African countries, these two programmes have empowered entrepreneurs to adopt resource-efficient and sustainable business practices.

The success of these programmes is compelling evidence that businesses achieve significantly more when they commit to measuring their social and environmental impact, in addition to their financial performance, rather than solely focusing on generating profit or the traditional bottom line. This reconceptualised six-pronged bottom line encompasses Profit, People, Planet, Prosperity, Peace and Partnerships (6Ps) and is, in effect, a holistic approach that empowers businesses to reinforce their financial stability and make positive, lasting contributions to surrounding communities and the environment. This paradigm shift positions broad-based sustainability as a fundamental pillar of success, underscoring the importance of businesses in driving positive change.

Five key factors drive Africa's investment appeal: its dynamic economic landscape, youthful demographics, climate change challenges that offer opportunities to transition to net-zero emissions, digital transformation potential and the possibility to leverage the environmental, social and governance (ESG) framework for sustainability by embedding the three ESG pillars in corporate strategies, operations and financial reporting. These drivers together create a fertile ground for diverse green business opportunities, which can be categorised into climate-smart initiatives for achieving net-zero transition, nature-based solutions for sustainable resource management and circular economy opportunities. These green business prospects, in turn, mitigate climate risks and enhance resilience. Robust nature-risk assessments and client engagement for data disclosure are essential for financial institutions to effectively integrate climate change and nature's perils into governance and risk management. The untapped potential of African voluntary carbon markets presents a promising avenue to drive demand for carbon credits and support innovative projects through the Africa Carbon Markets Initiative (ACMI).

In addition, the African Continental Free Trade Area (AfCFTA) provides vital opportunities to scale green businesses. It aims to create a single market for goods and services across the continent and will be the largest free trade area in the world by the number of participating countries. By harmonising trade policies, reducing tariffs and eliminating non-tariff barriers, AfCFTA will be a game-changer through its ability to deliver transformative economic integration, attract investments, propel industrialisation, boost intra-Africa trade, create jobs, reduce poverty and foster shared prosperity in Africa.

This AEO for Business edition serves as a call to action for entrepreneurs to embrace opportunities presented by sustainable and circular practices. To create a conducive environment for sustainable business practices, policymakers should prioritise:

- ◇ developing robust regulatory frameworks that incentivise and reward environmentally friendly practices.*
- ◇ investing in education and capacity-building.*
- ◇ promoting public-private partnerships that facilitate knowledge exchange, access to finance and technology transfer, and foster collaboration between governments, businesses and local communities.*
- ◇ aligning regional trade agreements and supporting research and innovation.*

- ◇ *leveraging international cooperation and aligning sub-regional trade agreements to the African Continental Free Trade Area (AfCFTA) in order to level the playing field for green businesses and encourage the adoption of sustainable practices across borders.*
- ◇ *supporting research and development in green technologies and promoting innovation through funding and incentives, accelerating the pace of sustainable solutions.*

These strategies will incentivise green practices, empower entrepreneurs and drive Africa towards a greener, more prosperous future. By embracing the above strategies, policymakers can create an enabling environment that encourages businesses to invest in sustainable and circular models that address the Triple Planetary Crisis and achieve the vision of a prosperous, inclusive and environmentally resilient Africa by 2030.

The AEO for Business is the result of collaboration between the United Nations Environment Programme (UNEP), the European Union, the African Development Bank, African institutions and experts. I commend all those involved in preparing this report and urge them to translate this momentum into driving the adoption of sustainable business practices. I hope this report will serve as a catalyst, inspiring policy and decision-makers at all levels in Africa and entrepreneurs to take action in pursuit of truly sustainable development. Let the insights and recommendations within these pages spur transformative initiatives and guide our collective efforts towards making this aspiration a reality. I wish you all an engaging and enlightening reading experience. Let us seize the moment and work hand in hand, across borders and sectors, to build a green, resilient and prosperous Africa.

Signed by



A handwritten signature in black ink, appearing to read 'Alioune Ndoye', written in a cursive style.

H.E. Alioune Ndoye

Minister of Environment, Sustainable Development and Transition of Senegal and President of the African Ministerial Conference on the Environment (AMCEN)

Executive Summary

This Africa Environment Outlook for Business edition focuses on ecologically friendly business opportunities which address the critical environmental challenges of biodiversity loss, climate change and pollution facing the continent. This edition's success stories aim to inspire green businesses for Africa's sustainable development by 2030. Furthermore, the European Union-funded SWITCH Africa Green and SwitchMed programmes present evidence of the viability of a circular economy in Africa. The SWITCH Africa Green initiative targets country-specific priority sectors, such as agriculture, waste management, manufacturing and tourism.

Africa's environmental priorities

The world is grappling with three intertwined environmental crises: biodiversity loss, climate change and pollution, now commonly called the 'Triple Planetary Crisis'. Africa is disproportionately vulnerable to these challenges due to its geography and limited coping capacity.

KEY MESSAGES

Biodiversity loss stressors - agriculture, forestry, freshwater and marine resources

- ◇ Agriculture is the backbone of African economies, contributing 17 per cent to sub-Saharan Africa's GDP in 2021 while supporting millions of jobs and domestic trade. However, the use of unsustainable practices is exacerbating biodiversity loss and compromising ecosystem services, which in turn affects agricultural productivity.
- ◇ The way forward lies in transitioning to sustainable agriculture and embracing agroecology. Policymakers must mobilise financing to support

eco-friendly practices, including sustainable intensification and agroecology, to ensure food security while conserving biodiversity.

- ◇ Land degradation and deforestation are formidable challenges for Africa, with about 75 per cent of deserts and drylands experiencing degradation. Over the past decade, the continent has witnessed the highest net loss of forests globally, totalling 3.9 million hectares. Substantial investments in restoration efforts are essential. Action to combat soil erosion could lead to remarkable net benefits in vital nutrients, such as nitrogen, phosphorus, and potassium, worth \$62.4 billion annually in purchasing price parity.
- ◇ Achieving sustainable land management and combating land degradation requires significant investments in restoration projects. Following the strategies outlined in the United Nations Decade of Ecosystem Restoration 2021-2030, such as increased financing, incentivising restoration efforts and empowering local communities, can help bridge financing gaps and drive effective land restoration initiatives. Leveraging technological advancements can further enhance the efficiency and impact of these restoration efforts.
- ◇ Africa's freshwater and marine resources are crucial for water supply, food, livelihoods, and ecosystem functioning. The continent's fisheries and aquaculture sector are a powerhouse and present an opportunity to narrow the gender Wgap. From 2010 to 2018, Africa

accounted for a staggering 3 million tonnes of fish caught, making up 25 per cent of global inland catches, second only to Asia. Fisheries provide over 5 million jobs in Africa, with aquaculture contributing an additional 386,000 jobs.

- ◇ Freshwater fisheries face numerous stressors, including overfishing, pollution and climate change. Ensuring their resilience and sustainable use requires sustainable financing to support research, monitoring and managing aquatic ecosystems. Embracing innovative technologies can further enhance sustainable fisheries and aquaculture practices.

ADAPTATION AND MITIGATION OPPORTUNITIES

- ◇ Adaptation to climate change is a significant challenge as Africa's economy and livelihood rely heavily on climate-sensitive sectors. Bridging the 80 per cent financing gap for adaptation, prioritising and mobilising additional resources is paramount to safeguard the continent's future.
- ◇ Africa's unique position as a region impacted by climate change while holding abundant clean energy and mineral resources presents a golden opportunity for private sector-led investments in clean energy solutions. This potential must be harnessed for a greener and more sustainable future.
- ◇ Energy demand in Africa is set to outpace the global average by 2040, driven by population growth and a burgeoning middle class. However, about 900 million people in Africa lack access to clean cooking, relying on solid biomass fuels that lead to deforestation and indoor air pollution, claiming 500,000 lives

annually. Addressing this issue requires significant investments to ensure access to affordable, reliable, sustainable and modern energy for all.

- ◇ Africa boasts vast renewable energy potential to meet its surging demand (Solar – 7900GW, Wind – 461GW, Geothermal – 15GW). However, challenges like limited investments, institutional capacity, scalability, high transaction costs and concerns about perceived risks hinder progress. Commendable strides in electrification access have been made, reaching 50.6 per cent in sub-Saharan Africa, but affordability remains an obstacle. Policymakers must focus on reducing upfront costs and promoting energy-efficient solutions, exploring innovative financing mechanisms to ensure broader electricity access.
- ◇ As Africa industrialises, the demand for efficient transportation will rise, necessitating more freight vehicles, railways, navigation and aviation. Sustainable mobility policies promoting hybrid and electric vehicles (EVs) and shared mobility are crucial to achieving a low-carbon transportation transition. However, adopting these vehicle types remains limited due to the high cost of new EVs (around \$60,000) plus import duties and taxes. Additionally, the shift towards low-carbon solutions for long-haul transportation, including trucks, buses, railways and aircraft, remains largely underdeveloped.

AIR, SOIL AND WATER POLLUTION

- ◇ In 2019, air pollution emerged as Africa's second leading cause of death, claiming a staggering 1.1 million lives, accounting for 16.3 per cent of all deaths on the continent. Household air pollution alone caused

697,000 fatalities, while ambient air pollution contributed to 394,000 deaths.

- ◇ Within Africa's borders, fifteen of the world's fifty largest waste dumpsites create pressing concerns. They are located in Ghana, Kenya, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, South Africa, South Sudan and Tanzania. Hazardous waste generation is rising, driven by e-waste, health care risk waste and obsolete agricultural chemicals. The rapid growth of electrical and electronic equipment (EEE) sales in Africa has led to a corresponding rise in e-waste generation, creating opportunities for businesses in e-waste collection, recycling, refurbishment and reverse logistics.
- ◇ However, e-waste management in Africa faces challenges, including inadequate infrastructure for environmentally sound practices, lack of specific legislation, limited product take-back frameworks and insufficient public awareness about the risks of uncontrolled e-waste importation. Initiatives have been put in place in response to these challenges.
- ◇ Africa's hydrological systems and freshwater habitats face significant challenges from improper waste management, over-abstraction, climate change and urbanisation, leading to safe drinking water being a considerable challenge in sub-Saharan Africa, with only 64 per cent having access to basic drinking water services in 2020. Achieving universal safe drinking water, sanitation, and hygiene requires an annual investment of \$35 billion. Implementing smart design principles in water management can enhance sustainability, but the main concern

lies in securing sufficient revenue for infrastructure maintenance, presenting a real challenge for policymakers.

- ◇ Africa's plastic production and consumption are also on the increase. Although these account for only 5 per cent and 4 per cent of global production and consumption, respectively, the continent's growing population and urbanisation contribute to an alarming increase in single-use plastic usage, posing significant environmental pollution and health risks. Bans on single-use plastic and improved waste management practices focused on reducing, reusing, and recycling is imperative to curb this challenge.

The attraction of Africa for sustainable investments

Africa's attractiveness for investment lies in five drivers: its economic dynamics, demographics, climate change challenges and opportunities, digital transformation potential and leveraging the Environmental, Social and Governance (ESG) framework for sustainability.

KEY MESSAGES

- ◇ Africa's promising economic drivers and optimistic outlook make it an attractive investment destination. For example, the continent was the highest profitable region from 2006 to 2011, surpassing the global average for Foreign Direct Investments (11.4 per cent versus 7.1 per cent). The African Continental Free Trade Area (AfCFTA) further enhances its potential, uniting a vast population and creating a massive free trade zone.
- ◇ The continent's demographic drivers fuel optimism for the future. Africa boasts the world's most dynamic

population growth, urbanisation (hosting six of the world's top ten urbanised countries) and a burgeoning middle class. Its youthful population, projected to double from 20.3 per cent in 2023 to 44.9 per cent by 2100, presents a unique opportunity to catalyse economic transformations and leverage innovation for green businesses.

- ◇ Africa's climate change vulnerability creates opportunities for climate financing, with a significant annual funding gap of \$213.4 billion, offering innovative investors a chance to make a transformative impact that builds the continent's climate resilience.
- ◇ As the demand for Environmental, Social, and Governance (ESG) investments gains global prominence, Africa has significant potential to meet this rising demand, making it an attractive landscape for responsible businesses seeking long-term financial value and stakeholder alignment and offering diverse opportunities for impactful and green ventures.

Africa's green business opportunities

Africa offers a range of green business opportunities which fall into three broad categories: climate-smart opportunities for a net-zero transition, nature-based solutions for climate adaptation and sustainable resource management, and circular economy opportunities.

KEY MESSAGES

Climate-smart opportunities for a net-zero transition

- ◇ Driving the adoption of climate-smart opportunities across Africa relies on

unleashing the potential of African entrepreneurs. With a pipeline of 360 ongoing and committed sustainable infrastructure projects worth \$100 billion in sectors like energy, information and communications technology (ICT), logistics, mining and construction as of 2022, the continent offers promising investment opportunities in the transition to net zero. Additionally, tentative projects valued at \$257 billion in the same sectors highlight Africa's potential in green businesses.

- ◇ Africa's strategic advantage lies in significant reserves of vital minerals like bauxite, cobalt, manganese and platinum, accounting for over 40 per cent of the global share. The continent also holds viable deposits of copper, graphite, lithium, molybdenum, nickel and zinc, essential for electric vehicles, hydrogen electrolysers, solar PV cell technology and wind turbines. This presents exceptional opportunities for climate-smart value chain development.
- ◇ While renewable energy projects focusing on solar, wind, geothermal, and bioenergy have experienced rapid growth in Africa, with a projected 6.4 per cent increase in GDP from 2021 to 2050, green hydrogen also offers excellent potential. Africa could emerge as one of the most cost-effective regions for hydrogen production, with the capacity to generate a staggering 5,000 Mt annually at less than \$2 per kilogram.
- ◇ In addition to these opportunities, innovative business models and cost-effective investments in other sustainable products, such as energy-efficient cookstoves, innovative lighting solutions and 'cool roof paint', offer low-hanging fruits for green

businesses in Africa. The African LED lighting market is expected to witness significant growth, projected to increase from \$3.71 billion in 2023 to \$5.49 billion by 2028, presenting a lucrative opportunity for businesses in the lighting sector. Another promising low-cost solution is 'cool roof paint', which can reflect up to 95 per cent of solar heat, reducing interior temperatures and the need for air conditioning. Successfully deployed in tropical Asian countries like India and Indonesia, 'cool roof paint' has proven effective in promoting energy efficiency and climate adaptation.

BLUE ECONOMY AND ECOTOURISM POTENTIAL

- ◇ Africa's vast coastline offers lucrative prospects in the blue economy, generating \$296 billion and 49 million jobs in 2018, and projections indicate \$576 billion and 127 million jobs by 2063, about 5 per cent of Africa's active population. Marine and coastal tourism, worth \$80 billion, surpasses the global average and strategic investments could yield \$100 billion and employ 28 million people by 2030.
- ◇ Despite the growth potential, the African Blue Economy faces sustainability concerns, such as illegal, unreported, and unregulated (IUU) fishing, leading to an estimated \$10 billion loss in catch annually.
- ◇ Africa's marine transport sector contributes 3 per cent to global trade, valued at \$22 billion in 2018, projected to reach \$48 billion by 2063 with strategic investments in ports, shipping technology and maritime education
- ◇ Ocean renewable energy presents a vast untapped resource for Africa, with the potential to generate between 100 to 400 per cent of current global energy

demand. Some African countries have already begun incorporating blue energy into their energy mixes, such as Ghana's exploration of wave energy and Mauritius' investment in floating solar photovoltaics.

- ◇ Marine and coastal tourism presents tremendous opportunities for sustainable development in Africa, with potential value-added exceeding \$100 billion by 2030. By incorporating sustainability principles, this sector can build resilience and contribute to long-term economic growth while conserving marine biodiversity. Various ecotourism business opportunities in Africa range from wildlife safaris and conservation tourism to sustainable agriculture and culinary tourism, offering unique experiences that capitalise on the continent's incredibly rich wildlife.

AFRICA'S CIRCULAR ECONOMY OPPORTUNITIES

- ◇ Africa's circular economy presents a wide range of opportunities across sectors, promoting resource efficiency, waste reduction and sustainability. From tackling plastic waste through recycling infrastructure and sustainable packaging to capitalising on the growing demand for electrical and electronic equipment (EEE) with e-waste collection and refurbishment services, businesses can find lucrative pathways.
- ◇ In the agro-food industry, circular economy approaches, such as efficient supply chains and food waste reduction, enhance resource utilisation while meeting the continent's growing food demand. Exploring plant-based proteins and implementing food safety systems can further drive growth and sustainable practices.

- ◇ Ensuring access to clean water and sanitation provides opportunities for investments in innovative infrastructure, water conservation and resource recovery from wastewater. Smart water management systems can improve efficiency and reliability in delivering these vital services, supporting sustainable development.
- ◇ The fashion and textiles sector in sub-Saharan Africa is valued at approximately \$31 billion, with projected growth of around 5 per cent annually from 2019 to 2024. Opportunities abound, including sustainable material sourcing, recycling, ethical manufacturing, rental and sharing models, and consumer education, fostering a circular and eco-conscious fashion industry.
- ◇ The African automotive market is predominantly dominated by used vehicles, paving the way for businesses to thrive in vehicle recycling, remanufacturing, battery recycling, shared mobility solutions, repair and maintenance services, circular supply chain management, and training and skill development, transforming the automotive industry toward sustainability.
- ◇ To convert Africa's prospects to sustainable ventures, the financing gap for environmentally sound technologies (ESTs) must be addressed. In 2020, only \$6.07 billion flowed into the continent for ESTs, while the global exported technology value reached \$1.17 trillion. Closing this gap will enable the adoption of ESTs, which offer superior environmental performance compared to other technologies.

Green businesses and the African Continental Free Trade Area (AfCFTA)

The African Continental Free Trade Area presents a transformative opportunity for African green businesses to access a vast and integrated market, driving sustainable economic growth and fostering environmental stewardship continent-wide.

KEY MESSAGES

- ◇ The African Continental Free Trade Area provides essential opportunities for boosting intra-African trade and promoting sustainable development, creating opportunities for green businesses to expand their markets. For example, the AfCFTA is projected to increase intra-African trade demand for transport and logistics by 28 per cent by 2030, while intra-African agricultural trade is expected to increase by 574 per cent by 2030 if tariffs are eliminated. If fully implemented, the AfCFTA could be instrumental in promoting economic integration and attracting investment. Still, its successful implementation requires addressing bottlenecks, such as country-to-country standards, governance systems, infrastructure and financing.
- ◇ To create an enabling environment for green businesses under AfCFTA, governments need to deepen support for green trade, include environmental provisions, align investment, intellectual property, competition and e-commerce policies with sustainability goals, and prioritise workforce upskilling, R&D support and green financing mechanisms. These would help address the challenges faced by green businesses in Africa.

Strategies and policies for scaling Africa's green businesses

Strategies and policies for scaling Africa's green businesses involve technology transfer, deploying blended capital, implementing supportive government policies and building industry capabilities to address challenges in capital deployment, policy barriers and industry structure, fostering sustainable growth and economic development.

KEY MESSAGES

- ◇ In Africa, decarbonisation alone presents a \$3 trillion investment potential. In addition, digital technologies for the agribusiness sector offer a potential \$1 trillion market to drive the innovation crucial for feeding the continent's burgeoning population of 2.5 billion by 2050.
- ◇ To seize these opportunities and drive sustainable growth, green businesses in Africa must overcome certain hurdles. Scaling up poses a significant challenge, requiring blended capital approaches, supportive policies, and developing management and technological capabilities.
- ◇ Forward-thinking governments hold the key to unlocking the potential of green enterprises. By prioritising these businesses, offering fiscal incentives and bolstering procurement from sustainable sources, they can lay the foundation for success. Harmonising regional standards and forging cross-sector partnerships, including alliances with multinational companies, will be vital in achieving scalable and sustainable growth.

Minimising risks for green businesses

Implementing comprehensive risk management strategies and policies is crucial for businesses in Africa to minimise risks from political, economic, environmental and technological challenges, fostering resilience and enabling successful navigation of the continent's unique business landscape.

KEY MESSAGES

- ◇ Africa presents both risks and compelling business opportunities, making assessing the opportunities and risks landscape for informed decision-making essential. African executives and boards are increasingly concerned about political, economic and social developments, infrastructure deficits, healthcare access, food security, climate change impacts and cybercrime risks. However, they are proving to be ahead of the curve by adopting effective risk management measures, setting them ahead of global peers.
- ◇ Navigating the African terrain presents its share of challenges. Corruption, inadequate infrastructure, and evolving regulatory frameworks add complexity to operations in some African countries. The COVID-19 pandemic, political unrest and economic volatility have further disrupted economies, but with strategic risk management at its helm, businesses can mitigate these challenges and emerge more resilient.
- ◇ Unlocking the vast potential of Africa's emerging markets necessitates an approach that integrates risk considerations into business strategies. Embracing resilient and

reliable infrastructure and technology investments, implementing anti-corruption policies and cultivating resilience through risk-adjusted performance and vigilant monitoring will be the keys to thriving amidst Africa's dynamic landscape.

Digital transformation for businesses

Enhancing African business processes through digital transformation enables the continent to leverage technology to optimise operations, streamline efficiency and unlock new opportunities, fostering inclusive and sustainable growth in the digital economy.

KEY MESSAGES

- ◇ The pursuit of sustainable socio-economic development in Africa hinges on embracing a robust digital transformation, a vision well-captured in the African Union Commission's Digital Transformation Strategy. This strategic blueprint identifies key pillars that lay the foundation for a thriving digital ecosystem: enabling policies, digital infrastructure, digital entrepreneurship, digital trade and digital skills.
- ◇ Achieving digital transformation in Africa promises to reshape industries and drive innovation, with the internet economy projected to make substantial contributions to Africa's economic landscape by contributing up to \$180 billion by 2025 and \$712 billion by 2050.
- ◇ Signs of Africa's digital journey can be seen in the rising numbers of mobile phone subscriptions, increased internet access and mobile banking innovations. Yet challenges persist,

and the continent must address critical gaps to keep pace with the global digital frontier. Bridging the digital skills gap, enhancing digital infrastructure and fostering digital financial inclusion are paramount to driving inclusive and sustainable growth, especially within the AfCFTA context.

- ◇ While strides have been made in certain areas, the digitalisation gap still looms. Investing in robust digital infrastructure and advancing digital finance can dramatically impact Africa's digitisation progress. Notably, the importance of digital skills cannot be overstated, and there is an urgent call to enhance capabilities for driving Africa's digital economy forward. By investing in education, technology equipment, e-learning platforms and effective e-governance, Africa can bridge the digital skills divide, unlocking the immense potential of digital transformation for economic growth and innovation.

Lessons from the EU's SWITCH Africa Green and SwitchMed initiatives

The SWITCH Africa Green and SwitchMed initiatives focus on specific priority sectors tailored to individual countries or regions. All projects within these initiatives adhere to the circularity criteria, encompassing resource efficiency, low carbon emissions, and social inclusiveness as key attributes.

KEY MESSAGES

SWITCH Africa Green

- ◇ The journey to an inclusive, greener and more prosperous Africa involves valuable insights from SWITCH Africa Green. Overcoming

challenges of finance, resource constraints, behaviour change, and policy gaps requires prioritising financing, awareness creation, capacity building, partnerships and policy alignment.

- ◇ With investments of approximately \$20.9 million in over 3,000 micro-, small and medium-sized enterprises (MSMEs) across key sectors in Burkina Faso, Ethiopia, Ghana, Kenya, Mauritius, South Africa and Uganda, SWITCH Africa Green fosters prosperity while minimising environmental impacts. It achieves this by enhancing business and technical skills, boosting profitability and creating new job opportunities.
- ◇ Despite the challenges faced, the initiatives yielded noteworthy learning milestones. Industrial symbiosis emerged as a promising means for service exchange, collaborating with research institutions to drive technological innovation. Capitalising on business opportunities from industrial waste profiling showed great potential as a catalyst for policy transformation, highlighting the importance of exploring innovative approaches for sustainability.

SwitchMed

- ◇ SwitchMed, a transformative initiative launched in 2013, aims to achieve a circular economy in the southern Mediterranean while decoupling development from environmental degradation. Benefitting eight countries with four in North Africa, including Algeria, Egypt, Morocco and Tunisia, SwitchMed empowers eco-innovative MSMEs, industries, startups and policymakers to promote sustainable products and services through three components: policy, demonstration and networking.

- ◇ In its first phase (2013–2018), SwitchMed achieved remarkable milestones with a total funding of \$26.3 million. It trained over 1,500 stakeholders and 2,300 entrepreneurs, developed Regional and National Action Plans, and implemented 20 demonstration projects. The efforts created over 1000 green jobs, raised \$1.54 million and led to \$2.36 million in potential investment for green entrepreneurs. With \$45.7 million in annual production cost savings, 197,525 tonnes of CO2 avoided and 1,830 resource-efficient measures identified, the programme's impact was profound, leaving a trail of sustainability across industries and communities.

- ◇ The SwitchMed initiative offers valuable lessons in pursuing a circular economy in the southern Mediterranean. Policymakers are pivotal in mainstreaming sustainable consumption and production, necessitating supportive legislation and regulations for green businesses. Collaborative efforts between financial institutions and sustainable enterprises are vital to overcoming financial challenges. Stakeholder engagement, capacity building and networking are crucial for successfully adopting sustainable practices, informed by measured impact for effective scaling up and replication.

Private sector investments in nature

Embracing nature-positive outcomes offers exciting opportunities for private sector investments, empowering businesses to have a positive impact on the environment. Neglecting nature, on the other hand, risks damaging reputations in the era of heightened environmental consciousness.

To navigate these critical aspects, financial institutions must conduct robust nature-risk assessments, engage clients for transparent data disclosure and seamlessly integrate climate and nature-risk governance.

KEY MESSAGES

Nature-related risk assessment for financial institutions

- ◇ Embracing nature positivity and halting and reversing nature loss by 2030 can unlock a business value of \$10 trillion and create 395 million jobs by 2030. Neglecting nature can lead to reputational damage and decreased viability for organisations.
- ◇ Financial institutions face exposure to nature-related risks and opportunities due to their impacts and dependencies on nature. In Africa, nature loss poses significant risks to the economy and financial systems, making it imperative for banks to integrate nature-related risks into their risk assessment and decision-making processes.

Increased investment for Nature-based Solutions (NbS)

- ◇ With G20 countries accounting for 92 per cent of global NbS investments directed towards domestic initiatives, NbS financing needs to more than double from \$154 billion to reach \$384 billion between 2023 and 2025. Closing the financing gap requires an additional annual investment of \$230 billion up to 2025, with investment needs reaching \$674 billion by 2050. Achieving the Paris Agreement's 1.5°C target demands a cumulative investment of \$11 trillion in NbS by 2050.
- ◇ The financing for NbS interventions comes from diverse sources, including international public sources, such as multilateral

donors, multilateral development banks, bilateral cooperation and domestic public sources. Private sector investments play a crucial role, with funding from commercial banks, private impact investors, philanthropy, institutional investors and market-based mechanisms, such as carbon credits and offsets. Blended finance, which combines concessional funding with private capital, is also utilised.

- ◇ While NbS present significant opportunities, there are barriers to accessing funding, especially for developing countries. To attract private investments, governments and stakeholders must create supportive policies, incentives and a compelling business case. Harmonisation of support and streamlining of funding processes at the international level can facilitate access to financing for NbS initiatives and help close the financing gap.

The African carbon market potential

Private sector investments play a pivotal role in the African Voluntary Carbon market. As businesses increasingly embrace sustainability and environmental responsibility, Africa offers carbon offset projects to mitigate emissions and support sustainable development initiatives.

KEY MESSAGES

- ◇ Carbon markets play a vital role in achieving net zero emissions, offering economic incentives to limit greenhouse gas emissions. The demand for voluntary carbon markets is set to soar, potentially reaching a market value of over \$50 billion by

2030. New project types and rising carbon credit prices are reshaping the market alongside increased government engagement. Africa holds immense untapped potential in voluntary carbon markets, estimated at around 2,400 MtCO₂e annually. By harnessing this potential, the continent could redirect climate financing worth approximately \$7 billion annually by 2030, supporting broader development objectives.

- ◇ Despite the opportunities, African voluntary carbon markets face challenges, including fragmented projects, a scarcity of large-scale developers, regulatory uncertainties, credibility concerns for certain credits and equitable value distribution. Overcoming these obstacles is critical to unlocking climate finance and fostering sustainable development in Africa.
- ◇ The Africa Carbon Markets Initiative (ACMI) and the Taskforce on Scaling Voluntary Carbon Markets (TSVCM)

aim to promote demand for carbon credits, ensure market integrity, support innovative projects and scale the supply and demand for African credits, addressing the challenges and contributing to the growth of African voluntary carbon markets.

Africa's environmental priorities present many lucrative green business opportunities, encompassing climate-smart, circular and nature-based initiatives in sectors including agriculture, energy, manufacturing, infrastructure and tourism. However, concerted efforts are required to attract the necessary investments, facilitate technology transfer, implement supportive policies and foster capacity building to fully unlock this potential and drive sustainable development. By creating an enabling environment that promotes green investments, aligns regulations with sustainability goals and empowers local businesses through knowledge and skill development, Africa can position itself as a global leader in green innovation and pave the way for a more resilient and sustainable future.





CHAPTER

01

Introduction



Photo Credits: Geranimo | Unsplash

1.1 Background and scope

Africa Environment Outlook for Business is the latest edition in the Africa Environment Outlook (AEO) series, a flagship publication of the Africa Ministerial Conference on Environment (AMCEN). It is the sequel to Africa Environment Outlook 3 (UNEP, 2013). AMCEN was established in December 1985 following a conference of African ministers responsible for the environment held in Cairo, Egypt. Its mandate is to provide high-level advocacy for environmental protection in Africa and to partner with governments, institutions and international development agencies to formulate policies to sustainably harness environmental opportunities and address the continent's most crucial environmental issues. Through its Regional Office for Africa, the United Nations Environment Programme (UNEP) has served as the Secretariat of AMCEN since its inception (UNEP, 2022a).

In this publication, AMCEN and UNEP partnered with the European Union (EU) to highlight the

tremendous business opportunities in Africa for private sector players to embed environmentally sound practices across a company's entire value chain. This includes the supply chain, in-house production operations, outbound logistics, marketing and sales, after-sales service, support activities, such as procurement and purchasing, human resource management, and information and communications technology (ICT). Specifically, this AEO for Business spotlights the incredible successes, best practices and actionable learning points that the SWITCH Africa Green programme and SwitchMed have recorded, since their inception in 2014, in supporting diverse stakeholders in Africa to transition to an inclusive green economy based on sustainable consumption and production (SWITCH to Green, 2023a).

The SwitchMed initiative aims to achieve a circular economy in the southern Mediterranean by changing how goods and services are produced (SwitchMed, 2023a). The SWITCH

Africa Green programme conceptualised and funded by the European Union through the EU SWITCH to Green Flagship Initiative, is implemented by UNEP through its Regional Office for Africa and has been rolled out in seven countries—Burkina Faso, Ethiopia, Ghana, Kenya, Mauritius, South Africa and Uganda (SWITCH Africa Green, 2023d)—and targets four key sectors: agriculture, manufacturing, integrated waste management and tourism. It focuses on five thematic cross-cutting areas: energy efficiency, labelling and standards, water efficiency, eco-innovation and sustainable trade (SWITCH to Green, 2023b). By providing technical assistance, capacity development, and a suite of communication and outreach tools, more than 3,000 micro, small and medium-sized enterprises (MSMEs) have been able to adopt more resource-efficient, sustainable business practices (SWITCH Africa Green, 2020b) that have markedly ramped up their profitability, created green jobs, reduced poverty in surrounding communities and generally contributed to the sustainable development

of the continent (SWITCH to Green, 2023e). This initiative arises from the global scope of the EU’s Circular Economy Action Plan, which aims to reduce the strain on natural resources and drive job creation by promoting circular economy practices, encouraging sustainable consumption, minimising waste and maximising resource retention (EC, 2023).

The opening chapters of AEO for Business lay the groundwork for SWITCH Africa Green’s circularity concept, practical uptake and best practices by presenting the drivers that are putting unprecedented pressure on Africa’s natural capital and which therefore inform the continent’s environmental priorities. These priorities align with the ‘triple planetary crisis’, comprising biodiversity loss, climate change and pollution, that the world is contending with, and whose distinct and synergistic impacts are so dire that they pose an existential threat to the world’s ecosystems, biodiversity and even human inhabitants. Africa is disproportionately exposed to these crises due to its longitudinal

SUSTAINABLE DEVELOPMENT GOALS



Figure 1.1: *The Global Goals for Sustainable Development* (<https://sdgs.un.org/goals>)

and latitudinal coordinates, relatively low socio-economic development as evidenced by the preponderance of Least Developed Countries (LDCs) on the continent and limited coping capacity. Sub-national, national, sub-regional and regional levels of government in Africa are therefore spearheading determined efforts to avert the associated triple catastrophes. As AEO for Business discusses, these efforts, which sustainability precepts must necessarily underpin, offer extraordinary windows of lucrative opportunities to the continent's MSMEs.

The crisis-opportunity nexus is interrogated through the lens of Agenda 2030, its 17 Sustainable Development Goals (SDGs) and 169 attendant targets. These three wide-ranging and inextricably linked sets of aspirations collectively comprise the world's current, reimagined development blueprint up to 2030 and are the successor to the Millennium Development Goals (MDGs), which spanned a 15-year period up to 2015. The 2030 Agenda, also covering a 15-year period, was universally adopted by the United Nations Member States (including all African States) in 2015. It is reimagined because it challenges the prevailing focus on economic growth rates as the sole measure of development. Development is evolving into a term that includes social and environmental indicators in addition to economic ones. So together, the SDGs, which are integrated and indivisible, provide a shared blueprint for peace and prosperity for all people and the planet. Figure 1.1 depicts these 17 SDGs, which aspire to eliminate poverty and hunger, ensure quality education, gender equality, clean water and sanitation, and affordable and clean energy. The goals also aim to foster industry, innovation and infrastructure, and sustainable cities and communities in order to galvanise responsible consumption and production, climate action, and conserve life on land and below water, among others. Moreover, MSMEs that implement innovative and even disruptive strategies in meeting these SDGs will be rewarded with a reconceptualised six-pronged bottom line which, besides Profit, includes –People, Planet,

Prosperity, Peace, and Partnerships—which are interlinked and which reinforce each other. AEO for Business, therefore, argues that it makes good commercial sense to embed the SDGs in corporate strategies, core and support operations, and evaluations.

1.2 Africa: a natural resources treasure trove

Africa is endowed with vast oil reserves, natural gas deposits and the world's largest reserves of mineral and metal resources, including aluminium, chromium, cobalt, diamond, gold, manganese, phosphate, vanadium and the platinum metal group (which, besides platinum, include iridium, osmium, palladium, rhodium and ruthenium) (Leke and Signé 2019). These natural resources present significant development opportunities for its people and lucrative business opportunities for astute corporates. According to the definition provided by the United Nations Conference on Trade and Development (UNCTAD, 2021), commodity dependence is a scenario where commodities constitute over 60 per cent of a country's total merchandise exports; 83 per cent of African nations fall under the category of commodity dependence. These African countries alone contribute to 45 per cent of the total commodity-dependent countries globally. The continent's primary commodities include extractive resources (minerals, oil, and gas) and agricultural products (agricultural raw materials and food). Figure 1.2 displays commodity exports—including re-exports—as a percentage of the total export of goods for Africa's commodity-dependent countries. This leaves just a handful of non-commodity-dependent countries on the 55-country continent: Comoros, Djibouti, Egypt, Eswatini, Lesotho, Mauritius, Morocco, South Africa and Tunisia.

These commodities present considerable lucrative opportunities for value creation and for innovative businesses to embed various SDGs in their corporate strategies from the commencement of their business operations.

7 and would propel many other global goals to achievement.

With a land area spanning 30 million square kilometres, Africa is the second-largest continent globally, second to only Asia. The continent is also home to 65 per cent of the world's unutilised arable land (FAO, 2021a), worth several billion US dollars in investment potential. Africa cultivates more than 350 million hectares of cropland, more than twice the comparable area in the European Union (FAO, 2021b). The continent, therefore, has vast potential to become a production powerhouse to feed its people with a large surplus exported to earn the continent vital foreign exchange. The prospect of these commodities and fallow arable land to shore up the bottom lines of corporates that currently survive on low-profit margins in saturated markets in developed economies cannot be disputed. These resources are, therefore, key to achieving the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). Further, these natural resources and their proceeds can be harnessed by policymakers to appreciably raise the standard of living of the continent's inhabitants, many of whom are mired in poverty and live in deplorable, dehumanising conditions.

Moreover, the continent's natural resources have always underpinned its economy and livelihoods as large segments of the region's population directly or indirectly depend on biodiversity, water, forests and land for subsistence and income generation. These natural resources also directly contribute to economic development through tourism, agriculture, forestry, fisheries, industry and other activities. The economic potential of the continent's natural resources needs to be optimally utilised to maximise business opportunities that have been hampered due to factors such as lack of capital, capacity and information. However, natural capital is decreasing and conservative estimates suggest that Africa's losses amount to \$195

billion annually. Recent analyses suggest that reversing these losses would enable Africa to invest adequately in achieving the SDGs. Therefore, investors have the unique opportunity to make healthy profits while advancing Africa's sustainable development.

1.3 Objective

AEO for Business aims to identify and document options for stimulating the linkages between business and environmental sustainability in Africa while augmenting their benefits to people, nature, and economies and achieving SDGs. This includes analysing sustainable consumption and production and transforming markets through four thematic sectors: sustainable agriculture, sustainable eco-tourism, sustainable manufacturing and integrated waste management. This is in addition to several cross-cutting areas such as water, energy, eco-innovation, sustainable trade, and labelling and standards, including in the context of post-COVID-19 green and more inclusive socio-economic recovery interventions (UNEP, 2023f). This report's preparation adopts an integrated approach with well-illustrated interlinkages between the environment and opportunities for green Business as the underlying theme. In addition, it:

- ◆ Comprises case studies, best practices and examples from numerous Micro, Small, and Medium Enterprises (MSMEs) that have benefited from the SWITCH Africa Green programme since it was rolled out in 2013.
- ◆ Comprises expert consultations and UNEP's own experiences and lessons learnt through its African operations.
- ◆ Considers the regional and global policy process and priorities such as the SDGs, the Paris Climate Agreement, African Union Agenda 2063, the Malabo Declaration on Accelerated Agricultural Growth, the Pan-African Action Agenda on Ecosystem



Cattle farmer in South Sudan. Photo credit: UNEP

Restoration, the UN Decade on Ecosystem Restoration, and SWITCH Africa Green.

- ◆ Fosters the inculcation of circularity, Sustainable Consumption and Production (SCP), and other innovative interventions with strong and discernible linkages with the environment.
- ◆ Considers the pivotal role of women, youth and other under-represented groups in Africa's development trajectory, in addition to showcasing avenues for capacity development, access to capital and enabling policies, as some of the vital ingredients that will fast-track the continent's catching-up.
- ◆ Inspires feasible, scalable, replicable, and sustainable "home-grown" and cutting-edge enterprise development in Africa.
- ◆ Contributes to innovative options for future-proofing people, nature and economies from the past, present and foreseeable environmental and public health emergencies such as COVID-19 and climate change.

- ◆ Uses concrete and latest data coupled with rich visualisations.

- ◆ Showcases regionally balanced contributions as well as case studies on best practices.

1.4 Target audience

In a radical departure from the earlier three AEO editions, which highlighted the growing raft of the continent's environmental problems from a thematic standpoint and were primarily written for policymakers, the target audience of this edition of AEO for Business is—as the name suggests—the business community and the regional, sub-regional and national agencies that are mandated with promotion and facilitation of investments. The report catalogues some of the untapped but immensely lucrative business opportunities and the regional, sub-regional and national environmental, economic, and integrated policies and drivers that make Africa a lucrative investment destination while quantum-leaping the continent's sustainable development.

1.5 Methodology

The AEO for Business process adopts the Drivers, Pressures, State, Impacts, Response and Opportunities (DPSIRO) framework. The data and information are examined using the DPSIRO framework, which connects the environment with opportunities for green businesses. This analysis demonstrates how mitigating the socio-economic forces driving environmental change can create business opportunities, improve degraded ecosystems, reduce exposure to disaster risk, and accelerate progress towards achieving SDGs. Where these driving forces, pressures, states and impacts operate differently in relationship to gender, this is highlighted in the analysis.

Driving forces result in pressures on the environment. All economic activity sectors generate pressures, such as transport, energy, housing, agriculture, industry and tourism. Pressures can occur from resource extraction, processing of materials and the production, distribution and consumption of goods, as well as the release of waste products. Addressing these pressures creates tremendous opportunities for business investments. Environmental, economic and other policies may also exert pressure on the environment. For example, subsidies for fertilisers encourage their excessive use, resulting in their accumulation and subsequent eutrophication and degradation of aquatic ecosystems, adversely impacting investments in fisheries. Such policies must also be included in the analysis of the environmental state and trends that have implications for business. Pressures may also be caused by natural processes that affect the environmental state. In many cases, the state and trends may be caused by a combination of pressures.

This report will identify these cases and, where possible, discuss the degree to which each pressure impacts the environment and the challenges and opportunities presented for business. The framework focuses on an

integrated analysis of the state and trends in three overarching economic clusters (climate and energy, biodiversity and natural resource management, chemicals and pollution), disaggregated into enterprises (renewable energy, sustainable infrastructure, sustainable agricultural supply chains, blue economy, sustainable tourism and circular economy in automotive, electronics and wastes, fashion and textiles, food and agriculture, and plastics, with a focus on the potential for Green Business. The analysis includes:

- ◆ Mapping of socio-economic and other drivers on Africa's natural capital.
- ◆ Pressures on the environment and natural resources, including economic, demographic and other sectoral policies, and how they impact resource integrity.
- ◆ Mapping of regional environmental priority areas:
 - ◆ Business opportunities and actions
 - ◆ Explaining the concept of Green Business, Circular Economy (through SWITCH Africa Green), etc.
 - ◆ Opportunities for the private sector to contribute to environmental sustainability, with illustrated possibilities and case studies.

1.6 Report production process

AEO for Business is the culmination of several processes. These included desk research of several publications, including those of the African Union (AU), African Development Bank (AfDB), SWITCH Africa Green and SWITCH to Green, and those of the Bretton Woods Institutions—the International Monetary Fund (IMF) and the World Bank. It also included examining publications by a range of UN specialised agencies, including the Food and Agriculture Organization (FAO), International

Telecommunication Union (ITU), United Nations Conference on Trade and Development (UNCTAD), United Nations Department of Economic and Social Affairs (UNDESA), UNEP and the World Trade Organization (WTO), among others. Hundreds of scholarly articles were also reviewed, with the findings informing the insights in this report.

The production process also involved analysing raw data and extracting trends, with many of the findings distilled into easy-to-understand infographics embedded in the report. The process of producing this AEO for Business was inclusive, with diverse inputs from the AU, UNEP, the business community, experts on a range of topics, government officials and researchers. The report has also been peer-reviewed, and a formal three-day regional consultation workshop was held in Cairo in May 2023. This workshop was attended by representatives from the AU, AfDB, UNEP, ministries responsible for the environment, national environmental agencies and national cleaner production centres, collaborating centres such as the Centre for Environment and Development for the Arab Region and Europe (CEDARE) and the Environmental Pulse Institute (EPI), international partners such as the European Union, United States government, among many other stakeholders.

1.7 Chapter breakdown

AEO for Business is structured into seven chapters that explore the enormous, lucrative, sustainable development-related business opportunities available to the intrepid investor.

CHAPTER 1, the introductory chapter, sets the scene for the rest of the report and outlines the objectives, target audience, methodology and production process.

CHAPTER 2 makes the business case for investing in sustainable development in Africa by interrogating various drivers and how their trajectories can be harnessed to run profitable business operations and help the continent

achieve the ambitious global SDGs.

CHAPTER 3 lays out the continent's three environmental priorities: climate change and energy, biodiversity and natural resource management, and pollution and waste management. Investing in these priority areas is a win-win for the investor and the continent. These attendant investments yield high returns for the investor through priority-specific fiscal and other incentives. At the same time, African governments can turn the tide on the persistent environmental challenges associated with these areas.

CHAPTER 4 specifies the budding business opportunities and actions required to pursue them. These prospects run the gamut from renewable energy; clean cooking fuels; sustainable infrastructure, agricultural supply chains, and blue economy; sustainable tourism and economy; to circular economy opportunities in manufacturing, plastics, electronics and e-wastes, fashion and textiles, food and agriculture, automotive, and water and sanitation.

CHAPTER 5 contains the replicable lessons learned from implementing SWITCH Africa Green and SwitchMed. SWITCH Africa Green is an initiative developed a decade ago to assist the private sector in seven sub-Saharan African countries—Burkina Faso, Ethiopia, Ghana, Kenya, Mauritius, South Africa and Uganda—to transition to a green economy. Concurrently, SwitchMed is a programme that seeks to progressively shift the Mediterranean region, including several African countries such as Algeria, Egypt, Libya, Morocco, and Tunisia, to a circular economy.

CHAPTER 6 explores the topic of financing for nature through private sector investments. It assesses the current risks and opportunities, highlights financing gaps and evaluates the current access to affordable finance and technical know-how for green business. It also considers the status and outlook of the African carbon market and its potential to create tens

of millions of jobs and unlock upwards of \$120 billion in revenue by 2050.

CHAPTER 7 discusses possible strategies and policies that can be harnessed to create enabling conditions for green businesses. Specifically, these strategies and policies are geared toward greening the African Continental Free Trade Area (AfCFTA).

CHAPTER 8 deals with some of the challenges in scaling up green businesses.

CHAPTER 9 spells out some of the strategies for minimising risks.

CHAPTER 10 focuses on issues in improving business processes through digital transformation, which promises to increase productivity exponentially.







CHAPTER

02

Key Drivers for Sustainable Investment in Africa



Photo Credits: SWITCH Africa Green

2.1 Introduction

This chapter highlights five drivers uniquely positioning Africa as a prime sustainable investment destination. These are the continent's:

- ◆ Stellar economic growth rates that continue to outpace global averages.
- ◆ Unique demographic dynamics that will ensure that early investors reap the benefits of the most significant demographic dividend in world history.
- ◆ Distinct climate change challenges and the attendant enormous opportunities to tap billions of dollars in climate finance.
- ◆ Prospect of harnessing the transformative power of the rapidly evolving artificial intelligence (AI) technologies for disruptive innovations.

◆ Potential to leverage the Environmental, Social, and Governance (ESG) framework to enhance sustainability performance and competitive advantage.

These five drivers have tremendous potential to ensure a reimagined six-pronged bottom line which, besides Profit, includes People, Planet, Prosperity, Peace and Partnerships (6Ps). These six facets are interlinked, have synergistic effects and crucially contribute to Africa's sustainable development as undergirded by the 17 SDGs as set out in Chapter 1. In this regard, it makes good commercial sense to intentionally embed the SDGs in corporate strategies, core and support operations, and evaluations.

2.2 Favourable economic drivers and outlook

2.2.1 Profitability of Africa

Africa had the highest rate of return on Foreign Direct Investment (FDI) inflows between 2006 and 2011, with a rate of 11.4 per cent compared to a global average of 7.1 per cent (Odusola, 2022). Large and stable markets comprising a growing middle class with stable disposable income are attractive for FDI. Backed by steady strides toward political stability and governance over the last three decades, African countries have increasingly fit this description (EY Global, 2020). Various factors drive up the prospect of Africa's profitability, and many companies have converted these prospects into real profits.

2.2.2 Economic growth prospects

In the years leading up to the COVID-19 pandemic, Africa's real GDP growth rate was projected to exhibit a promising trajectory. According to several pre-covid projections for the 2018-2023 period, the continent's growth rate was anticipated to accelerate from 3.5 per cent in 2018 to 4 per cent in 2019 and further to 4.1 per cent in 2020. This optimistic outlook outpaced the growth rates of other emerging and developing countries, as well as the global averages forecasted by the International Monetary Fund (IMF) in April 2019, which predicted 3.6 per cent for 2018, 3.3 per cent for 2019, and 3.6 per cent for 2020. However, the outbreak of the COVID-19 pandemic severely disrupted all global economies, upending these projections and diverting them off-course.

However, in the 'new normal', the continent is making up for lost ground, with the IMF projecting that emerging markets and developing economies will grow by an impressive 4.5 per cent in the fourth quarter of 2023, up from 2.8 per cent in the same period in 2022. The comparable global growth rates are less optimistic, with a 2.8 per cent growth rate expected in 2023 and a marginally higher 3.0 per cent in 2024, weighed down by

decelerations in the advanced economies, notably the United Kingdom and the Eurozone (IMF, 2023). Therefore, the trend where sub-Saharan Africa will remain the fastest-growing region in the world is set to continue for the rest of the Agenda 2030 period, buoyed by the fact that Africa is home to six of the world's 12 fastest-growing countries. These are Ethiopia, the Democratic Republic of the Congo, Côte d'Ivoire, Mozambique, the United Republic of Tanzania and Rwanda (Odusola, 2022), with some of these countries posting unprecedented GDP growth rates.

The regional variations in the continent's economic growth are displayed in Figure 2.1, with all the subregions remaining in positive territory for the entire 2021-2024 period. This highlights the resilience of African economies in the face of a convergence of multiple concurrent global shocks in recent years, notably the COVID-19 pandemic, Russia's invasion of Ukraine (AfDB, 2022a) and the rapid rise in US interest rates. The strengthening of the US dollar with detrimental cross-border spillover effects such as inflation, bond and stock market volatility, the failures of First Republic Bank, Signature Bank and Silicon Valley Bank in the US and Credit Suisse in Switzerland in the first quarter of 2023 alone rocked the global financial system. While different sectors have contributed to the continent's economic growth, an upbeat services sector has been a significant driver, helping the continent diversify away from heavy dependence on extractives. This diversification is primarily due to the new value chains developing on the back of agribusiness, energy and telecommunications platforms (EY Global, 2020).

In terms of absolute values, while Africa may currently be the least developed of the major continents, its GDP at current prices is forecast to rise from \$3 trillion in 2023 to \$4.2 trillion in

2028 (IMF, 2023) and \$29 trillion by 2050 (WPR, 2023). Sub-Saharan Africa's share of GDP is projected at \$2.1 trillion in 2023 (representing 70 per cent of the continent's share) and \$3.1 trillion in 2028 (IMF, 2023), accounting for 73.8 per cent of the continent's share.

A growing GDP yields tremendous positive implications for businesses, setting a virtuous cycle of prosperity in motion. As the GDP rises, so do employment opportunities, resulting in increased wages that, in turn, stimulate consumer spending and elevate standards

of living. This heightened economic activity translates to higher profits for businesses, further fuelling the GDP growth and perpetuating the virtuous cycle of progress.

In addition, annual spending by African consumers and businesses is anticipated to rise by 66.5 per cent from \$4 trillion in 2015 to \$6.66 trillion by 2030. Figure 2.1 shows the continent's growth performance and outlook by region.

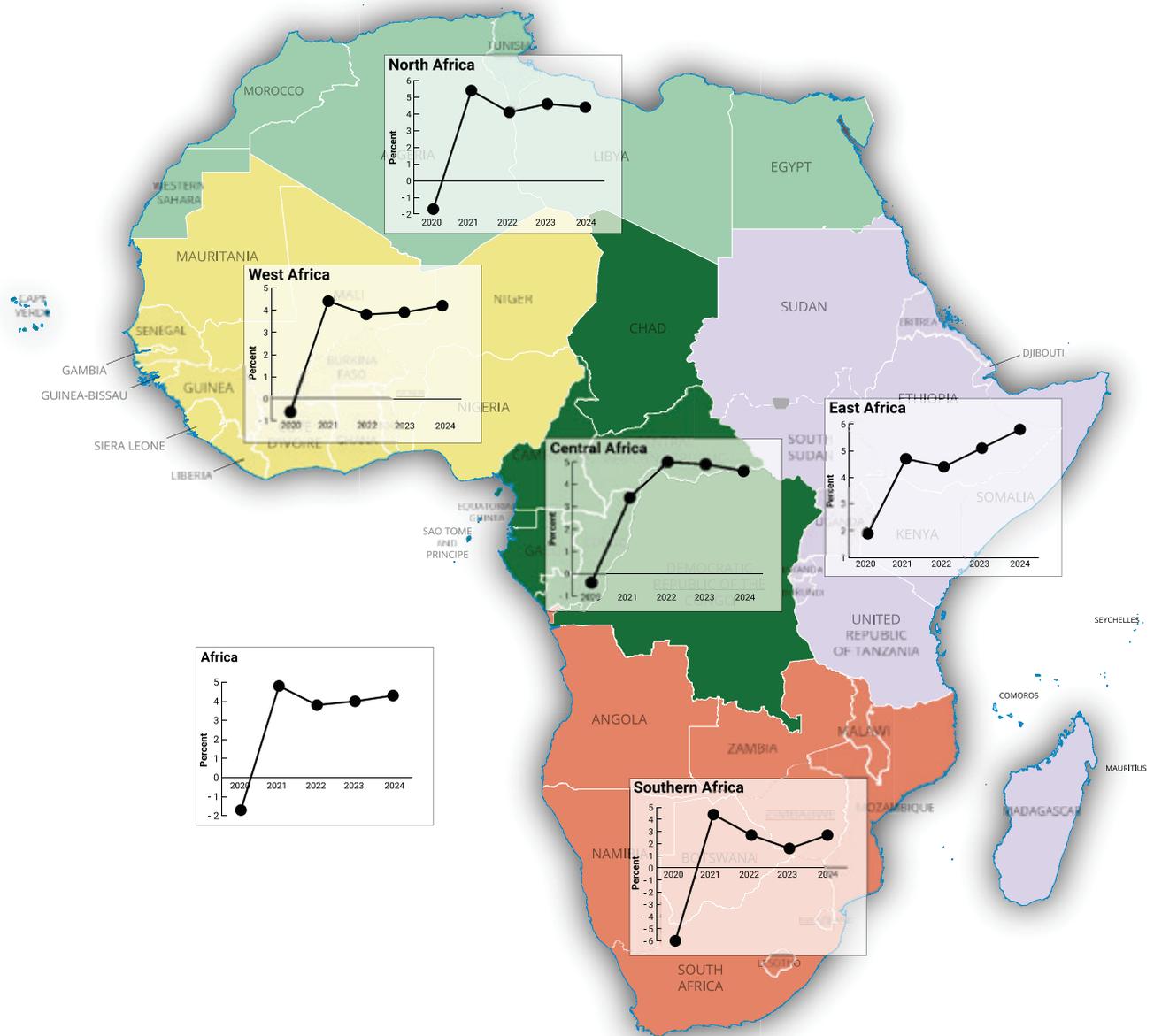


Figure 2.1: Africa's growth performance and outlook by region, 2020-2024 (AfDB, 2023b)

2.2.3 Improved macroeconomic and governance metrics

Emerging macroeconomic and governance policy developments show improvements in the continent's macroeconomic prudence and overall governance. At its core, governance is concerned with delivering public goods and services. Besides general peace, operative multiparty democracy and peaceful transition of power, good governance is characterised by a separation of powers between the three arms of government, especially the judiciary and legislature, operating without interference from the hitherto all-powerful executive. The separation of powers is also typified by the fact that the system of checks and balances functions as envisaged in each country's constitution. Respect for the rule of law is fundamental. Maturation in governance across the continent is also evident in functional key institutions such as the ministries responsible for finance and immigration and the agencies in charge of tax collection, electricity and water utilities. Using the respected Ibrahim Index of African Governance as an example, the index has improved at an annual rate of 1.4 per cent since 2007, principally on the back of improvements of more than 5 per cent in at least 12 countries, including Côte d'Ivoire, Ethiopia, Rwanda and Tunisia (Odusola, 2022). While there is scope for improvement, the index demonstrates that the building blocks for governance are in place in Africa (EY Global, 2020).

Another critical factor is the ease of doing business. Although significant gaps remain between developing and developed economies in various indicators concerning ease of doing business, this masks the remarkable strides many African countries have made at the individual level to create a conducive business environment. These strides span a wide range of themes, including company incorporation, access to credit and credit information, dealing with construction permits, resolving contract disputes and protection of minority investors, among others, as illustrated in

Table 2.1. Even though only a handful of the continent's economies have taken trackable steps to leapfrog their capacity to trade across borders, implementing the Agreement for African Continental Free Trade Area (AfCFTA) discussed further below should help to address this concern significantly.

One of the major factors cited as impediments to FDI in Africa is too much risk (Ogbonna et al., 2022). The perception of risk often exceeds real risk as African countries have become more stable and are predictable places to live, work and build businesses (EY Global, 2020). Nevertheless, scaling-up improvements in the 11 themes of Table 2.1 will undoubtedly aid in mitigating the perceived risks and ease the business process for many investors (Acha and Landry 2019). Of course, risk cannot be entirely eliminated as risk and profit go hand in hand: high-risk ventures are frequently associated with higher profits (Odusola, 2022). As a matter of fact, risk pooling has been identified as the single largest monetary opportunity in Africa, valued at \$150 billion (BSDC, 2017).



Photo Credits: SWITCH Africa Green

Table 2.1: Africa's improved countries by theme collated from (WB, 2020b)

THEME		IMPROVED AFRICAN COUNTRIES
1	Start a business: reducing incorporation fees or refining the one-stop-shop value proposition.	Democratic Republic of the Congo, Egypt, Equatorial Guinea, Eswatini, Gabon, the Gambia, Guinea, Lesotho, Nigeria, Togo, Tunisia and Zimbabwe
2	Access to credit or credit information	Cameroon, Central African Republic, Chad, Republic of Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Gabon, Kenya, Mauritania, Niger, Rwanda, Senegal, Togo and Zimbabwe
3	Dealing with construction permits	Democratic Republic of the Congo, Eswatini, Ethiopia, Gabon, Kenya, Mauritius, Morocco, Nigeria, Rwanda, Seychelles, Togo and Zimbabwe
4	Tax reforms: lowering the corporate tax rate, electronic filing and online systems for refunds	Côte d'Ivoire, Democratic Republic of the Congo, Egypt, the Gambia, Kenya, Morocco, Senegal and Tunisia
5	Contract disputes adjudication in the judicial systems	Côte d'Ivoire, Madagascar, Mauritania, Mauritius, Morocco, Nigeria, South Africa
6	Minority investor protections	Djibouti, Egypt, Kenya, Morocco, Zambia
7	Resolving insolvency	Djibouti, Kenya, Mauritius, Zambia, Zimbabwe
8	Employee welfare: minimum wage, paid leave	Djibouti, Rwanda, South Africa
9	Electricity connections: speed of connections, reliability and reporting and restoring outages	Egypt, Eswatini, Ghana, Kenya, Morocco, Nigeria, Rwanda, Togo, Uganda
10	Registration of property	Eswatini, Ethiopia, Guinea, Mauritius, Nigeria, Togo, Tunisia, Zimbabwe
11	Trading across borders	Morocco, Nigeria, Sierra Leone

2.2.4 The African Continental Free Trade Area

The agreement establishing the African Continental Free Trade Area (AfCFTA) was signed in 2018 and came into force in May 2019, making Africa the world's largest free trade area by the number of countries that have ratified the agreement. The main objective of the AfCFTA is to enhance trade between African nations by establishing an inclusive and advantageous trade agreement encompassing various areas such as trade in goods and services, investment, intellectual property rights, and competition policy, benefiting all member states.

With a substantial market size of 1.3 billion people (WB, 2023a) and a combined GDP of \$3 trillion in 2023, the AfCFTA presents lucrative investment prospects in key areas

such as agriculture, energy markets, minerals, health infrastructure and pharmaceutical industries, light manufacturing, transport and logistics, and the digital economy. These sectors offer considerable business openings for entrepreneurs, enabling them to generate notable economic and social returns on investment (AfDB, 2023b).

It is envisioned that five operational instruments will govern the AfCFTA:

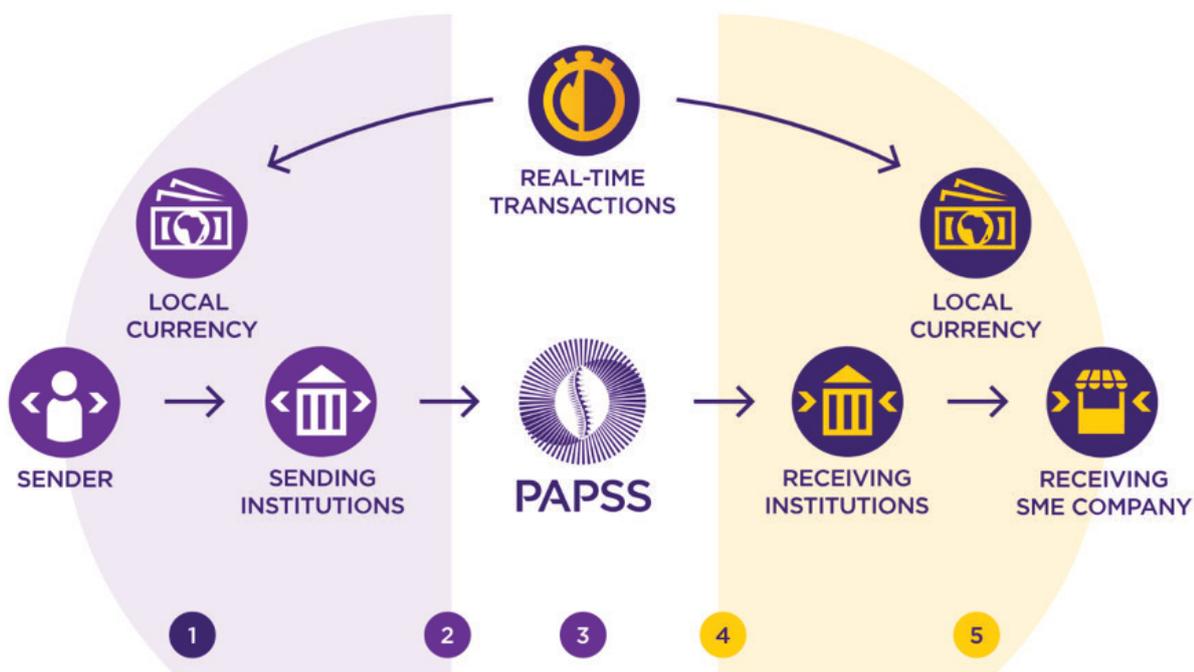
1. Rules of origin which lay out the criteria for a product or service to be traded duty-free across the region.
2. Tariff concessions where countries will progressively eliminate import duties on goods originating from the territory of any

other member state, thereby ultimately liberalising those goods.

3. An online mechanism dedicated to monitoring and reporting non-tariff barriers (NTBs) with the aim of eventually eliminating them.
4. The Pan-African Payment and Settlement System (PAPSS) is, at its core, a cross-border, simplified financial market infrastructure geared towards enabling instant, secure, and multi-local currency payment transactions across Africa to bolster confidence in the AfCFTA and unlock new markets. PAPSS also has scope for a range of overlay services. The envisaged payment cycle is shown in Figure 2.2.
5. The African Trade Observatory is a trade information portal designed to address hindrances to intra-African trade owing

to a lack of information or information asymmetry regarding opportunities, trade statistics and potential trading partners for both importers and exporters in other countries.

Under this framework, countries tend to specialise in producing goods and services in which they possess a comparative advantage. This reallocation of resources can lead to enhanced economic efficiency, including reducing costs associated with environmentally-friendly goods, services and technologies. Consequently, this efficiency gain can improve energy efficiency and lower GHG emissions, offsetting trade expansion's potential negative impacts (WTO, 2022). Therefore, early adopters of green innovation will have a first-mover advantage (Kuo et al., 2022), where investments can quickly pay for themselves several times over, especially where barriers to entry are high.



PAPSS Sequence of Events:

1. An originator issues a payment instruction in their local currency to their bank or payment service provider.
2. The payment instruction is sent to PAPSS.
3. PAPSS carries out all necessary validation checks on the payment instruction.
4. The payment instruction is forwarded to the beneficiary's bank or payment service provider.
5. The beneficiary's bank clears the funds to the beneficiary in their local currency.

Figure 2.2: How PAPSS Will Work Source (PAPSS, 2023)

2.2.5 SDG-related business opportunities

The Business and Sustainable Development Commission (BSDC) conducted extensive research and uncovered many untapped private-sector prospects. These opportunities, valued at a minimum of \$12 trillion annually by 2030, comprise around 10 per cent of the projected global GDP. Additionally, they have the potential to triple in size within four key economic systems, which account for 60 per cent of the real economy (as contrasted with the financial economy). These four economic systems are food and agriculture, cities, energy and materials, and health and well-being, and they directly correlate with many of the 17 SDGs depicted in Figure 1.1 in Chapter 1. Figure 2.3 illustrates how the value of business opportunities from the Global Goals are distributed among different regions and systems.

As shown by the map in Figure 2.3, in essentially keeping with a noticeable developing-developed country divide, the highest value of opportunities in Africa lie in the food and agriculture economic system, followed by health and well-being, energy and materials,

and then cities. The massive opportunity in the food and agricultural sector validates consistent research findings that Africa has 60 to 65 per cent of the world's remaining uncultivated arable land, plenty of fresh water, and about 300 days of sunshine each year (AfDB, 2019; FAO, 2021a). Figure 2.4 lists the 60 biggest market opportunities grouped by economic system.

Businesses can unlock numerous benefits by prioritising social inclusion and environmental sustainability with the same conscientiousness as their financial goals. By embracing these dimensions, they can quickly reap the 6Ps from these 60 quick wins, which include:

- ◆ **Food and Agriculture:** By reducing food waste in value chains, adopting micro-irrigation practices, and addressing packaging waste.
- ◆ **Cities:** Through initiatives like energy-efficient buildings, electric and hybrid vehicles, and autonomous vehicles.

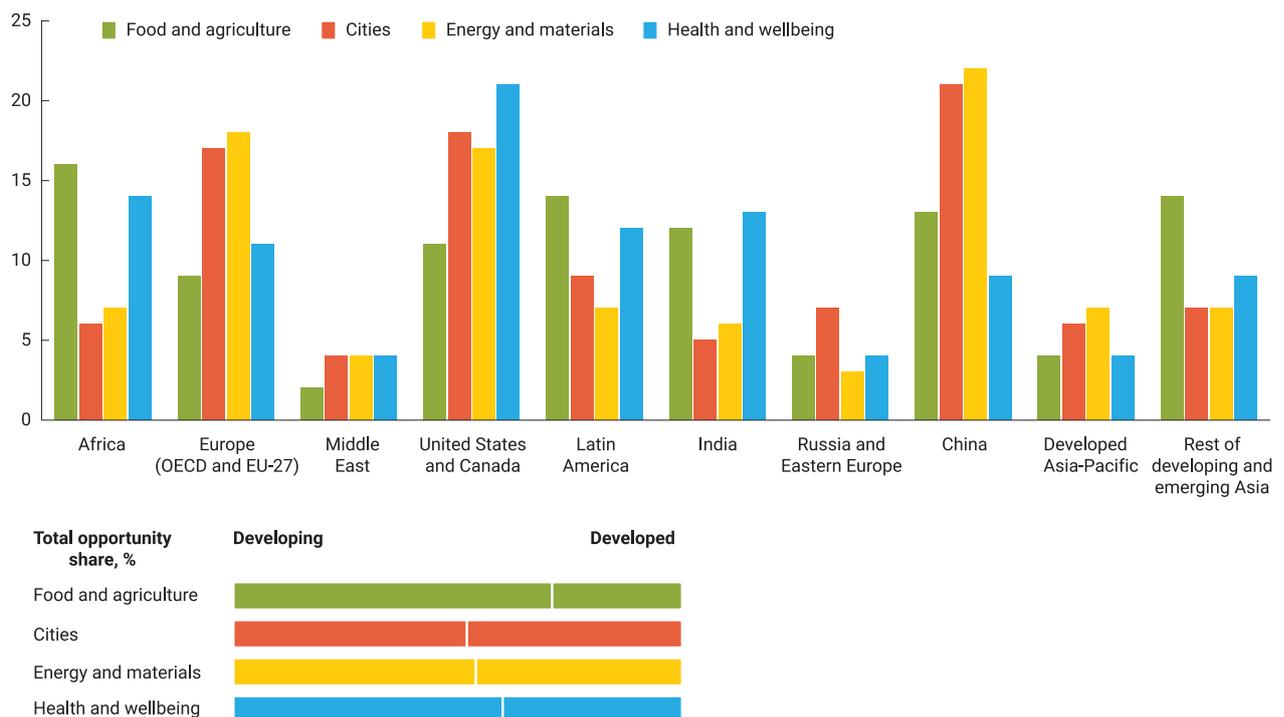


Figure 2.3: Percentage Share of SDG-related business opportunities by region and economic system (BSDC, 2017)

- ◆ **Energy and Materials:** By adopting circular models for the automotive and appliance electronics industries, promoting clean energy and green chemicals, and emphasising local content in extractive practices.
- ◆ **Health and Well-being:** By implementing risk pooling strategies, utilising remote

patient monitoring and telehealth services, advancing genomics, and exploring low-cost surgery options.

Moreover, pursuing these 60 business and growth opportunities could create up to 85 million new jobs in Africa alone by 2030 (BSDC, 2017).

	 Food and Agriculture	 Cities	 Energy and Materials	 Health and Well-Being
1	Reducing food waste in value chain	Affordable housing	Circular models - automotive	Risk pooling
2	Forest ecosystem services	Energy efficiency - buildings	Expansion of renewables	Remote patient monitoring
3	Low-income food markets	Electric and hybrid vehicles	Circular models - appliances	Telehealth
4	Reducing consumer food waste	Public transport in urban areas	Circular models - electronics	Advanced genomics
5	Product reformulation	Car sharing	Energy efficiency - non-energy intensive industries	Activity services
6	Technology in large-scale farms	Road safety equipment	Energy storage systems	Detection of counterfeit drugs
7	Dietary switch	Autonomous vehicles	Resource recovery	Tobacco control
8	Sustainable aquaculture	ICE vehicle fuel efficiency	End-use steel efficiency	Weight management programs
9	Technology in smallholder farms	Building resilient cities	Energy efficiency - energy intensive industries	Better disease management
10	Micro-irrigation	Municipal water leakage	Carbon capture and storage	Electronic medical records
11	Restoring degraded land	Cultural tourism	Energy access	Better maternal and child health
12	Reducing packaging waste	Smart metering	Green chemicals	Healthcare training
13	Cattle intensification	Water and sanitation infrastructure	Additive manufacturing	Low-cost surgery
14	Urban agriculture	Office sharing	Local content in extractives	
15		Timber buildings	Shared infrastructure	
16		Durable and modular buildings	Mine rehabilitation	
17			Grid interconnection	

Figure 2.4: The 60 biggest SDG-related private sector business opportunities in four economic systems (BSDC, 2017)

2.3 Uptick in demographic drivers

2.3.1 Highest population growth rate in the world

The latest projections by the UN Department of Economic and Social Affairs (UNDESA) suggest that the global population could grow from 8 billion in 2022 to around 8.5 billion in 2030, 9.7 billion in 2050 and 10.4 billion in 2100. The 300-year global population by region is illustrated in Figure 2.5. More than 50 per cent of this projected increase in global population up to 2050 is expected to be concentrated in just eight countries, five of which are located in Africa. India, Pakistan and the Philippines will be joined by the Democratic Republic of the Congo, Egypt, Ethiopia, Nigeria and the United Republic of Tanzania in this league of eight. At the top of this league will be the Democratic Republic of the Congo and the United Republic of Tanzania, whose populations are expected to grow most rapidly by 2 to 3 per cent each year over the 2022-2050 period (UNDESA, 2022).

The continent's share of the global population is expected to rise from 18 per cent to approximately 40 per cent by 2100, as shown in Figure 2.5. Some research forecasts that the continent's population will double from 1.19 billion in 2015 to surpass 2 billion in the late 2040s and will quadruple the 2015 figure to reach 4.39 billion by 2100 (Odusola, 2022). In 2022, the population in Africa grew at a 2.5 per cent annual rate, representing more than three times the global average of 0.8 per cent per year (UNDESA, 2022). The anticipated rapid rise in Africa's population is directly attributed to falling child mortality, higher life expectancy and the fact that it is the only continent in the entire world where the birth rate is forecast to stay well above the replacement rate for at least a generation (Bricker and Ibbitson 2019). Indeed, although considerably lower than the 6.3 births per woman recorded in 1990 (S&P

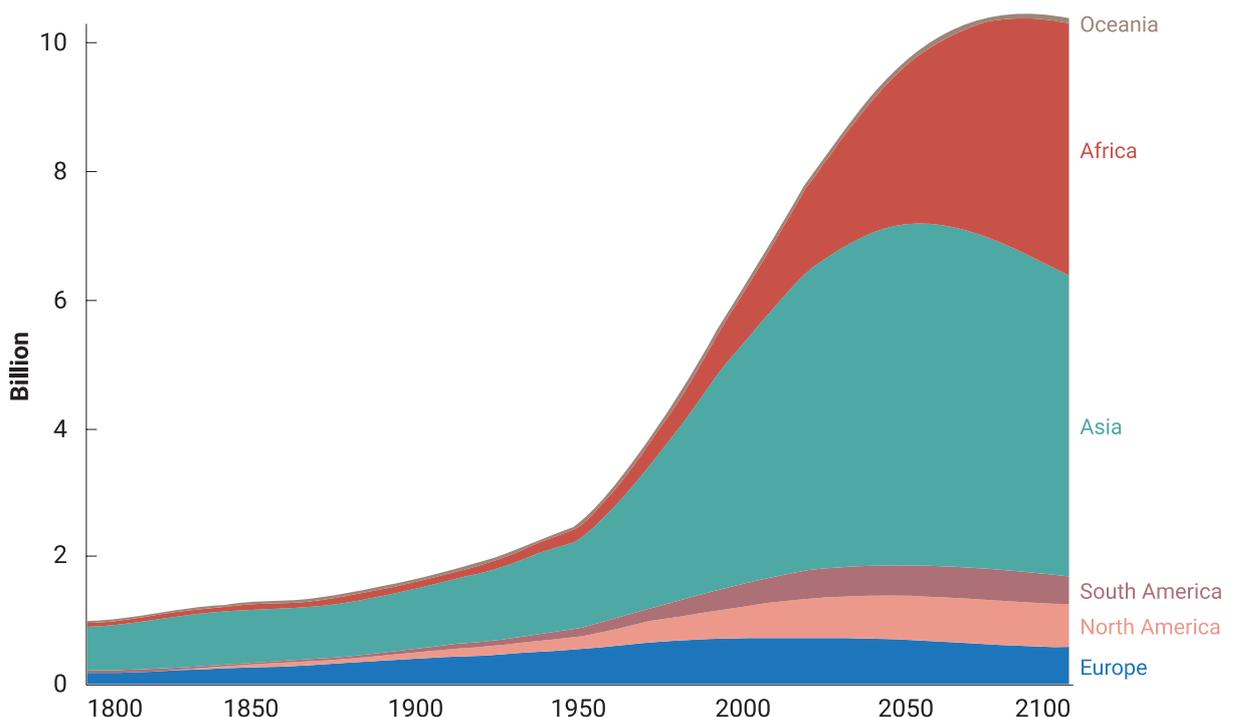


Figure 2.5: Past, present, and future projections of the global population by region, 1800-2100 (Our World in Data, 2023e), collated from HYDE (2017); Gapminder (2023); UN (2022).

Global 2021), it is projected that sub-Saharan Africa will have a much higher fertility rate (4.6 births per woman) than Oceania excluding Australia and New Zealand (3.1 births per woman), Northern Africa and Western Asia (2.8

births per woman), and Central and Southern Asia (2.3 births per woman) for the rest of the century. Figure 2.6 depicts the total fertility rate by world region and the projections through 2100.

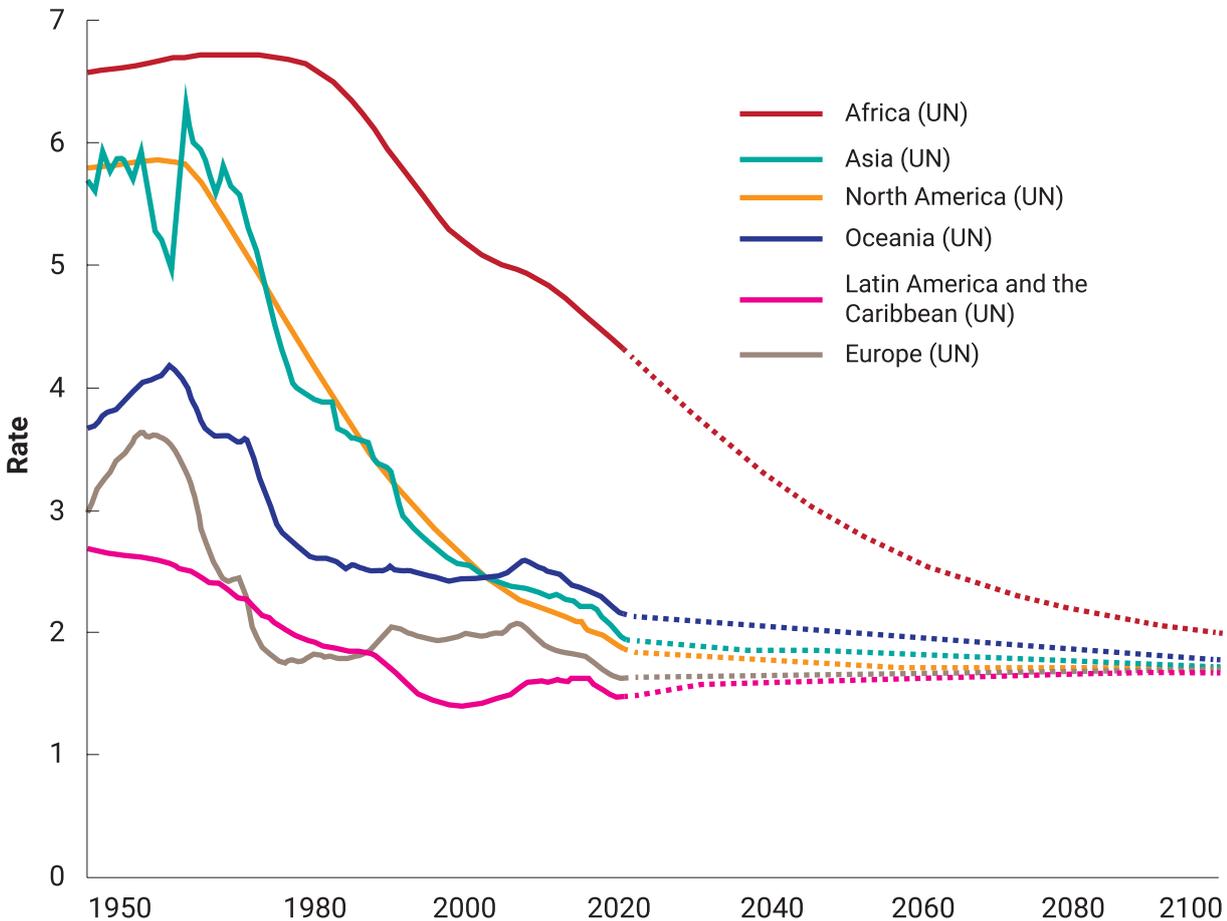


Figure 2.6: Global fertility rate by region up to 2100 (UN, 2022a)

2.3.2 Africa's youthful population: businesses opportunities and demographic dividends

Following similar trends in Asia, Latin America and the Caribbean, sub-Saharan Africa is currently witnessing a shift in the age distribution of its population. More specifically, the proportion of the working-age population (25-64 years) is rising relative to the younger and older non-working cohorts.

As a demonstration of this shift in the population's age distribution, Africa's median age is 18.8 years old, at least 12.2 years younger

than Latin America and the Caribbean, which ranks second place, and 23.4 years younger than Europe, which has the highest median age in the world at 42.2 (MIF, 2023). This trend is expected to continue until at least 2100, as shown in Figure 2.7.

The comparison with other regions makes investing in Africa an incredibly unique value proposition. The continent's share of the global youth population will more than double from

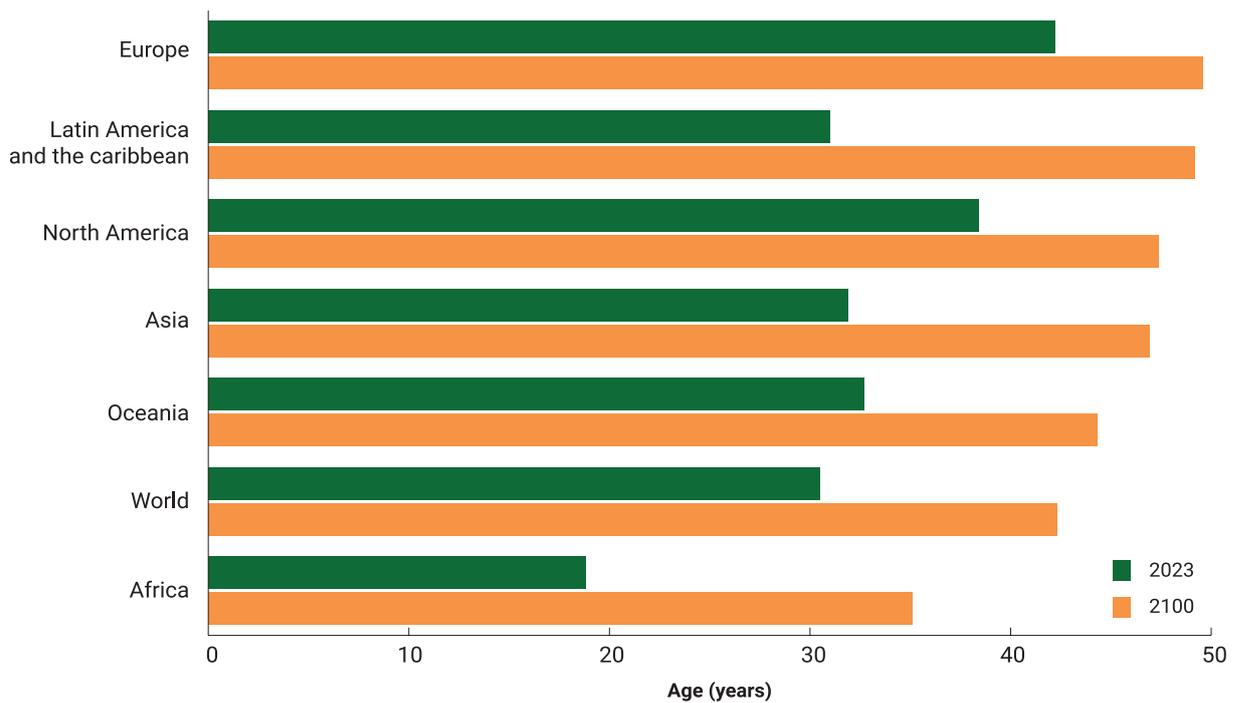


Figure 2.7: World regions: Median age, 2023 and 2100 (MIF, 2023)

20.3 per cent in 2023 to 44.9 per cent in 2100 (MIF, 2023), as shown in Figure 2.8, and Africa is poised to overtake Asia as the continent with the highest number of youths by 2085. Hence, in contrast to other regions, notably those in the global North, which grapple with the challenges posed by an ageing population, Africa stands out as the youngest continent by a considerable margin, as shown in Figure 2.9. This presents an opportunity to revolutionise the continent’s economies through the characteristic innovation and creativity of younger, less risk-averse brains.

This shift in age distribution offers a limited window of time that African economies can ride to transform their economies, a phenomenon that has appropriately earned the catchphrase ‘demographic dividend’. The rationale is that with comparatively fewer young and elderly dependents to support financially, a country has a timebound opportunity to channel the corollary savings into accelerating GDP growth. This opportunity is, however, timebound as the working cohort will eventually reach retirement age, requiring financial support from social security benefits or informal social safety nets. This situation would deplete any potential ‘savings’ that could have otherwise been utilised

to expedite economic growth. It is estimated that by 2016, up to 12 million African youth entered the workforce each year to compete for only 3.1 million new jobs, leaving about 9 million youth unemployed. This number is estimated to have risen considerably to as high as 20 million in 2023 (WPR, 2023).

Furthermore, the female population is more than 50 per cent of the total population of Africa, and they are more and more active in the continent’s economic growth. The increased literacy rate of the African female population means an increased potential for women’s entrepreneurship.

On the one hand, investors can maximise this demographic dividend by harnessing the readily available workforce in labour-intensive industries to lower production costs. This indicates a high benefit-cost ratio for doing business in Africa. On the other hand, policymakers at the national, sub-regional and regional levels can optimise this advantageous age distribution by developing their human capital (UNDESA, 2022).

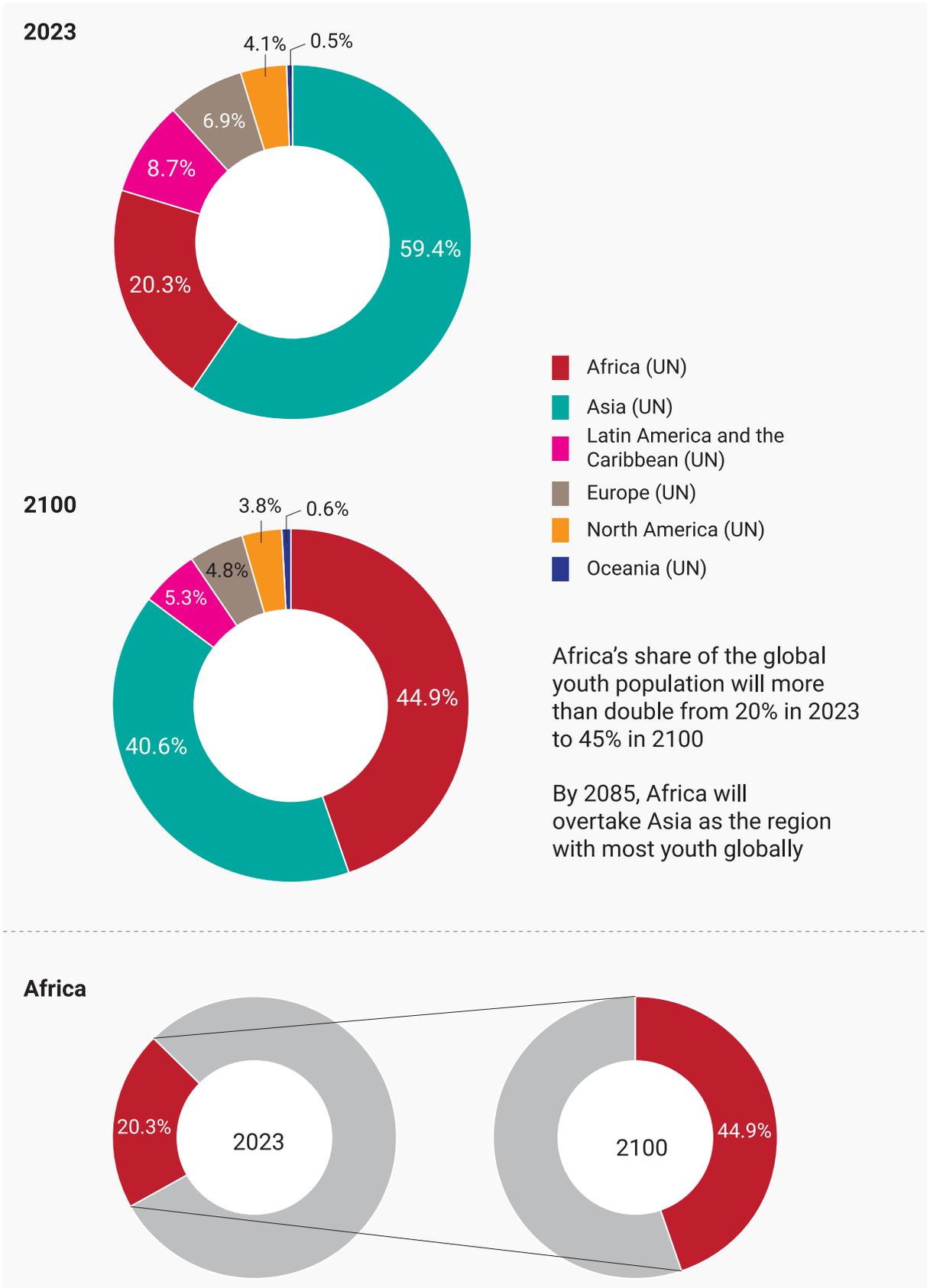


Figure 2.8: Share of global youth population by region, 2023 & 2100 (MIF, 2023)

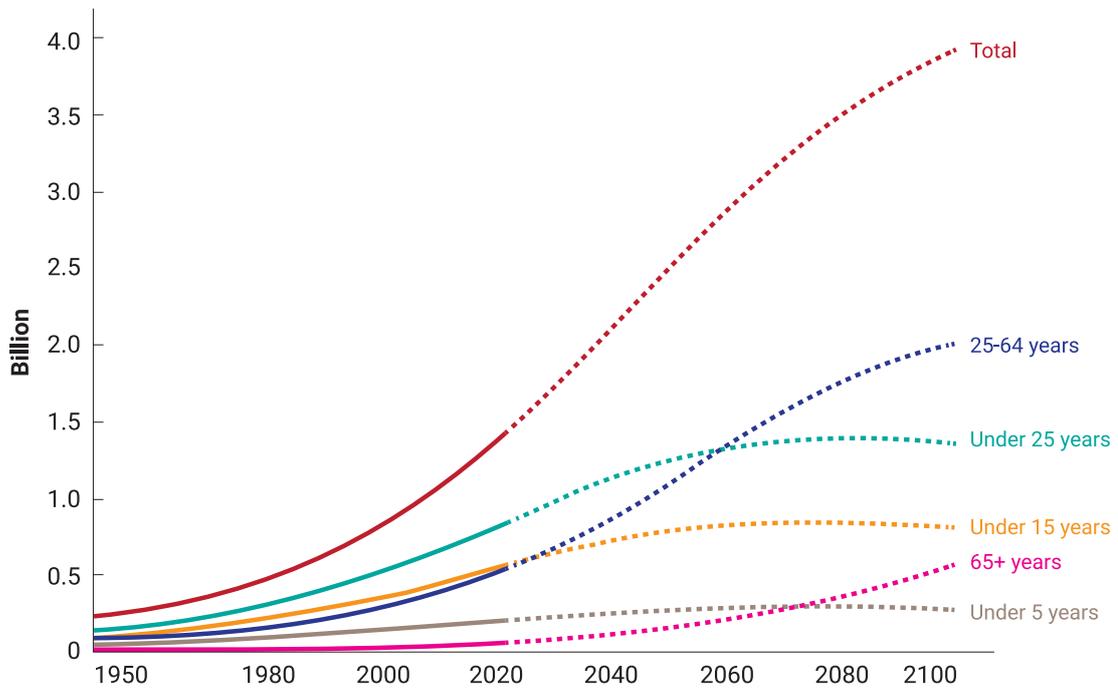


Figure 2.9: African population by age group, 1950-2100 (UN, 2022a)

2.3.3 Rapidly urbanising population

The anticipated population growth in Africa coincides with a parallel rise in urban expansion. The global population is heading towards an overwhelmingly urban future. In 1950, 30 per cent of the world’s population resided in urban areas and grew to 55 per cent by 2018. Projections indicate that by 2050, approximately 68 per cent of the world’s population will live in urban areas, adding roughly 2.5 billion people

to the global urban population. Ninety per cent of this growth is expected in Africa and Asia (UN, 2019). Africa is the fastest urbanising region in the world, and six of the world’s top ten countries experiencing rapid urbanisation are in Africa (UNEP, 2016). Figures 2.10 and 2.11 show the global urbanisation prospects and the share of Africa’s urban-rural divide by 2050, respectively.

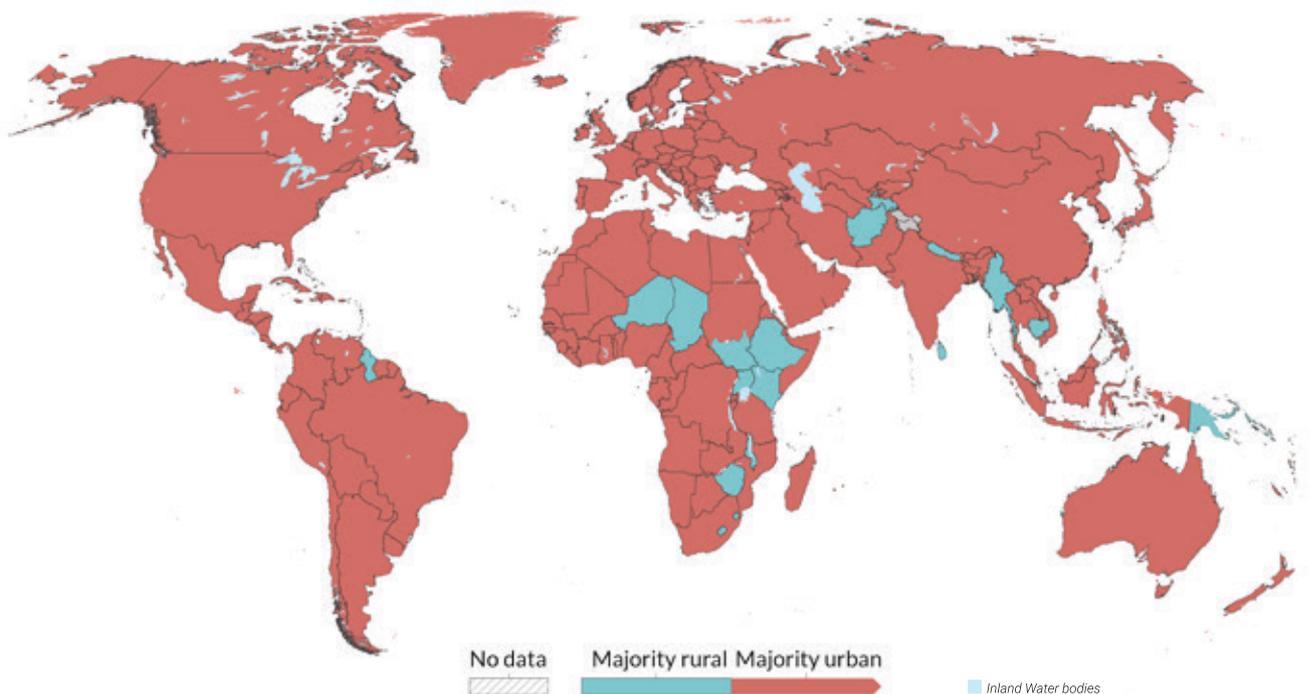


Figure 2.10: Share of the world’s rural and urban population in 2050 (UN, 2019)

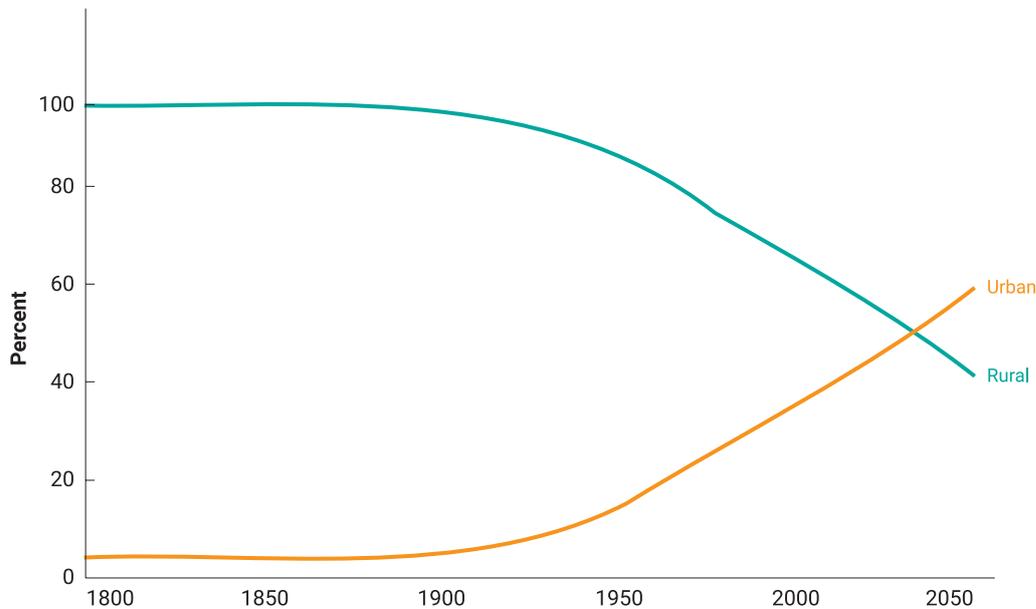


Figure 2.11: *Share of Africa's rural and urban population (UN, 2019)*

The shift of Africa's population from rural to urban areas is expected to occur due to the increasing income of its fast-growing middle class and the emergence of new business opportunities in its expanding consumer market. The annual spending by African consumers and businesses, which was \$4 trillion in 2015, is projected to reach \$6.66 trillion by 2030, offering businesses additional income streams and the opportunity to leverage the 6Ps.

Africa's demographic and urbanisation trends present a blend of challenges and opportunities. For businesses that can address these attendant challenges, the most significant opportunities offer a potential value of \$214 billion in sectors such as affordable housing, water and sanitation infrastructure, and energy efficiency in buildings, while creating over 32 million jobs (BSDC, 2017). Other sectors requiring concomitant scaling up of investments include agriculture, energy and all modes of transportation (road, rail, air and sea).

2.4 Climate change finance: drivers and opportunities

The Intergovernmental Panel on Climate Change (IPCC) has reiterated that while Africa is among the lowest contributors to greenhouse gas emissions, the continent is warming faster than the global average and is the most severely affected by the impacts of climate change (IPCC, 2022). Most African economies rely heavily on climate-sensitive economic sectors that are exposed to climate variability, such as agriculture (UNEP, 2016). As such, various sectors crucial to Africa's development are facing significant losses and damage due to human-induced climate change.

Climate change mitigation and adaptation measures are urgently needed to build and strengthen preparedness and resilience and decouple the continent's economic growth from carbon emissions. These are measures that the private sector, by virtue of its financial acuity, is well placed to identify and invest in.

Following the UN's 26th Climate Change Conference of the Parties (COP 26) in 2021, there has been a significant shift in the global consensus towards achieving net zero

emissions and centralising this target as a principle for businesses globally. Following the subsequent COP 27 edition in 2022, a loss and damage fund was established due to the sustained advocacy and pressure from climate-vulnerable developing nations for several decades. The fund is expected to support affected countries in addressing inevitable losses arising from droughts, floods, rising sea levels and other climate change-related disasters.

funds. The private sector has a significant opportunity to capitalise on this inflow of funds to explore novel prospects within climate-related markets. This can be achieved through collaboration with governments, development finance institutions and local entrepreneurs actively enhancing resilience and adaptive capacity and transitioning Africa to a low-carbon economy.

Many African countries have a substantial deficit in climate finance and investment to implement preparedness and response measures for climate change (AfDB, 2022a). According to the latest submitted Nationally Determined Contributions (NDCs) as of April 2023, Africa cumulatively needs at least \$2.7 trillion over 2020-2030 or \$242.4 billion annually in climate financing. Of that amount, 44 per cent would help fund adaptation, 42 per cent would go towards mitigation, 13 per cent towards loss and damage, and the remaining 1 per cent going to support other needs such as capacity development (AfDB, 2023b), as illustrated in Figure 2.12.



Charcoal Production. Photo Credits: UNEP

The finance gap is unlikely to be filled by traditional financing instruments, and more innovative donor funds are expected to flow into Africa, in addition to internal public sector

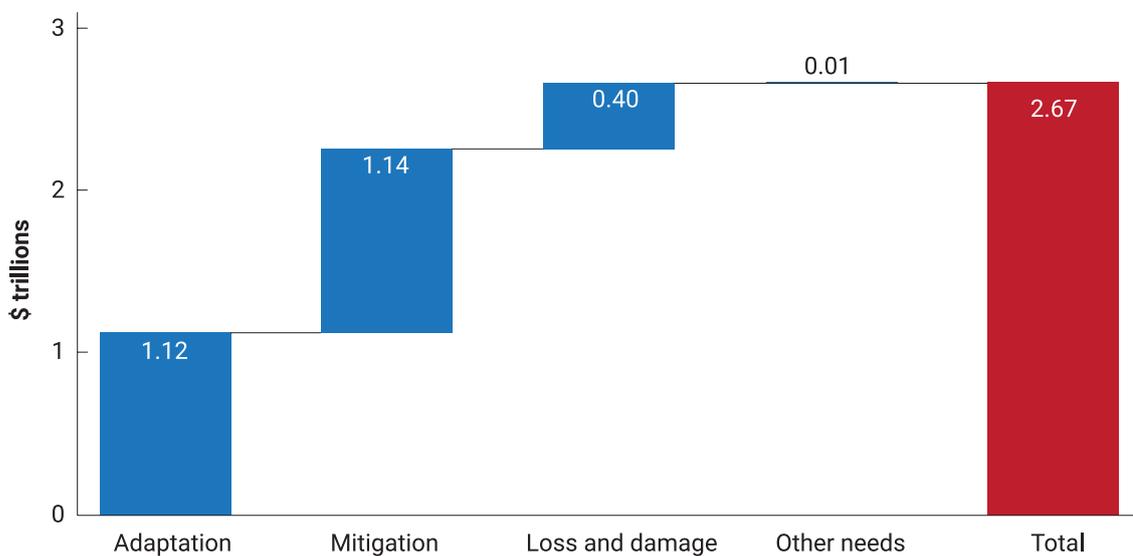


Figure 2.12: Cumulative climate finance needs in Africa's NDCs, 2020-2030 (AfDB, 2023b)

2.5 Harnessing digital transformation for disruptive innovation

2.5.1 Mobile internet adoption

An internet-enabled mobile telephone is a prerequisite for mobile internet connectivity. The proliferation of mobile telephony is dramatically growing in Africa. In 2022, 58 per cent of individuals in the least developed countries (LDCs)—with Africa accounting for 33 of the 46 countries designated as such—owned a mobile phone, reasonably close to the global average of 73 per cent (ITU, 2023). Mobile cellular subscriptions followed a similar trend, with LDCs averaging 79 subscriptions per 100 inhabitants, which is fairly comparable to the world average of 108 (ITU, 2023). Disaggregating these figures by sub-region, sub-Saharan Africa had 515 million mobile services subscribers, accounting for 46 per cent of the population by the end of 2021 (GSMA, 2022a). This marked an increase of nearly 20 million compared to the previous year. However, Africa’s technology uptake is the lowest in the world, and the continent’s internet

infrastructure quality and coverage trail other regions by a significant extent (Begazo et al., 2023). Figure 2.13 provides an overview of the global, country-by-country mobile subscription levels in 2020, with Africa demonstrably lagging behind the other continents.

Mobile telephony is poised to grow exponentially over the next two years. Projections indicate that there will be approximately 100 million new mobile subscribers in sub-Saharan Africa by 2025, bringing the total number of subscribers to 613 million, equivalent to 50 per cent of the continent’s population (GSMA, 2022a). Incorporating figures for North Africa, which the Global System for Mobile Communications Association (GSMA) currently aggregates with the Middle East, would undoubtedly raise both these averages and absolute values, given that in 2021, there were 648 million SIM connections in the Middle East and North Africa (MENA)

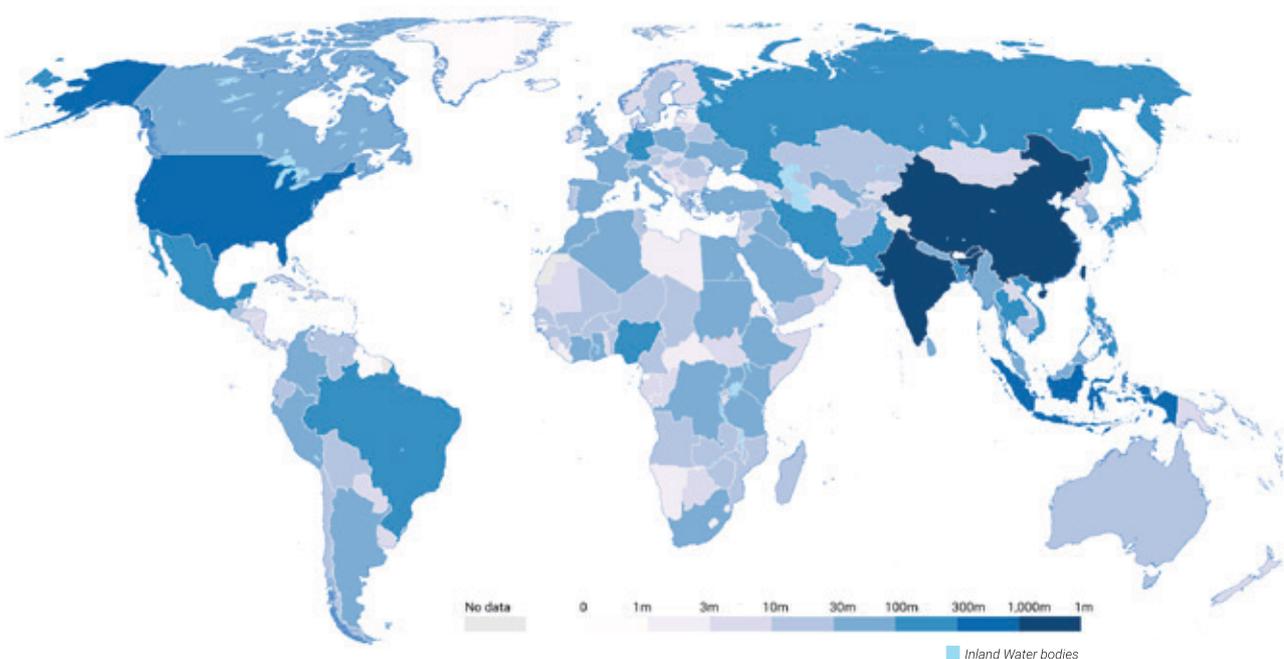


Figure 2.13: Global mobile phone subscribers (WB, 2020a), collated from the International Telecommunication Union (ITU) World Telecommunication/ICT Indicators Database

region, representing a penetration rate of 103 per cent (GSMA, 2022b). Extrapolating the MENA figure to North Africa would considerably increase the penetration rate for Africa.

Nearly 40 per cent of sub-Saharan Africa's adult population is now connected to mobile internet services. While 44 per cent of the population has access to mobile broadband network coverage (ITU, 2022b), many do not use mobile internet services. The primary reasons are affordability and lack of digital skills (GSMA, 2022a), creating a usage gap. This gap presents potential areas for policymakers' intervention and opportunities for investors seeking reliable business models. This is especially true given that smartphones accounted for 49 per cent of mobile internet connections in 2021 in sub-Saharan Africa and are expected to catapult to 61 per cent in 2025.

Due to its convenience and versatility, the smartphone has emerged as the preferred device for carrying out essential online tasks. Its usage surpasses other ICT devices such as laptops, desktop computers and tablets, leading to lower adoption rates of these alternative devices in Africa. Consequently, African businesses need more support in leveraging technology to drive enhanced productivity, primarily due to the slower adoption of smartphones, computers, and more advanced digital technologies. Indeed, the World Bank's recent empirical research corroborates the assertion that the use of mobile internet has a direct positive impact on enterprise productivity, job creation and poverty reduction across the African continent (Begazo et al., 2023). Addressing the gap between the aspiration of SDG Target 9.c and its achievement necessitates targeted investments.

2.5.2 Mobile ecosystems' contribution to economic growth

Africa's digital and mobile services have experienced a remarkable surge in accessibility, surpassing the conventional banking sector for many individuals. This advancement has provided swift and convenient access to funds and expanded markets, accelerating transactions and enhancing overall productivity. The mobile ecosystem contributed approximately 8 per cent, adding nearly \$140 billion in economic value to the GDP of sub-Saharan Africa in 2021 alone. Moreover, this ecosystem generated \$16 million in taxes to the public coffers over the same period and created and sustained over 3.2 million jobs (GSMA, 2022a). This trend is anticipated to add upwards of \$300 billion to Africa's GDP by 2025. Technology has transformed and equalised societies by enhancing connectivity, financial inclusion, and access to trade and public services.

Africa's large and fast-growing marketplace is evident with its almost 1.4 billion people, over 500 million internet users and 330 million e-commerce users, along with rapid modernisation and promising signs of growth. This presents a first-mover opportunity window for businesses and investors to consider (Yalowitz et al., 2022) seriously. Between 2015 and 2030, consumer spending is expected to grow by two-thirds, and the current 515 million internet users in Africa are expected to comprise 16 per cent of the global total with an expansion of about 11 per cent over the next decade. With each 10 per cent expected increase in internet access, Africa can be expected to see a 2.5 per cent increase in GDP per capita, compared with a 2 per cent increase globally.

Findings from extensive research into the African tech ecosystem carried out by the Accenture Consulting company show that the internet-based economy is rising across Africa, with several countries on the continent

Africa's \$180B Internet economy future

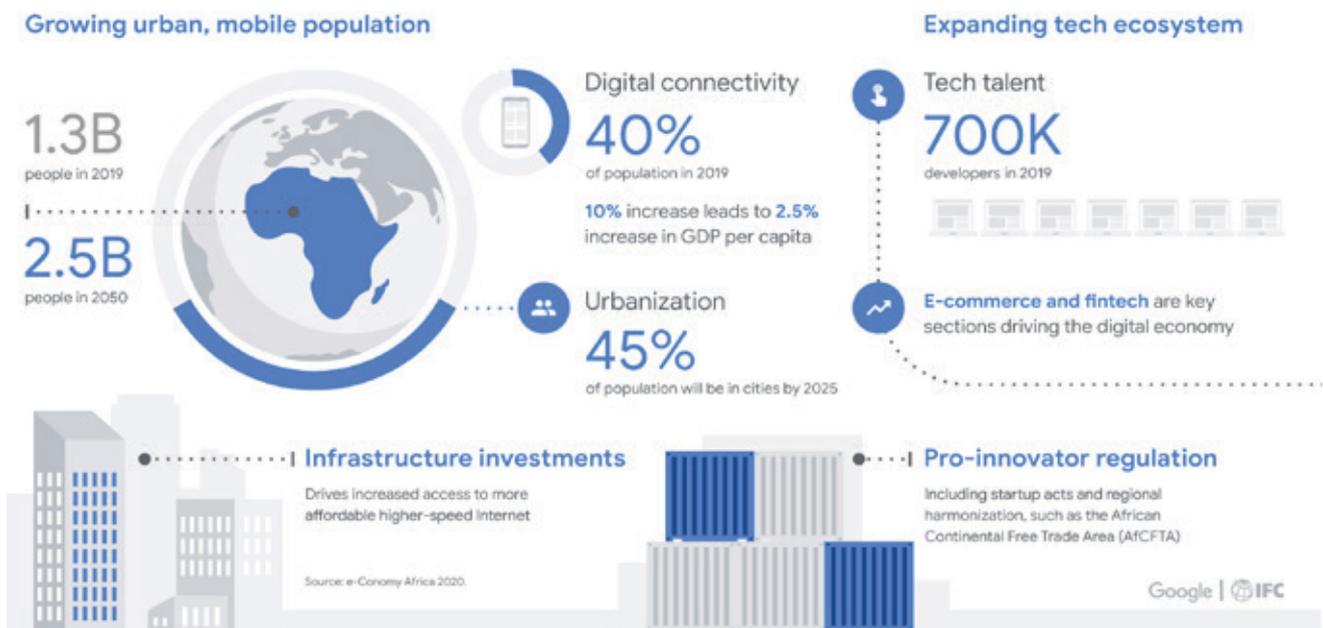


Figure 2.14: Drivers of Africa's internet economy, 2025 (WEF, 2022)

achieving sustained growth in internet-driven GDP (iGDP) in the past decade. In many cases, the iGDP has doubled from 1.5 per cent to more than 3 per cent of GDP since 2012, and some countries have demonstrated exceptionally rapid trajectories. For example, by 2050, the share of iGDP in Kenya, Morocco, Senegal and South Africa is expected to be approximately 6 per cent of GDP, similar to where the United States of America is today. Going by these trends, the Internet economy is anticipated to contribute up to \$180 billion and \$712 billion to the African economy by 2025 and 2050, respectively (Yalowitz et al., 2022). Figure 2.14 depicts the drivers and prospects of Africa's digital economy by 2025.

The World Economic Forum (WEF) postulates that Africa has the potential to emulate China's rapid economic rise over the past 50 years if it accelerates and sustains structural reforms. The continent's fast-expanding tech ecosystem presents an exceptional opportunity for both tech and non-tech companies to enter the market, offering a level of potential that rivals the opportunities previously witnessed in the Asia-Pacific (APAC) region (Yalowitz et al., 2022).

2.5.3 Leveraging the exponential power of artificial intelligence (AI)

The continent is also home to a booming start-up ecosystem, with venture capital investment growing more than ten times between 2015 and 2021, reaching over \$4.3 billion in 2021 (Yalowitz et al., 2022).

More than 600 technology hubs have emerged across the continent, with three of them achieving international recognition in Lagos, Nigeria; Nairobi, Kenya; and Cape Town, South Africa. While local businesses capitalise on these promising trends with the use of digital tools and platforms in business surging in the last two years, national governments are now encouraging the acceleration of tech growth by launching initiatives and schemes to incentivise tech entrepreneurship. There is also an ongoing trend of regional harmonisation, with AfCFTA promising to be a significant boost for pan-continental business, including digital business (Yalowitz et al., 2022).

Deploying artificial intelligence (AI) can be a potent tool for leapfrogging Africa into realising the gamut of the SDGs. Given its sheer versatility and speed, AI has, understandably, been touted as the most significant technological breakthrough since the inception of the internet. As organisations worldwide make frantic efforts to utilise AI as a solution for various challenges spanning agriculture, business processes, economy, environment, human health, human resources management and beyond, Africa stands in a favourable position to leverage AI for multiple reasons:

- ◆ The continent is at a comparatively low base of ICT development and will not be encumbered by regrets over sunk costs in predecessor technologies that AI has now outclassed and consigned to archival collections.
- ◆ The rapidly growing population means that the benefits of AI can be scaled.
- ◆ A youthful population which is inherently tech-savvy (ITU, 2023) will be more likely to stretch the limits of AI and thereby likely to generate new uses and complementary technologies, which bodes well for the future of AI in Africa, potentially transforming the continent into an AI superpower.

The power of AI lies in its capacity to rapidly analyse vast and diverse collections of unstructured data within milliseconds. This capability is growing exponentially, sometimes within a span of just three months. Moreover, in a recent report dated June 2023, McKinsey and Company reported that generative AI has the potential to unlock additional value worth trillions of dollars in the global economy beyond what can be achieved with other AI and analytics methods (Chui et al., 2023) as illustrated in Figure 2.15. According to the study by McKinsey and Company summarised in the graphic, the application of generative AI across knowledge workers' activities is projected to yield annual net economic benefits ranging from an astounding \$6.1 trillion to \$7.9 trillion.

The value potential of generative AI varies by function, with just four of 16 business functions accounting for approximately 75 per cent of the total annual value from generative AI use cases, as shown in Figure 2.16. These four functions are customer operations (via customer self-service interactions and customer-agent interactions), marketing and sales (via strategisation, awareness, consideration, conversion and retention), software engineering (via inception and planning, system design, coding, testing and maintenance), and research and

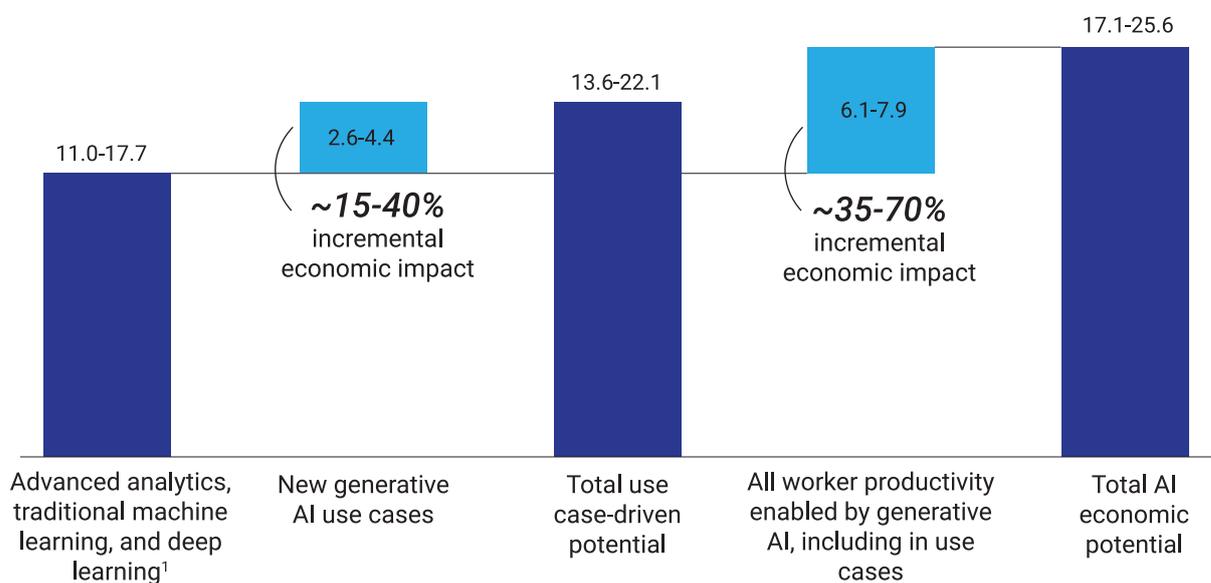


Figure 2.15: AI's potential impact on the global economy, \$ trillion (Chui et al., 2023)

development (via early research analysis, virtual design, virtual simulations and physical test planning) (Chui et al., 2023).

Furthermore, generative AI holds significant potential, estimated to generate a value ranging from \$2.6 trillion to \$4.4 trillion in select industries. However, its impact on business functions varies across different sectors, as

illustrated in Figure 2.17. Notably, deploying generative AI in software engineering within the high-tech industry is anticipated to have a particularly substantial impact. For Africa to realise its full potential in AI, employees must be trained in the new skills and supported to continue learning to keep abreast with developments (Bawumia, 2023).

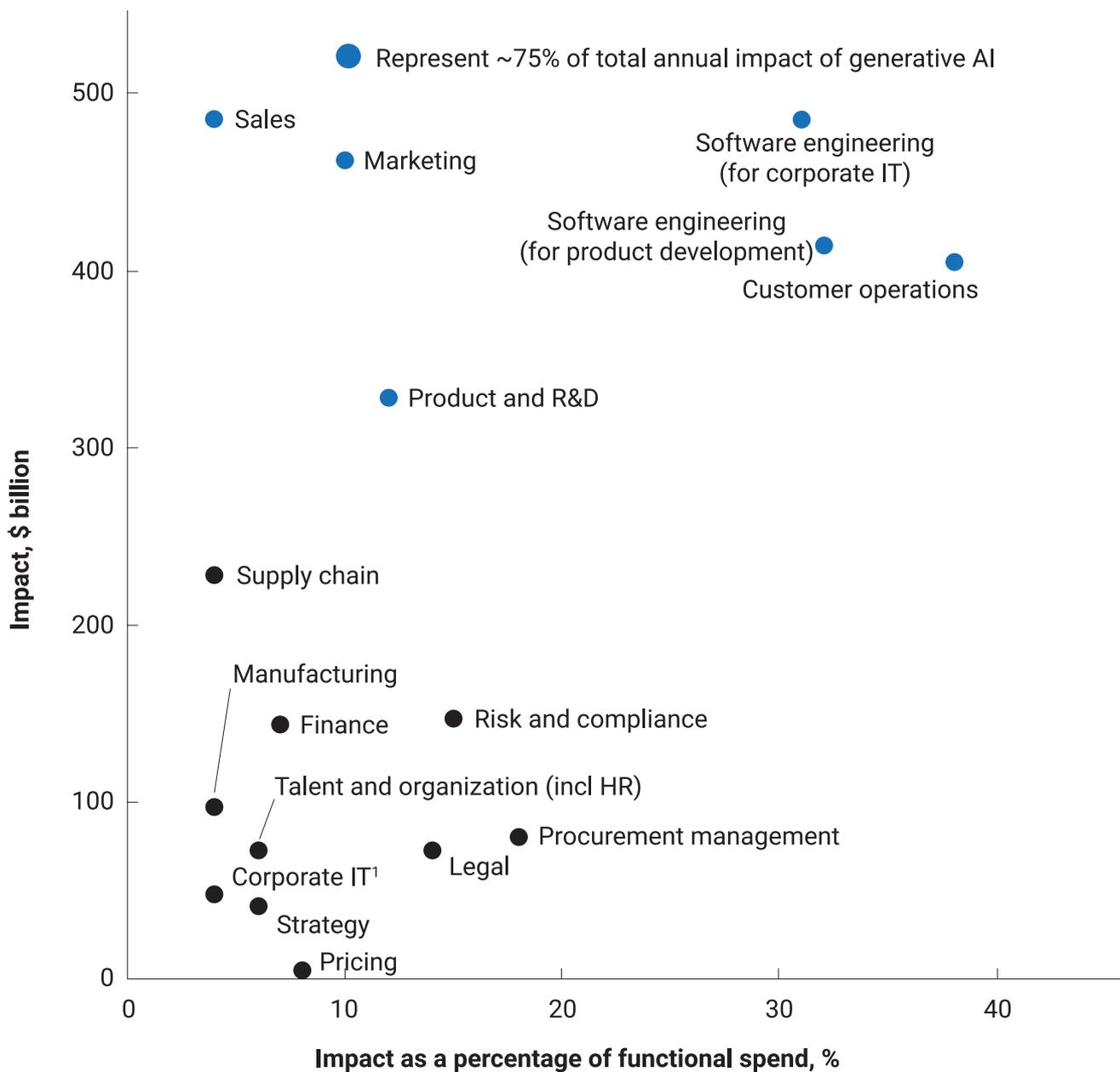


Figure 2.16: Value potential of generative AI by function (Chui et al., 2023)

Generative AI productivity impact by business functions¹

Low impact  High impact

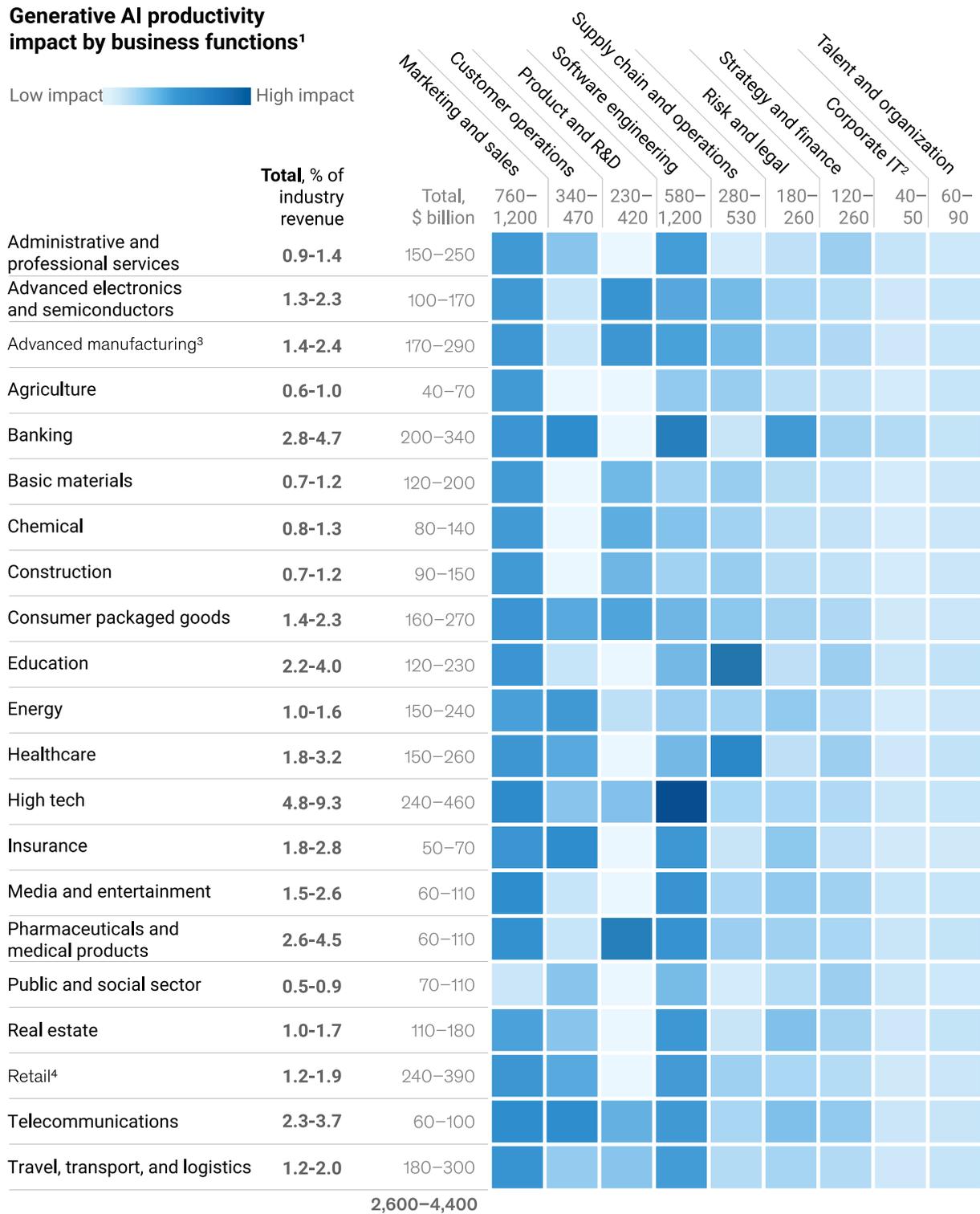


Figure 2.17: Generative AI productivity impact by business functions (Chui et al., 2023)

2.6 Leveraging ESG for sustainability and competitive advantage



Figure 2.18: The ESG framework (Czaplicki, 2019)

2.6.1 The Environmental, Social and Governance framework

Environmental, social and governance (ESG) is a framework used to evaluate a company's business practices and performance on a range of sustainability and ethical matters, including climate risk, energy efficiency, circularity and its impact on its employees, customers and surrounding communities as illustrated in Figure 2.18. ESG criteria are categorised into three pillars: environmental, social and governance.

◆ **Improved financial indicators.** Companies with strong ESG performance tend to experience lower capital costs, more stable earnings, and reduced market risk compared to those with lower ESG ratings.

◆ **Flexibility.** Businesses that embrace evolving models can better mitigate the effects of technological advancements or regulatory changes.

2.6.2 Why is ESG important?

Companies that prioritise high ESG performance can reap several advantages:

◆ **Increased investor appeal.** Companies with favourable ESG scores are more likely to attract green investment funds and socially responsible investors.

◆ **Enhanced performance.** Studies conducted by asset managers demonstrate that portfolios with high ESG scores generally outperform competing investments.

◆ **Regulatory readiness.** Companies that invest in renewable energy infrastructure and technology to reduce carbon emissions can prepare themselves for upcoming environmental taxes or carbon offset payments.

◆ **Embracing innovation.** Technological progress supports the growth of sharing economies, fostering innovation and enhancing overall efficiency.

◆ **Enhanced brand reputation.** Companies upholding strong ESG values tend to enjoy

improved staff and customer retention rates and a more positive brand image in the market (Czaplicki, 2019).

2.6.3 ESG gaining prominence worldwide

ESG initiatives have gained prominence and have become a strategic imperative for organisations across industries, geographies and company sizes as an increasing number have been allocating more resources toward improving ESG. Over 90 per cent of S&P 500 companies in the United States currently disclose and publish ESG reports in some form, and this reporting practice is either mandatory or under active consideration in several jurisdictions (Pérez et al., 2022). This is an upshot of increased focus and pressure from investors, regulators, employees and other stakeholders to integrate ESG considerations into business decisions and operations.

ESG's rising profile has also been evident in investments and investment decisions where related factors are considered in determining the viability of an investment. This is referred to as sustainable investments and includes a taxonomy of associated funds such as ESG funds, impact funds and socially responsible funds, among others. Funds with an ESG framework typically seek to invest in companies that score highly on environmental, social and governance criteria. This typically means they are working to reduce their environmental impact, treat employees and customers well, value corporate diversity and align their policies with the interest of shareholders. ESG investing is gaining momentum as investors increasingly seek long-term value that aligns with sustainability and climate-related objectives (OECD, 2021). To underscore its importance, inflows into sustainable funds have seen an astronomical increase over the years, rising from \$5 billion in 2018 to over \$50 billion in 2020 and nearly \$70 billion in 2021. Sustainable funds also gained \$87 billion and \$33 billion of new net money in the first and second quarters



A woman fetching water from an unimproved water source.
Photo Credits: UNEP

of 2022, respectively (Pérez et al., 2022).

Considered a 'social license to operate', many organisations are using ESG to achieve both societal impact and ancillary financial benefits. Figure 2.19 shows the share of professional investors increasing their ESG investments globally from 2020 to 2022.

The demand for ESG investment products and initiatives is rising, and Africa has tremendous upside potential to meet this demand. The continent offers a spectrum of equity, debt and fund investment opportunities for international and domestic investors seeking better long-term financial value and alignment with stakeholder values. Africa is a treasure trove of demand for investments that meet ESG requirements and considerations. As the private sector adjusts to a low-carbon economy, businesses can tap into the inflow of sustainable investment funds to create innovative solutions to Africa's sustainable growth and development challenges. Businesses can also directly invest in ESG initiatives in the companies they set up in Africa, as opportunities abound to demonstrate a dynamic social license to operate.

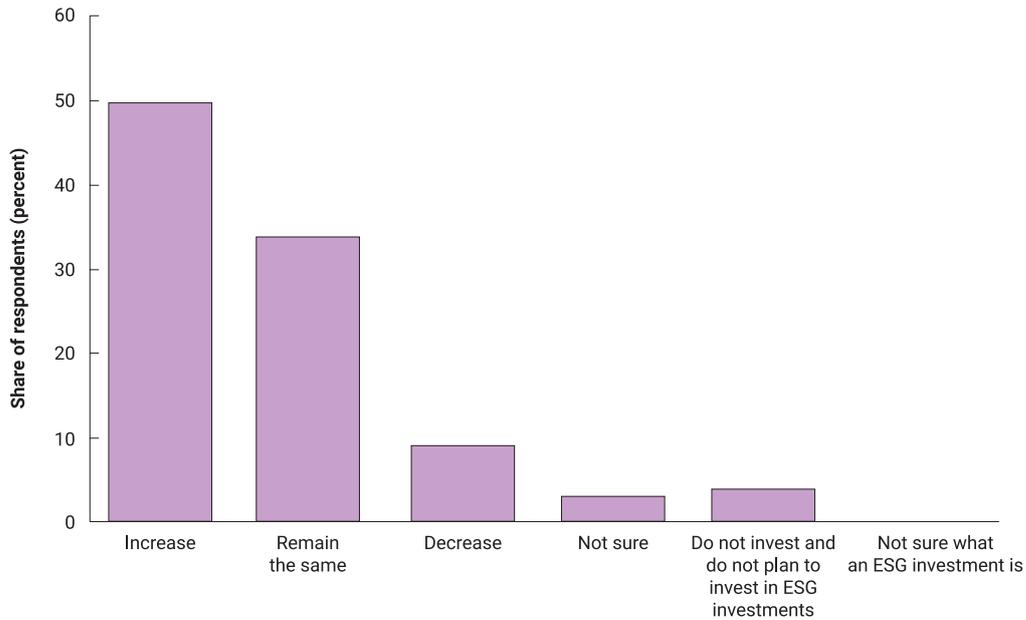


Figure 2.19: *Share of professional investors increasing their ESG investments worldwide (Statista, 2023a)*

2.7 Conclusion

This chapter has highlighted the key drivers that have the potential to position Africa as a lucrative destination for sustainable development investments. While these drivers may be associated with a series of challenges, savvy investors can leverage these and flip them into profitable business opportunities. Some of these drivers, such as those related to AfCFTA and ESG, are incipient. As such, there is significant scope for audacious, first movers to build strong, easily recognisable and profitable brands and win over the loyalty of environmentally-conscious consumers long

before other players enter the market. Africa can gain various advantages by fostering an enabling environment for the growth of eco-friendly businesses. These include increased GDP, higher income per capita, reduced inequality, greater employment opportunities, particularly for the burgeoning youth population, female literacy, improved living standards, expanded tax revenues and mitigated impacts of climate change, among other benefits. These outcomes collectively reinforce Africa's trajectory towards sustainable development as the world approaches the year 2030.



Sao Vicente in Cape Verde. Photo Credits: UNEP





CHAPTER

03

Africa's
Environmental
Priorities



Boat structure, Kenya. Photo Credits: UNEP

3.1 Triple planetary crisis and opportunities in Africa

The world faces an unprecedented convergence of three interrelated environmental challenges: biodiversity loss, climate change and pollution, which pose significant threats to ecosystems, human well-being, and the planet's sustainability. These challenges are commonly known as the "Triple Planetary Crisis," a term adopted by the United Nations in 2020 to highlight the urgency of these threats and mobilise global efforts to tackle them (UN, 2020). These crises have garnered widespread attention at the global level, prompting a collective call for urgent action from governments, international organisations, and civil society. Scientific evidence highlights the alarming decline in biodiversity, with species extinction rates occurring at an unprecedented pace. Concurrently, the escalating impacts of climate change are disrupting weather patterns, leading to extreme weather events, rising sea levels, and altered ecosystems. Furthermore,

pollution, in its various forms, threatens water quality, air purity, and soil health, affecting human health and exacerbating ecological degradation.

Africa finds itself at the forefront of these crises due to its unique geography, making it particularly vulnerable to the associated disasters, compounded by the limited coping capacity of its inhabitants. Despite the challenges, Africa also presents immense potential for transformative action. The continent's vast natural resources, young demographic, and growing economy offer a unique opportunity to steer development towards sustainable pathways. This chapter examines these environmental priorities through a distinctively African lens and highlights the challenges and opportunities that this diverse and vibrant continent faces. It asserts that while the triple planetary crisis poses significant challenges,

it paradoxically presents equally substantial opportunities for investors, drawing upon global initiatives and regional efforts. Success lies in the persistence to carefully assess the potential of these opportunities and withstand short-term uncertainties to achieve sustained long-term profitability through collective action and unwavering commitment.

3.2 Biodiversity loss and land degradation

Africa possesses remarkable terrestrial and aquatic biological resources, accounting for nearly a quarter of the global total. The continent's mega-fauna species are world-renowned and serve as significant tourist attractions. From deserts to glacier-topped mountains, mangroves, savannas, and Mediterranean and tropical forests, Africa hosts diverse ecosystems, including eight of the 36 global biodiversity hotspots. However, these ecosystems face acute threats primarily due to over-exploitation, deforestation, degradation, urbanisation and climate change. This section discusses the state of African biodiversity and natural resources related to agriculture, forestry, freshwater and marine resources.

3.2.1 State of agriculture

Agriculture remains the backbone of African economies and is estimated to contribute 17 per cent of the GDP of sub-Saharan economies in 2021 (Statista, 2023b), providing up to 226 million jobs (FAO, 2022) and about three-quarters of domestic trade. The significance of agriculture is highlighted in the Comprehensive African Agricultural Development Programme (CAADP). This Agenda 2063 initiative aims to help African countries eliminate hunger and reduce poverty by enhancing economic growth through agriculture-led development. 42.5 per cent of sub-Saharan Africa's landmass is utilised for agricultural activities (WB, 2023b). Figure 3.1 depicts the relative change in agricultural land use in Africa between 1961 and 2020.

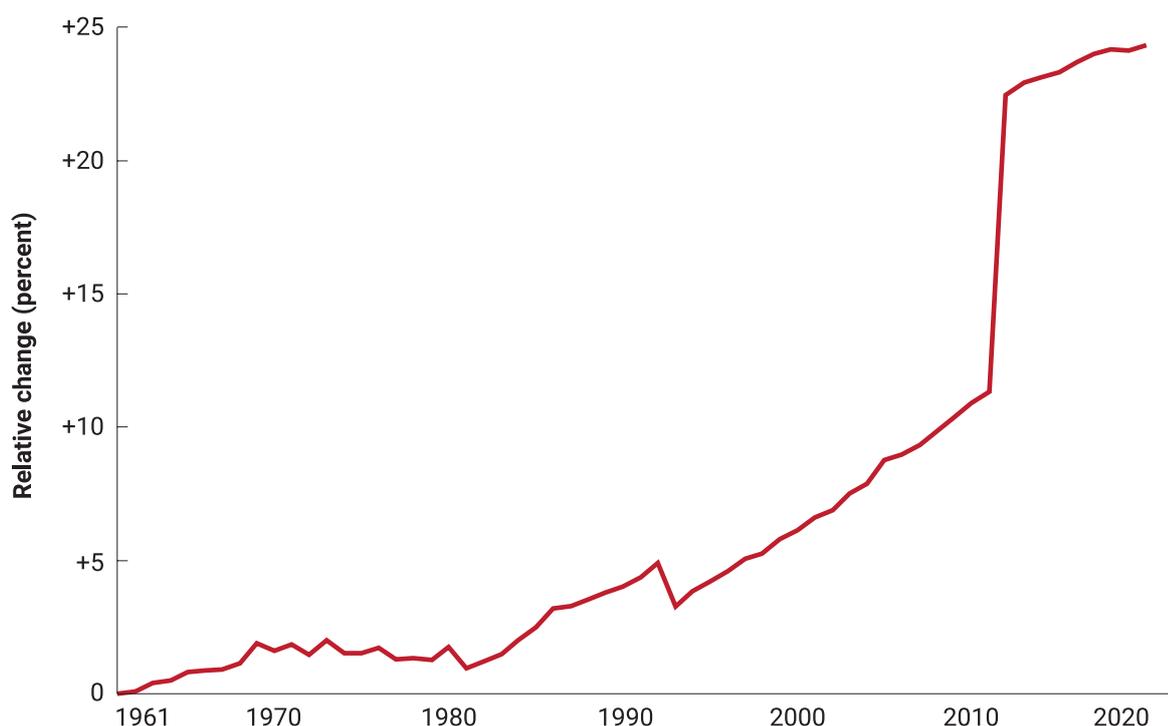


Figure 3.1: Relative change in agricultural land use in Africa 1961-2020 (OWD, 2023a from FAO)

The exacerbation of biodiversity loss in Africa is closely linked to the intensification of agricultural practices, marked by prevalent monoculture, the adoption of genetically modified organisms (GMOs), concentrated animal feeding operations (CAFOs), and the limited focus on a narrow range of primary plant foods (maize, rice, and wheat) and 14 animal species (DeClerck et al., 2023). Conversely, the detrimental consequences of biodiversity loss stemming from unsustainable agricultural practices lead to the depletion of natural capital for ecosystem services. Consequently, the integrity of ecosystems to provide essential services, such as enhanced soil fertility, maintenance of watershed services, nutrient cycling, pest and disease control, and crucial pollination and seed dispersal mechanisms, becomes compromised, thus significantly impacting agricultural productivity.

TRANSITIONING TO SUSTAINABLE AGRICULTURE

The existing agricultural system's shortcomings raise fundamental concerns about its suitability in its current conceptualisation. As outlined in Target 10 of the Kunming-Montreal Global Biodiversity Framework (GBF), adopted during the Conference of Parties (COP 15) of the Convention on Biological Diversity in Montreal in December 2022, there is a pressing need to transition towards a biodiversity-centric approach in agriculture. This shift entails promoting the adoption of biodiversity-friendly practices, including sustainable intensification and agroecology, to ensure food security, conserve biodiversity, and sustain ecosystem functions and services beyond agricultural lands' confines. Policymakers need to implement the following transformative measures to successfully attain this critical target (DeClerck et al., 2023):

- ◆ Entrench the concept of agroecosystems, where agricultural systems are treated as ecological systems, as this would lead to higher yields, more equitable food security and boost ecosystem services provision. Transitioning to agroecosystems

would entail dismantling conceptual and institutional silos around agriculture, biodiversity and other environmental themes.

- ◆ Halt the expansion of agriculture into untouched natural ecosystems such as forests to attain zero net loss of biodiversity.
- ◆ Invest in a comprehensive food policy incorporating market, supply chain and value chain considerations and reducing food waste.
- ◆ Encourage co-creating knowledge that embraces local and indigenous knowledge and global science.
- ◆ Designate ecosystem systems as public goods and incentivise farmers to produce these by incorporating payment for ecosystem services in national budgets. In essence, understanding that advancing agriculture and conserving biodiversity need not be a zero-sum game.
- ◆ Incentivise farmers to adopt circular production systems which maximise reuse and minimise waste.
- ◆ Diversify the human palate by deliberately incorporating underproduced crops such as ancient grains (finger millet, pearl millet, sorghum), Bambara groundnut, tubers—such as sweet potatoes, cassava, yams—and eating the whole plant as food, for example, sweet potato vines and tubers, bean leaves and pods. Moreover, because these suggested additions are lower on the food chain than animal products, they reduce greenhouse gas (GHG) emissions per capita and provide affordable, nutrient-dense foods to Africa's low-income communities.
- ◆ Review trade policies to ensure that imported agricultural inputs and market prices reflect biodiversity externalities through traceability mechanisms.

The Kunming-Montreal GBF offers a unique opportunity for Africa to rethink its agriculture systems and transform them to be in tune with its biodiversity, climate and food security targets.

LAND DEGRADATION, DEFORESTATION AND DESERTIFICATION

Deserts and drylands comprise approximately 67 per cent of Africa, making it indispensable for agriculture and food production to feed the continent's burgeoning population. However, an estimated 75 per cent of this land, which encompasses the Horn of Africa and the Sahel, is degraded, predisposing the continent to severe, recurrent droughts (UNCCD, 2023a).

While Land degradation encompasses both soil erosion and soil degradation, it transcends these to include all adverse alterations in the ecosystem's ability to provide goods and services. These include biological and water-related goods and services, as well as land-related social and economic goods and services (FAO, 2023). According to the UN Convention to Combat Desertification, desertification does not refer to the natural expansion of existing deserts but rather the deterioration of the land in arid, semi-arid, and dry sub-humid regions, which is characterised by a gradual decline in soil productivity and the reduction of vegetation cover (UNCCD, 2023c).

The twin problems of land degradation and desertification are compounded by the unprecedented rate of deforestation that the continent is grappling with (Mansourian and Berrahmouni 2021). The combined effect of the three problems is concerning because ecosystems are damaged far faster than they can recover, resulting in the loss of their ability to provide vital services due to their compromised integrity (UNEP, 2021a).

A convergence of evidence points to a clear trend showing that the increasing demand for food, fodder, fibre and fuel intensifies competition for land resources, exacerbating

land degradation. This scenario holds particularly true for Africa, whose population is growing faster than the rest of the world, as discussed in Chapter 2. Due to limited access to essential resources such as improved seeds, fertilisers, agricultural extension services and advanced technologies like irrigation pumps and ploughing machinery, smallholder farmers in Africa face challenges in enhancing crop yields and so resort to unsustainable practices like low-input farming, deforestation and overgrazing. There are also competing land pressures from animal feed production, livestock rearing and biofuel production from maize and sugar cane (EU, 2018). These rising pressures on the land have resulted in the disproportionate degradation of Africa's land compared to the rest of the world, as depicted in Figure 3.2. The map shows that land degradation and desertification present significant environmental challenges globally, with around 33 per cent of the earth's surface affected, leading to the loss of approximately one-third of arable land in the past four decades, primarily due to erosion (ELD Initiative and UNEP, 2015). Africa is especially susceptible, with 45 per cent of its land area already impacted and 55 per cent of this land at a high or very high risk of further degradation.

South Africa faces the most severe land degradation, with 78 per cent of its land affected. Following closely, Benin experiences the second highest level of degradation at 53 per cent, while Botswana ranks third with 51 per cent of its land degraded. Subsequently, the next group of countries encountering the next most significant degree of land degradation includes Kenya (40 per cent), Zimbabwe (36 per cent), Eritrea (35 per cent), Chad (34 per cent), and Nigeria (32 per cent). The adverse effects of land degradation on agricultural ecosystems and crop production hinder efforts to attain food security and enhance livelihoods in Africa.

An ELD Initiative and UNEP report highlights insufficient empirical data quantifying land degradation losses and evaluating the costs

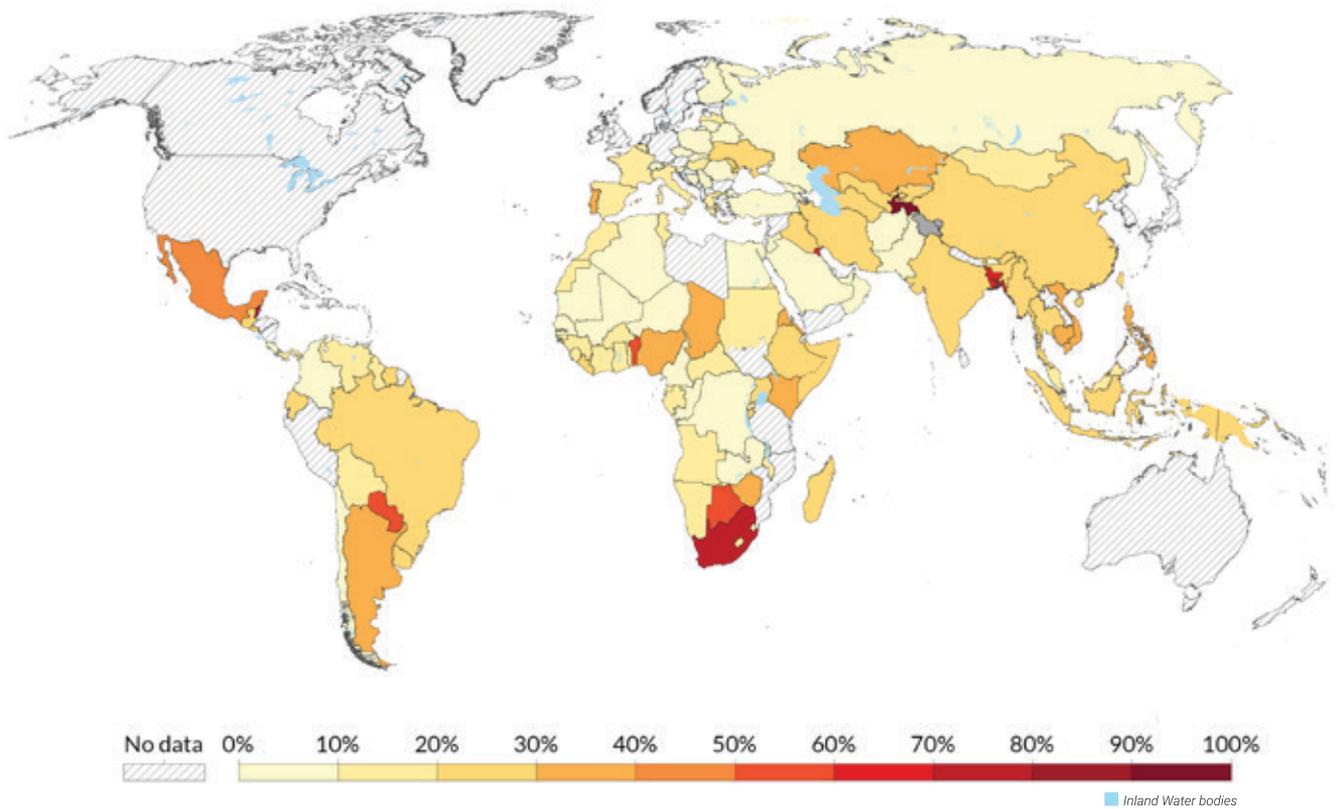


Figure 3.2: *Share of land that is degraded, 2015 (OWD, 2023b) compiled from FAO*

and benefits of taking action against land degradation. Addressing land degradation necessitates investments in restoring degraded land and reducing degradation rates, with potential benefits stemming from crop damage prevention and enhanced productivity. The report focuses on erosion-induced soil nutrient depletion in arable lands dedicated to cereal production across 42 African countries, encompassing 105 million hectares (ELD Initiative and UNEP, 2015). Notably, the analysis indicates that failure to address soil erosion over a 15-year period (from 2016 to 2030) would lead to an annual loss of approximately 4.74 million tons of nitrogen, phosphorus, and potassium (NPK) nutrients, valued at approximately \$72.40 billion in purchasing power parity (PPP) in present value, equivalent to \$5.09 billion annually. Conversely, implementing measures to combat soil erosion could yield net benefits totalling a substantial \$2.48 trillion PPP USD or \$62.4 billion per year, amounting to around 5.31 per cent of the average Gross Domestic Product (GDP) for the 42 African countries during 2010-2012. The report's conclusion emphasises that

the cumulative cost of inaction, representing the foregone maximum benefits of action, far exceeds the cumulative cost of action, signifying the potential for significant economic growth through effective land degradation combat measures (ELD Initiative and UNEP, 2015).

ACHIEVING SUSTAINABLE LAND MANAGEMENT (SLM) LAND DEGRADATION NEUTRALITY (LDN)

Given the extensive arid or semi-arid classification of a significant portion of the continent and the reliance of a large population on natural resources for livelihoods, as already noted in this chapter, combatting land degradation and desertification is pivotal to Africa's economic and social aspirations. This effort is anchored in sustainable land management (SLM) and the establishment of drought resilience. With its core objective of achieving 'zero net losses' in healthy and productive land, SLM ensures a natural and secure landscape for humans, wildlife and plant communities. Key pillars of SLM encompass reforestation and afforestation, crop rotation

practices, utilising water retention techniques and the preference for organic manures and mineral fertilisers over synthetic, petroleum-based alternatives (UNCCD, 2023b).

Various approaches can be employed to attain LDN, including active restoration efforts or addressing the root causes of degradation to passively facilitate natural ecosystem regeneration. Table 3.1 highlights various approaches, including ecological restoration, forest and landscape restoration, restoration of aquatic production ecosystems, regenerative agriculture and rewilding (UNEP, 2021a).

In addition to the tabulated land restoration approaches, adopting the ten strategies advocated in the UN strategy paper for the Decade of Ecosystem Restoration 2021-2030 can help achieve LDN (UNEP and FAO 2021a).

These strategies that bring together a global movement for restoration include ramping up financing from governments, international financiers, development agencies and private businesses, incentivising restoration, emulating successful leadership and fostering behaviour change. Additional strategies encompass investing in research and capacity building, fostering a culture of restoration throughout society, empowering children as ecosystem ambassadors to ensure long-term impact beyond the UN decade and promoting active listening and learning (UNEP and FAO 2020). With every \$1 invested in restoration yielding up to \$30 in economic benefits (UNEP and FAO 2020), the business case for private enterprises to participate in these strategies is compelling and aligns with economic and sustainable development goals.

Table 3.1: *Land restoration approaches (UNEP, 2021a)*

APPROACH	PROCESS	INTENDED ENDPOINT
Ecological restoration	Assisting the recovery of a terrestrial, freshwater or marine ecosystem that has been degraded, damaged, or destroyed.	Transition from a degraded ecosystem to a reference ecosystem, which may be a natural or a cultural one.
Forest and landscape restoration	Reversing the degradation of soils, agricultural areas, forests and watersheds, thereby regaining their ecological functionality.	Restoring multiple ecological, social and economic functions across a landscape and generating a range of ecosystem goods and services that benefit multiple stakeholder groups.
Restoration of aquatic production ecosystems	Maintaining ecosystem structure and function to support food provisioning while minimising impacts, rather than restoring ecosystems to an initial state before production activity started.	Large/ oceanic marine ecosystems supporting all affected by direct and indirect impacts of fishing gears and fisheries production; recovery through changes in fishing methods and gear modification tribute fish stocks and reduce adverse impacts on the environment. Specificities for freshwater and coastal ecosystems once with linkages to fisheries and aquaculture.
Generative agriculture	Farming that uses soil conservation as an entry point to regenerate and contribute to multiple provisioning, regulating and supporting services.	Enhancing environmental, social and economic dimensions of sustainable food production. So, carbon, soil health and on-farm biodiversity are restored.
Rewilding	Rebuilding, following major human disturbance, a natural ecosystem by restoring your processes and the complete or near complete food web at all trophic levels, as well as self-sustaining and resilient ecosystem using biota that would have been present had the disturbance not occurred.	No predefined endpoint. Functioning native ecosystems complete with fully occupied trophic levels that are nature led across a range of landscape scales.

3.2.2 State of forestry resources

In 2020, approximately 31 per cent of the Earth's total land area, estimated at 4.06 billion hectares, was covered by forests, showing a decline from 32.5 per cent in 1990. Over the three decades leading up to 2020, global forest cover has exhibited a consistent decrease. Africa's total forest area amounts to 636 million hectares, with Western and Central Africa accounting for 48 per cent, Eastern and Southern Africa representing 46.5 per cent, and Northern Africa comprising the remaining 5.5 per cent (FAO, 2020a). Only the Democratic Republic of the Congo, with a total forest area of 126.1 million hectares, ranked in the top ten countries for forest area in 2020 (FAO, 2020a). This is concerning, as African forests play a multifaceted role in meeting diverse needs and providing essential services.

They furnish domestic products like firewood, timber, thatch grass, poles, and a wide array of food resources, including famine foods, dietary variety options, livestock fodder, and marketable food items. Additionally, forests serve as a source of medicinal plants. To meet the Food and Agriculture Organization's (FAO) criteria for a forest area, the land must contain natural or planted trees with an average height of five meters, with tree stands in agricultural production systems explicitly excluded. By analysing forest cover by world region, Figure 3.3 clearly illustrates a significant erosion of Africa's forest cover.

According to FAO's most recent Forest Resources Assessment, during the 2010-2020 decade, Africa experienced a substantial net

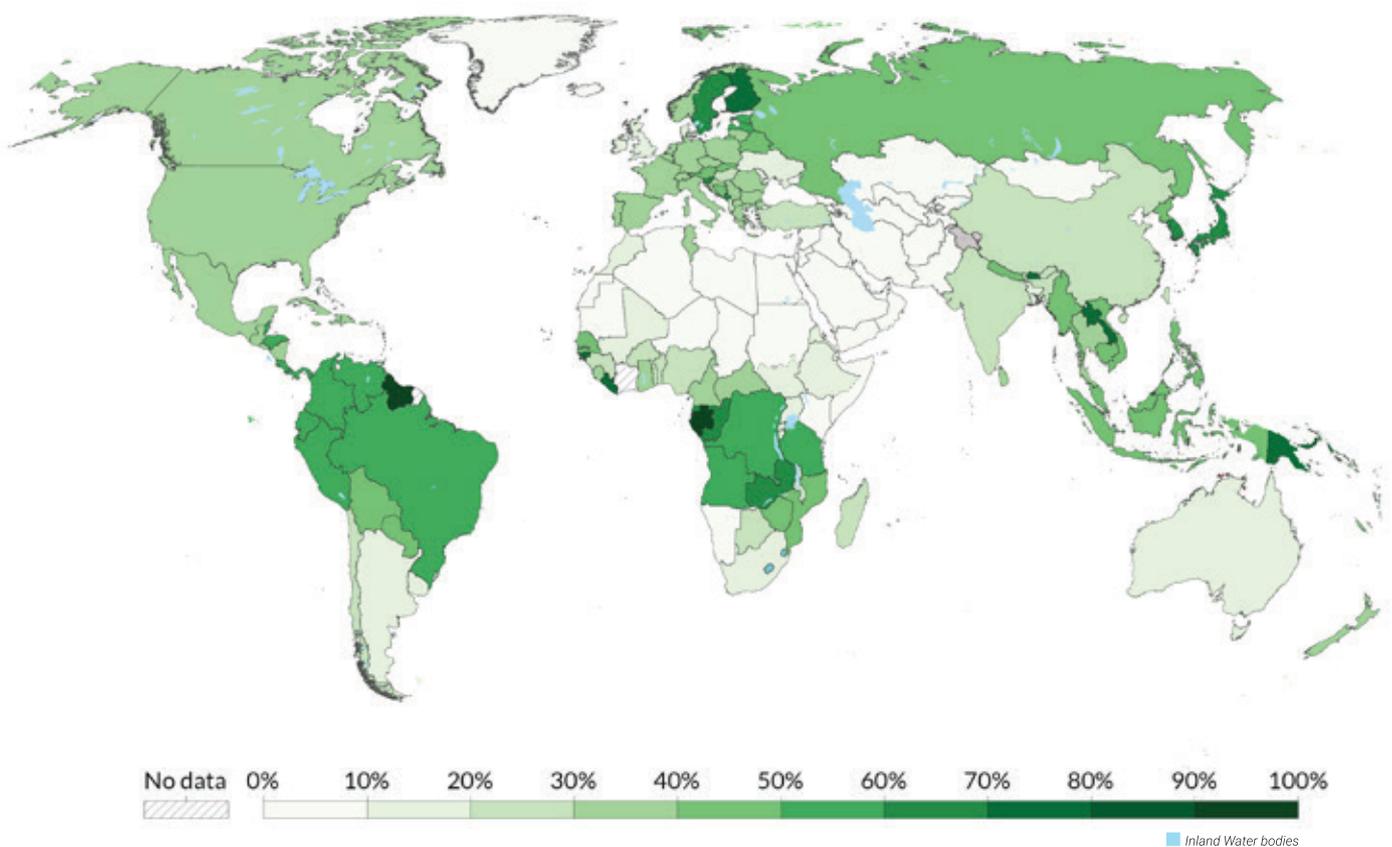


Figure 3.3: Global share of land covered by forest, 1990-2020 (OWD, 2023c), compiled from FAO, the UN and historical sources

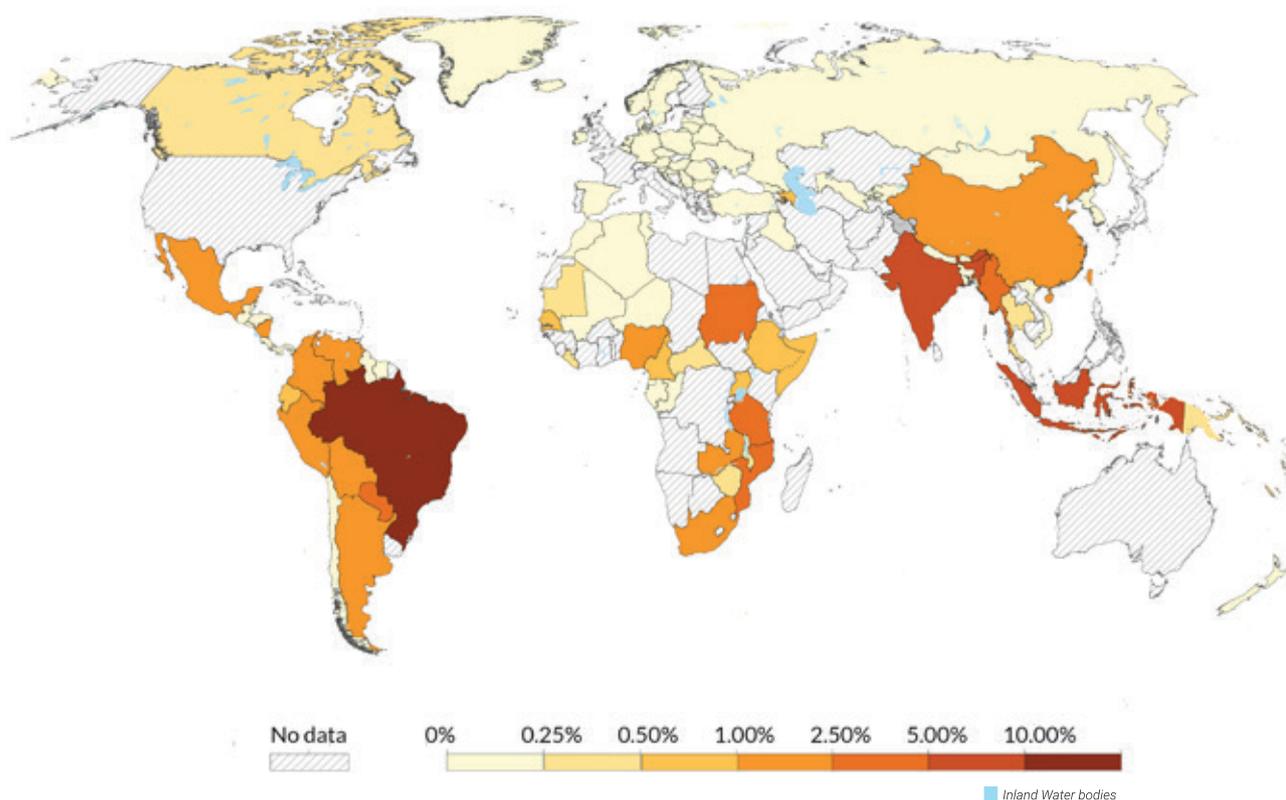


Figure 3.4: *Share of global deforestation, 2015 (OWD, 2023d), compiled from FAO Forest Resources Assessment 2020 data.*

loss of 3.9 million hectares, marking the highest rate globally and surpassing South America by 50 per cent, which recorded a net loss of 2.6 million hectares (FAO, 2020a). This worrying trend is further exacerbated by the fact that Africa has observed an increasing rate of net forest loss in each of the three decades since 1990, as depicted in Figure 3.5.

Amid the prevailing circumstances, there exist commendable success stories in Africa that offer valuable lessons for other nations. Gabon, boasting a forest cover of 91.3 per cent, along with Liberia (79.2 per cent) and Guinea-Bissau (70.4 per cent), serve as noteworthy beacons inspiring efforts to bolster forest cover across the continent. By juxtaposing the forest cover map (Figure 3.3) with the map depicting the share of global annual deforestation (Figure 3.4), certain countries, such as the United Republic of Tanzania (with an average annual deforestation rate of 4.7 per cent over the 1990–2015 period), Mozambique (2.6 per cent), Sudan (2.6 per cent), South Africa (2.0 per cent), Zambia (1.9 per cent), and Nigeria (1.6 per cent), may find it advisable to urgently and purposefully take

steps to achieve at least net zero forest loss or, ideally, to expand their forest cover swiftly. These successful forest conservation and expansion examples can be potent catalysts for catalysing similar transformative actions across Africa.

Accelerating sustainable forest management in Africa would involve implementing the following actions:

- ◆ Enhancing afforestation and reforestation,
- ◆ Scaling up resource mobilisation to help with forest-related policy implementation, and
- ◆ Sensitisation of local communities on the benefits of preserving standing forests.

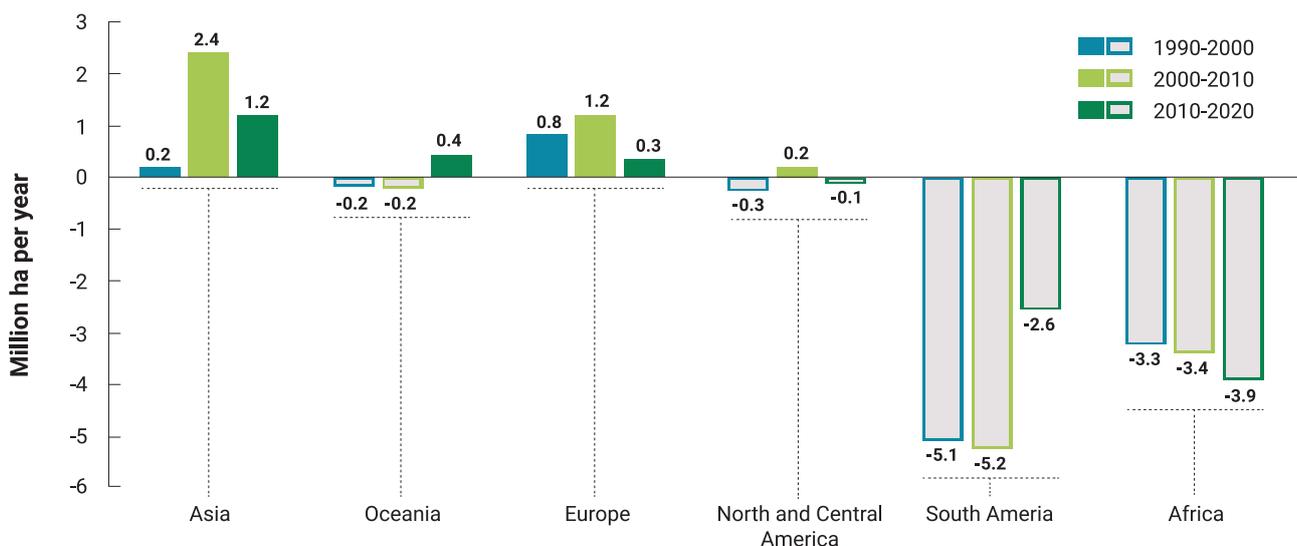


Figure 3.5: Annual forest area net change by decade and region, 1990–2020 (FAO, 2020a)

3.2.3 State of freshwater and marine resources

Africa is blessed with abundant freshwater ecosystems and groundwater reservoirs. The continent’s main rivers include the Congo, Nile (the world’s longest), Zambezi and Niger, whose large river basins are shared by several riparian countries. Africa’s vast collection of freshwater lakes includes Albert, Edward, Kivu, Kyoga, Malawi, Natron, Rukwa, Tanganyika, Turkana and Victoria, the second-largest freshwater lake in the world. Other freshwater aquatic ecosystems on the continent include seasonal lakes, streams and ponds. Given that the ocean encompasses over 70 per cent of the earth’s surface (Hoegh-Guldberg et al., 2019), it is understandable that marine water resources surpass those of inland waters. These surface waters are widely distributed across the continent and are characterised by variability in both space and time.

Hundreds of millions of Africans depend on freshwater resources for water and food and are also an essential source of livelihood (Muringai et al., 2022). Moreover, because the attendant water basins are some of the largest worldwide, they play significant roles in determining global climate and water resource dynamics through their contributions

to the energy, carbon and water cycles (Papa et al., 2023). In Africa, aquaculture accounted for approximately 18 per cent of the continent’s total fish production. Of the nearly 60 million individuals worldwide involved in capture fisheries and aquaculture, 9 per cent are based in Africa, predominantly as small-scale and artisanal fishers and aquaculture workers. Interestingly, while women comprise 14 per cent of the global total, they represent half of the labour force engaged in post-harvest operations. From 2010 to 2018, Africa’s inland catches amounted to an estimated 3.0 million tonnes of fish, accounting for 25 per cent of the global total, second only to Asia, as depicted in Table 3.2 (FAO, 2020b).

However, freshwater fisheries are facing numerous human-induced stressors, including overfishing, invasive alien fish species, impoundments and excessive water abstraction, modification of river basins, illegal fishing, pollution, the impacts of climate change, weak governance and limited institutional capacity to implement the required changes for sustainable fisheries (Papa et al., 2023; Chakona et al., 2022; FAO, 2020b).

Table 3.2: Fish capture production in the world's major fishing areas (FAO, 2020b)

PRODUCTION (Million tonnes, live weight)						
FISHING AREA NAME	2000s	2015	2016	2017	2018	PERCENTAGE SHARE (2018)
Africa- Inland waters	2.34	2.84	2.87	3.00	3.00	25
America, North- Inland waters	0.18	0.21	0.26	0.22	0.30	2
America, South- Inland waters	0.39	0.36	0.34	0.35	0.34	3
Asia- Inland waters	5.98	7.30	7.44	7.90	7.95	66
Europe- Inland waters	0.36	0.43	0.44	0.41	0.41	3
Oceania- Inland waters	0.02	0.02	0.02	0.02	0.02	0
Former Soviet Union Area- Inland waters	0.51	-	-	-	-	0
Inland Waters Total	9.27	11.15	11.37	11.91	12.02	100

ACHIEVING SUSTAINABLE FISHERIES AND AQUACULTURE

The fisheries and aquaculture sector offers unique opportunities to support all four pillars of food security articulated by the Committee on World Food Security (CFS): availability, access, utilisation and stability (CFS, 2014). With a value chain that encompasses harvesting, transporting, processing, wholesaling and retailing, the sector has a tremendous capacity to meet the goals to end hunger and provide decent work for Africans. For instance, the fisheries subsector provided over 5 million full-time, part-time or occasional employment opportunities in Africa in 2018, while 386,000 opportunities were attributed to aquaculture over the same period. Africa has a largely untapped aquaculture subsector with a relatively low average per capita consumption of fish of 9.9 kg, and more employment opportunities can be expected to be generated by scaling up this sub-sector to meet the anticipated population growth (FAO, 2020b).

The fisheries and aquaculture sector can also be a springboard for narrowing the gender

gap. While research proves the widely held view that fisherfolk are almost certainly men (Oloko et al., 2022), as mentioned earlier, women dominate post-harvest operations such as processing (drying, fermentation, salting and smoking) and retailing fish. Consequently, enhancing storage and transportation within the value chain by incorporating refrigeration facilities will increase women's employment opportunities. When women have their own source of income, they gain greater autonomy in shaping their futures and those of their daughters. In addition, the fisheries and aquaculture sector can galvanise climate action in harmony with SDG 13 by locally producing fish for local consumption, eliminating potential post-harvest losses and GHG emissions from transporting fish over long distances. Further, fisheries and aquaculture innately produce lower GHG emissions than livestock (cattle and poultry) production agricultural systems (Global Seafood Alliance, 2022).

Adopting better practices through quality feeds, genetic selection, and biosecurity is essential to ensure sustainable aquaculture. Embracing digital technologies such as

artificial intelligence (AI) can help individual entrepreneurs enhance feed efficiency, track fingerling growth, help with the early detection, diagnosis and treatment of diseases, environmental monitoring and control, and help reduce labour costs (Lutz, 2023). Together with satellite imagery and data, AI can help government and international agencies track fishing activity in territorial waters and on the high seas, respectively (Dettmering et al., 2020). This would help develop more accurate offtake data and help track and combat illegal, unreported and unregulated (IUU) fishing.

Looking ahead, Africa’s rapid population growth and the ensuing environmental challenges, including the depletion of oceans, freshwater sources and marine aquaculture, highlight freshwater and marine resources’ critical role in securing the continent’s food security. This situation emphasises the need for proactive measures to address the ‘tragedy of the commons’ and safeguard these vital resources.

3.3 Climate change: adaptation and mitigation opportunities

As discussed in Chapter 2, Africa suffers disproportionately from the broad impacts of climate change despite only contributing approximately two to three per cent of global GHG emissions. These adverse effects, extensively documented by the Intergovernmental Panel on Climate Change (IPCC), include severe droughts, floods, extreme weather events, melting mountain glaciers, loss of biodiversity and rising sea levels. The vulnerability of the most marginalised communities is exacerbated, hindering their ability to adapt due to insufficient mitigation efforts (UNEP, 2021b; IPCC, 2022). Relying solely on mitigation measures is insufficient to tackle the magnitude of the problem, and a heightened emphasis on adaptation strategies is imperative.

ADAPTATION

With growing awareness of the severity of climate change threats to society, climate adaptation has gained significant traction, emerging as a global challenge with multi-

Table 3.3: *Potential adaptation finance needs for developing countries by region, 2021-2030 (UNFCCC, 2022a)*

REGION	Annual adaptation finance needs in \$ billion (2020 value)		Annual adaptation finance needs as a percentage of GDP	
	MEDIAN	MIN-MAX	MEDIAN	MIN-MAX
East Asia & Pacific	69	27- 208	0.35	0.14- 1.05
South Asia	59	23- 177	1.69	0.66- 5.10
Sub-Saharan Africa	36	14- 109	2.10	0.82- 6.34
Latin American & Caribbean	21	8- 62	0.41	0.16- 1.25
Middle East & North Africa	15	6- 44	0.47	0.19- 1.43
Europe & Central Asia	4	1- 11	0.69	0.27- 2.08
Global	202	79- 612	0.60	0.24- 1.80

dimensional implications at local, subnational, national, regional, and global levels (article 7.2 of the Paris Agreement). It now stands as a central focus on political agendas worldwide, holding equal importance alongside climate change mitigation efforts (Khan and Munira 2021). Adaptation strategies are crucial for Africa due to its dependence on climate-sensitive sectors and limited influence on global emissions. These strategies can generate positive synergies with the macro economy, promoting inclusive growth and job creation. Effective adaptation also requires regional cooperation to address climate change impacts that transcend international borders, necessitating sharing of technologies and knowledge. Implementing such policies will require strong coordination within governments and with development partners involving various ministries and agencies. To support these efforts, addressing financing challenges and informational asymmetries is essential (IMF, 2020).

There is a pressing need to close the adaptation gap, which requires mobilising funds for developing countries. Africa faces a staggering 80 per cent financing gap for adaptation,

underscoring the urgent necessity to prioritise and allocate resources. Only one-quarter of global climate finance in 2019 was dedicated to adaptation efforts, reflecting a significant disparity in attention and funding for this critical aspect of climate action (Mo Ibrahim Foundation, 2022).

Table 3.3 shows the adaptation finance needs in per capita adaptation terms and as a percentage of GDP for developing countries by region from 2021 to 2030. Sub-Saharan Africa is shown to have an annual adaptation financing need ranging from \$14 billion to \$109 billion (median \$36 billion), amounting to 0.82 per cent to 6.34 per cent (median 2.10 per cent) of the region's GDP.

To address the adaptation challenges on the continent, the Africa Adaptation Acceleration Programme (AAP) was launched in April 2021. AAP represents an Africa-owned and Africa-led initiative to address the challenges of climate change while harnessing opportunities for sustainable growth and development. By mobilising \$25 billion by 2025, the program aims to accelerate adaptation efforts in multiple sectors, focusing on strategic



Cahora Bassa Dam. Photo Credits: UNEP

investments. These investments encompass enhancing agricultural productivity, fortifying the food supply chain, promoting sustainable forestry, bolstering resilience in urban and rural areas through robust infrastructure, restoring ecosystems, fostering biodiversity, empowering youth, creating employment opportunities, and increasing climate finance (GCA, 2022). Chapter 4 of this report discusses green business adaptation opportunities in the blue economy, agriculture, infrastructure, and tourism sectors and nature-based solutions to adaptation.

MITIGATION

Since 1991, the continent has experienced a temperature increase of 0.3°C per decade (WMO, 2022). This upward trend in temperatures presents businesses with a promising opportunity to meet the growing demand for clean energy solutions and accelerate sustainable development. Therefore, private sector-led investments in clean energy and fuels in Africa would be a win-win for all stakeholders for several reasons, including:

- ◆ Increased energy demand is poised to

grow twice as fast as the global average in the years up to 2040 owing to the continent’s population, particularly the growing middle class, which will require more energy to support higher industrial activity, air conditioning and the growing use of motorised transport.

- ◆ Rich endowment with the requisite natural resources such as hydro, wind, solar, bioenergy and geothermal energy, presenting substantial growth opportunities for existing enterprises that have already overcome the initial challenges and gained valuable experience in the subsector and new enterprises.

- ◆ Significant reserves of chromium, cobalt, copper, graphite, manganese, molybdenum, nickel, platinum and zinc exist and are essential raw materials in clean technologies, as indicated in Chapter 2 of this report. Figure 3.6 shows these mineral components in transportation and power generation technologies.

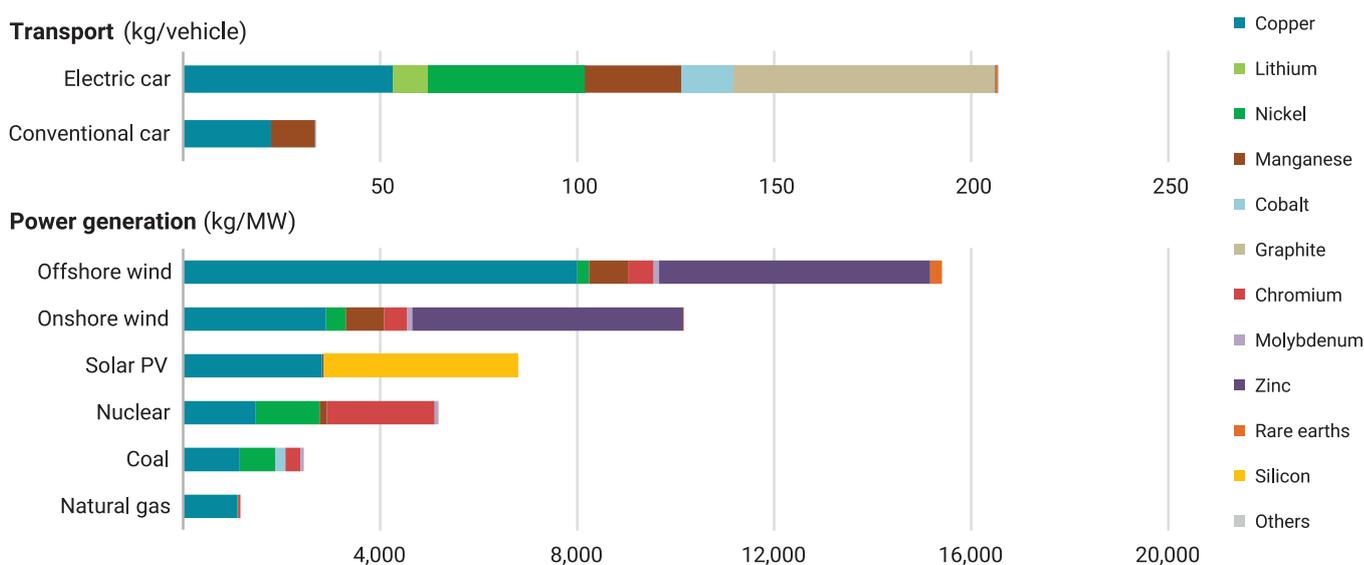


Figure 3.6: Minerals used in selected clean energy technologies (IEA, 2022)

3.3.1 State of energy resources

ACCESS TO CLEAN COOKING

About 900 million people representing 75 per cent of Africa's population, have no access to clean cooking energy sources (Onyeneke et al., 2023), as illustrated in Figure 3.7. These individuals are caught in energy poverty, compelled to depend on solid biomass fuels such as animal dung, crop residue, charcoal, and wood (Flanagan et al., 2022). The unsustainable utilisation of these solid biofuels results in deforestation, air pollution, and associated adverse impacts.

Rural areas continue to depend heavily on solid biomass for cooking, as depicted in Figure 3.8, while urban areas use a mix of fossil fuel, bioenergy and electricity sources. Using these biomass fuels leads to indoor air pollution, which causes acute respiratory infections, cardiovascular disease, mental illness and other ailments that claim the lives of 500,000 Africans every year (IEA, 2019).



Figure 3.7: Population without access to clean cooking in Africa, 2018 (IEA, 2019)

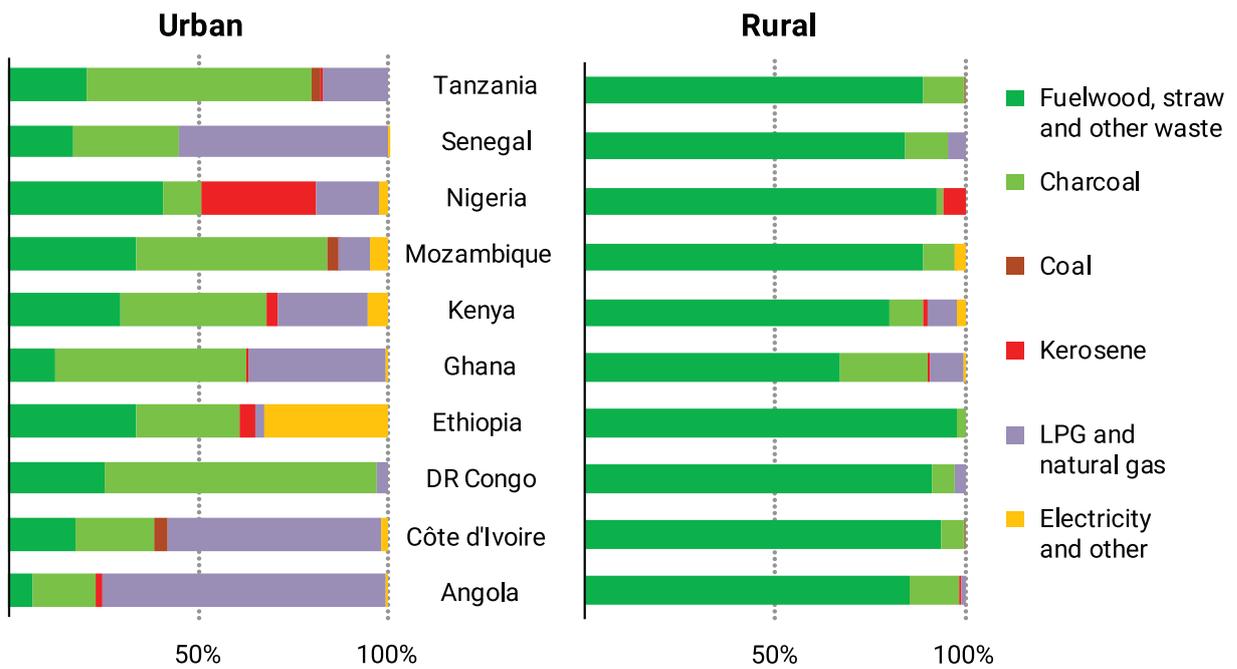


Figure 3.8: Main fuels used by households for cooking in Africa, 2018 (IEA, 2019)

ACCESS TO ELECTRICITY

In the past decade, there has been a significant acceleration in the electrification of sub-Saharan Africa, reaching 50.6 per cent in 2021 (IEA; IRENA; UNSD; World Bank; WHO, 2023). This progress is commendable, considering that research conducted in 2018 indicated that only 45 per cent of the population in sub-Saharan Africa had access to electricity, as shown in Figure 3.9. The situation was especially dire in 13 African countries, as over 75 per cent of the population lacked access to electricity, while uptake in Central Africa was slow (IEA, 2019).

Even though this gap has narrowed relative to 2018, as depicted in Figure 3.10, affordability remains an issue, especially regarding upfront connection costs, electrical appliances and monthly utility bills. Lowering these costs can increase uptake while utilising energy-efficient appliances can help keep monthly costs down. The substantial access to electricity and clean cooking gaps in Africa presents tremendous opportunities for business on the continent as it has the potential to leapfrog carbon-based energy systems into sustainable energy systems fuelled by clean and renewable energy sources (Oyewo et al., 2022).



School house on an Island in a lake. Photo Credits: UNEP

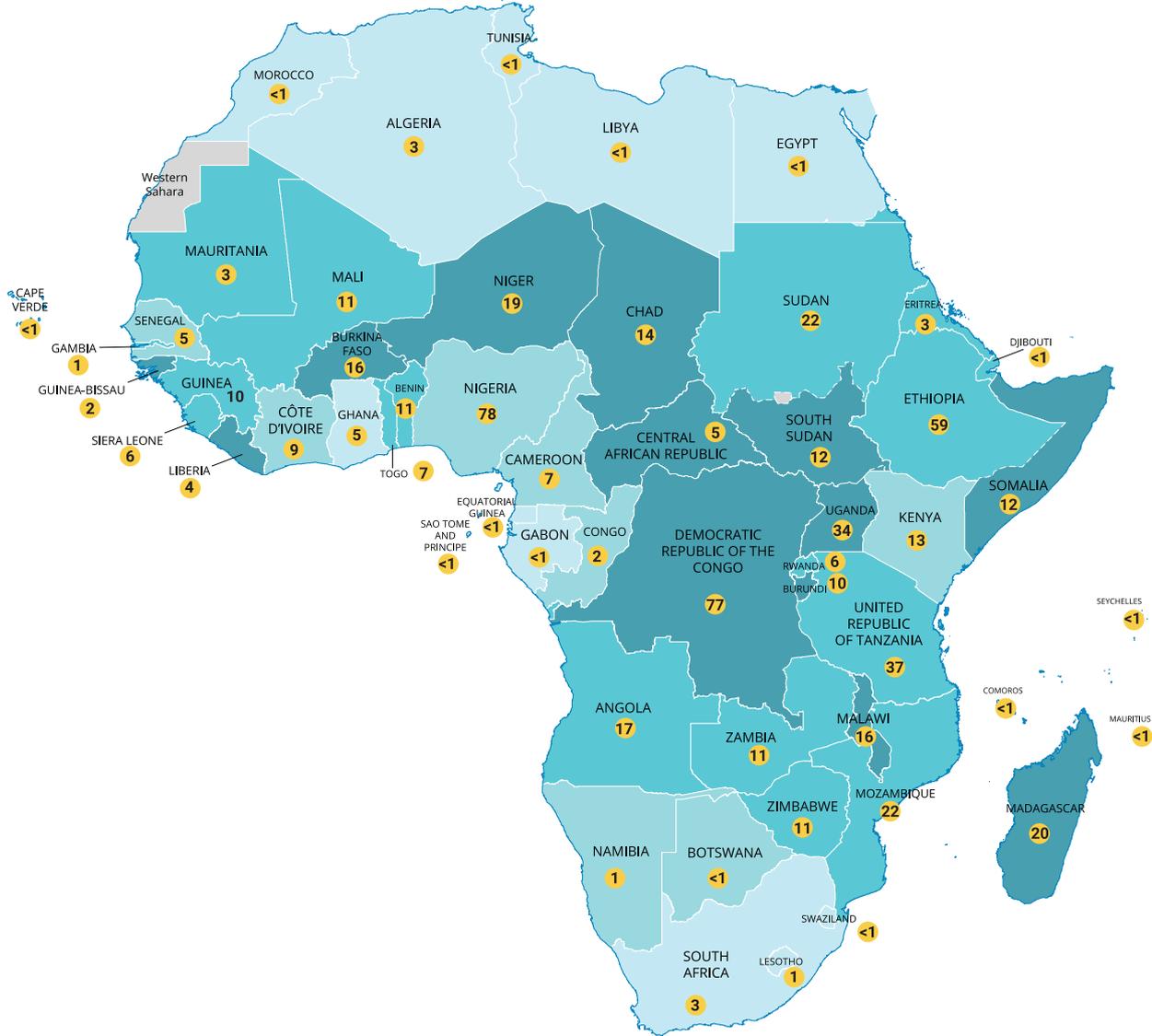


Figure 3.9: Population without access to electricity by country in Africa, 2018 (IEA, 2019)

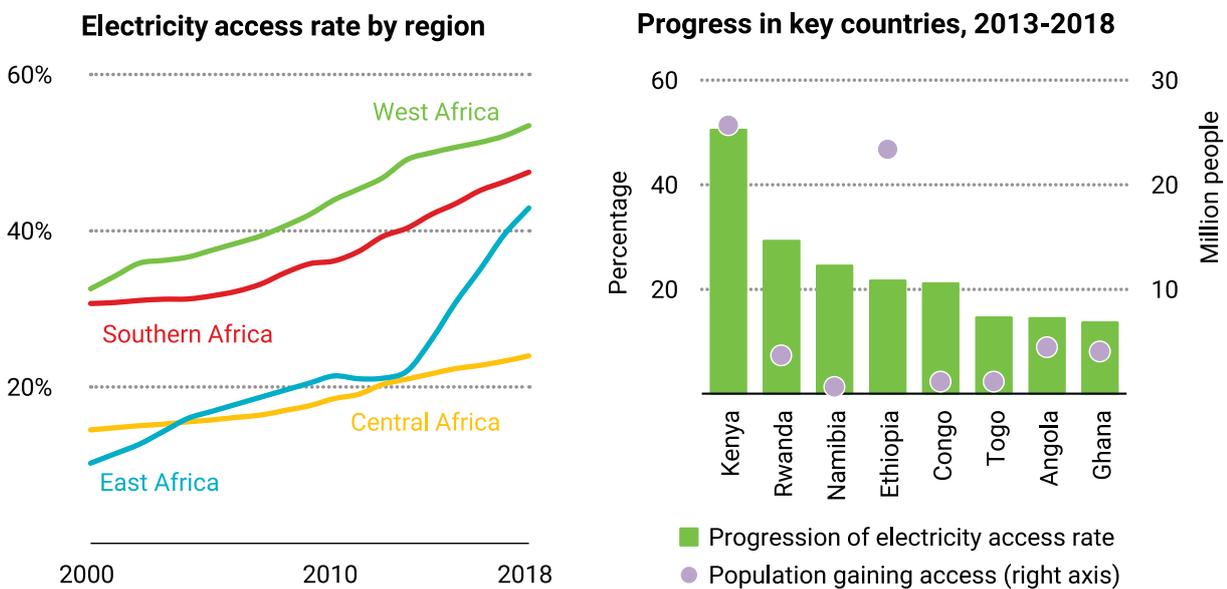


Figure 3.10: Progress in electricity access rate in sub-Saharan Africa (IEA, 2019)

RENEWABLE ENERGY POTENTIAL

Africa's most advanced renewable energy resource comprises 87 hydropower plants with a combined installed capacity of 35 GW (Cáceres et al., 2022). Several countries boast significant installed hydropower capacities, including Angola, Ethiopia, DR of the Congo, Mozambique, Nigeria, South Africa, Sudan and Zambia. The Congo River, renowned as the world's deepest, holds immense untapped potential, with a projected capacity of 100 GW and the ability to generate approximately 774 TWh of electricity annually (IEA, 2019; Chowdhury et al., 2022). There is also considerable potential for deploying mini-hydropower plants, ranging in capacity from 0.1 to 1 MW, to drive rural electrification efforts across the continent.

Most of Africa's wind resources are concentrated near coastal areas and mountains, predominantly in the eastern and northern regions of the continent. Algeria, Egypt, Ethiopia, Ghana, Kenya, Somalia, South Africa, Sudan and Tanzania have the highest inland wind energy potential (GWEC, 2019), while Angola, Madagascar, Mozambique, South Africa and Tanzania have great offshore potential (IEA, 2019).

Africa holds a vast solar photovoltaic (PV) theoretical capacity, estimated to exceed the continent's combined projected energy demand and capable of generating over 660,000 TWh of electricity annually. East Africa has the most significant potential, with a theoretical capacity exceeding 200,000 TWh per year, followed by Southern Africa with over 160,000 TWh per year (IEA, 2019).

The continent's geothermal resources are concentrated in East Africa's Great Rift Valley: Eritrea, Ethiopia, Kenya, Tanzania and Uganda. With an installed capacity of around 950 MW, enough to power about 3.8 million homes, Kenya is Africa's leading geothermal power generator and the world's seventh leading producer (Brown, 2022).

African nations face substantial challenges in the implementation of renewable energy projects. These obstacles include the requirement for enhanced institutional capacity within government institutions, limitations in scalability and competition, the burden of elevated transaction costs, and apprehensions regarding perceived risks associated with such endeavours (WB, 2018). Policymakers must thoroughly assess and leverage the considerable synergies between hydropower, wind, and solar resources in Africa's energy mix to stimulate greater private sector involvement in the subsector. By addressing these issues strategically, policymakers can foster a more conducive environment for renewable energy development and advance progress towards sustainable and inclusive energy solutions for the continent.

LOW CARBON TRANSPORTATION

The thrust of governments in Africa has been to encourage the use of non-motorised transport, such as walking and cycling, by creating user lanes alongside existing roads. Motorised transport on the continent continues to be dominated by oil-fuelled vehicles, as shown in Table 3.4.

As Africa undergoes increased industrialisation, the demand for transportation of raw materials and finished goods will rise, necessitating more freight vehicles, railways, navigation and aviation. The AfCFTA implementation is expected to enhance connectivity between countries, facilitating the movement of goods from production regions to major commercial centres and ports. An ambitious ongoing project, the Trans Africa Railway, aims to connect shipping ports in West and East Africa, potentially spanning over ten countries from Angola and the Democratic Republic of the Congo on the Atlantic coastline through Zambia, Tanzania and Kenya on the Indian Ocean coastline. Given the novelty of these infrastructure projects, there is significant potential to ensure their carbon neutrality throughout the design, construction and maintenance phases.

Table 3.4: Total final consumption by fuel and sector in sub-Saharan Africa, 2018, Mtoe (IEA, 2019)

	Industry	Transport	Residential	Other
Coal	12	0	5	5
Oil	9	69	5	13
Gas	9	0	0	0
Electricity	17	0	10	7
Bioenergy	18	0	281	13
Other Renewables	-	0	0	0
Total	65	69	301	38
<i>Share of total final consumption</i>	<i>14%</i>	<i>15%</i>	<i>64%</i>	<i>8%</i>

For Africa to accelerate its transition to low-carbon transportation, policymakers must implement measures towards more sustainable forms of mobility, particularly hybrid and electric vehicles (EVs), as well as shared mobility (Mohammadi and Saif 2023). The Electric Vehicle World Sales Database, which tracks global EV sales by region, is yet to start tracking EV sales in Africa, making it challenging to estimate the number of the world's 40 million electric road vehicles operating on the continent (EV Volumes, 2023). While hybrid models are slowly increasing, these are predominantly imported used vehicles from Asia. The high cost of new EVs, averaging around \$60,000 plus import duties and taxes, hinders investment in new ones (Edmunds, 2023). The transition to low carbon for long-haul transportation such as trucks, buses, railways and aircraft is nearly non-existent on the continent.

SUSTAINABLE MINING

Sustainable mining minimises the adverse environmental, social and governance impacts associated with mining operations. By adopting sustainable practices, the mining industry can effectively contribute to achieving multiple SDGs, as depicted in Figure 3.11. Emphasising environmental performance and social

responsibility goes beyond mere adherence to regulations and ethics, it is also a sound business strategy.

Sustainable mining can be achieved through the following measures:

- ◆ Circularity in mining comprises billions of tonnes annually, particularly for rocks and tailings. Re-treating tailings could, for example, recover minerals and trace elements left over during the primary processing.
- ◆ Water conservation by reducing the amount of water used in stifling dust, transporting and storing slurry, and processing this slurry to extract minerals. Mines can work to reduce water used and to recycle water to a point where there is zero liquid discharge which would have a positive impact on aquatic life, general riverine health, and biodiversity.
- ◆ Lower carbon dioxide emissions by transitioning from fossil fuels to clean energy fuels such as hydroelectric power, solar and wind.

- ◆ Land rehabilitation, such as afforestation, occurs when a mine reaches the end of its lifecycle either because the minerals are exhausted or mining at the site is no longer economically viable.
- ◆ Leveraging advanced technologies such as machine learning, artificial intelligence, cloud computing, and robotics can drive process automation within Africa’s mining industry leading to smart mining operations that have fewer adverse impacts on the employees, environment and neighbouring communities (Nhede, 2023).
- ◆ Discouraging illegal mining through local community sensitisation and benefit sharing. Illicit miners have little or no regard for safety, the environment or the benefits that accrue to the mine-dependent community as a collective (PAR, 2023).



Figure 3.11: Sustainable mining’s contribution to the achievement of SDGs (PAR, 2023)

3.4 Pollution

Africa faces significant challenges concerning air, plastic waste, and water pollution, posing critical threats to human health and the environment. Air pollution arises from various sources, including industrial activities, transportation emissions, and burning solid fuels for cooking and heating. Water pollution from agricultural runoff, untreated sewage, and industrial discharges compromises the availability of clean water for millions of people, impacting their well-being and livelihoods. Waste management is frequently characterised by uncontrolled dumping and open burning, with only limited instances of waste disposal in sanitary engineered landfills or diversion towards reuse, recycling, and recovery practices (R, Yongsheng, and Jun 2006). Improper waste management results in the pollution of soil, water and air. For example, plastic waste pollution is a mounting concern, with mismanaged plastics contaminating water bodies, soil, and wildlife habitats, leading to severe ecological consequences. This subsection examines some of these pollution categories that Africa grapples with.

3.4.1 State of air pollution

In 2019, air pollution was responsible for approximately 1.1 million deaths across Africa, accounting for 16.3 per cent of all deaths on the continent. Among these fatalities, household air pollution was attributed to 697,000 deaths, while ambient air pollution accounted for 394,000 deaths (Fisher et al., 2021). Government efforts to address the causes of air pollution, such as reducing the use of solid biomass for cooking, have led to a decline in indoor air pollution. However, there is an increasing trend in ambient air pollution, resulting in most deaths related to non-communicable diseases such as ischaemic heart disease, lower respiratory infections, neonatal disorders, chronic obstructive pulmonary disease and stroke. Notably, air pollution ranks as the second leading cause of non-communicable disease deaths, following tobacco smoking. Figure 3.12 illustrates the upward trajectory of deaths caused by non-communicable diseases.

Ambient air pollution not only results in reduced agricultural and manufacturing output but also leads to losses in the service sector and

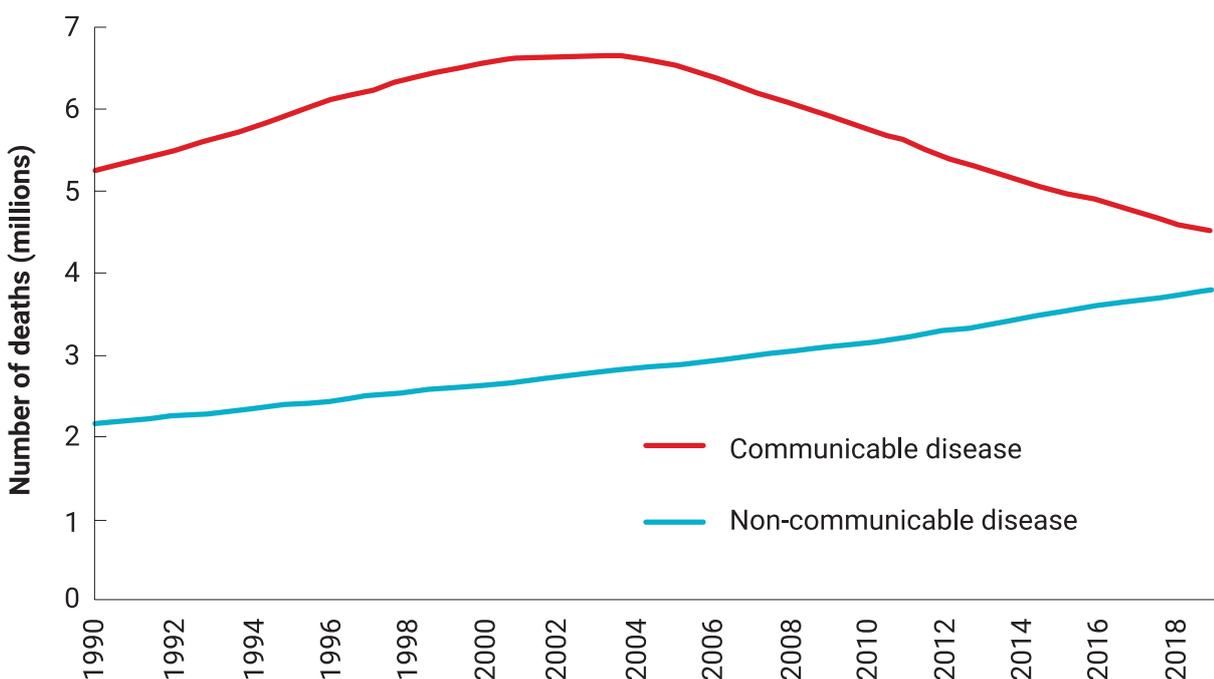


Figure 3.12: Deaths attributable to communicable and non-communicable diseases in Africa, 1990–2019 (Fisher et al., 2021)

overall lower performance of firms (Soppelsa et al., 2021). Various interventions can be implemented to address these challenges, including measures to reduce outdoor air pollution, regular health check-ups, adopting healthy diets and engaging in physical exercise (WHO, 2023a). These interventions create opportunities for start-up businesses to offer distinctive value propositions by incorporating one or more of them into their offerings.

3.4.2 Water pollution and access to safe drinking water

Unsafe water remains one of the most significant health and environmental challenges globally, particularly affecting vulnerable populations in impoverished regions. Over the past decades, Africa's hydrological systems and freshwater habitats have undergone significant transformations. Sub-Saharan Africa is poised to emerge as the dominant hotspot of surface water pollution due to a combination of factors (Jones et al., 2023). Rapid population growth, urbanisation, and industrialisation are putting immense pressure on water resources in the region. As economies expand, so does the demand for water-intensive industries, leading to increased discharge of pollutants into water bodies. Inadequate wastewater treatment facilities and the improper disposal of solid waste contribute significantly to the contamination of surface waters. Moreover, agricultural runoff, driven by intensive farming practices, introduces harmful chemicals and nutrients into rivers and lakes. Climate change exacerbates the situation by altering rainfall patterns and water availability, influencing pollutant transport and accumulation.

An analysis by UNICEF reveals that 190 million children across ten African countries face the gravest risk from a convergence of three water-related challenges: inadequate water, sanitation, and hygiene (WASH); waterborne diseases; and climate-induced hazards. Among these nations, Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria,

and Somalia, in West and Central Africa bear the most acute impact of this triple threat, rendering the region one of the world's most water-insecure and climate-affected areas. The situation is further exacerbated by instability and armed conflicts in many of the worst-affected countries, particularly in the Sahel, impeding access to clean water and sanitation services for vulnerable populations (UNICEF, 2023). Figure 3.13 compares the population share in the world regions with access to drinking water facilities in 2020. Only about 30 per cent of sub-Saharan Africa's population had access to safely managed water drinking water compared to the 74 per cent world average.

The attainment of universal safe drinking water, sanitation, and hygiene in sub-Saharan Africa is projected to necessitate an annual capital investment of \$35 billion. Adopting efficient and climate-resilient "smart design" principles in water management systems can enhance the sustainability of water and sanitation services. However, the World Resources Institute (WRI) identifies securing sufficient revenue to maintain newly developed infrastructure as the principal challenge confronting African policymakers and engineers in the water sector (Holtz, 2021).

Several African regional initiatives are actively working to curb water pollution and improve access to safe drinking water. For example, the African Ministers' Council on Water (AMCOW) launched the Africa Water Vision 2025, a comprehensive strategy for sustainable water management. The African Water Facility (AWF), hosted by the AfDB, supports various water-related projects, including those focused on pollution reduction and water quality improvement. The AU's Africa Water Sanitation and Hygiene (WASH) program strives to enhance African communities' access to clean water and sanitation facilities. These initiatives reflect the collective efforts of African governments and stakeholders in promoting sustainable water management and tackling water-related challenges across the continent.

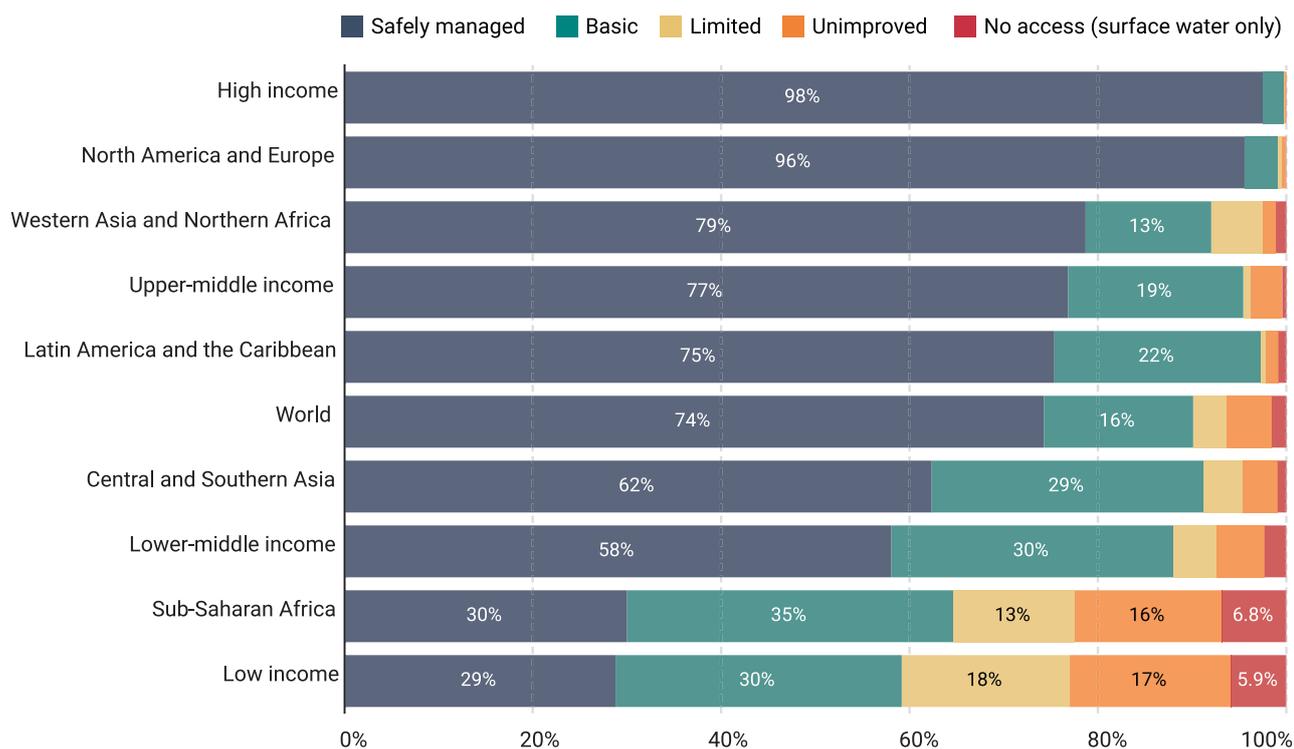


Figure 3.13: Population share with access to drinking water by region (OWD, 2021) compiled from WHO/ UNICEF Joint Monitoring Programme

3.4.3 Solid waste management

Like other developing regions globally, waste generation in Africa is influenced by several factors, including population growth, rapid urbanisation, an expanding middle class, evolving consumption habits and production practices, and the impacts of global waste trade and trafficking (UNEP, 2018a). Out of the 50 largest dumpsites worldwide, varying in history and size and serving as dumping grounds for waste, Africa accounts for approximately 15 of these sites. These locations receive varying compositions and quantities of waste and host diverse numbers of people, including workers at the dumps or inhabitants residing in the surrounding areas. Consequently, these dumpsites pose significant hazards to human health and the environment (UNEP, 2015a). The types of waste dumped at these sites include municipal solid waste, hazardous waste, e-waste and others.

In 2012, Africa generated a total of 125 million tonnes of municipal solid waste (MSW), with sub-Saharan Africa contributing 81 million

tonnes (65 per cent) of the total. Projections indicate that waste generation in Africa will increase to 244 million tonnes per year by 2025. The average composition of MSW in Africa (sub-Saharan Africa) comprises approximately 57 per cent organic waste, 9 per cent paper/cardboard, 13 per cent plastic, 4 per cent glass, 4 per cent metal, and 13 per cent other materials. The relatively higher organic content in comparison to paper and packaging aligns with the typical composition of MSW in developing countries. However, the composition of MSW in Africa can vary based on factors such as consumer attitudes, income levels, and cultural practices, leading to regional differences (UNEP, 2018a).

According to Figure 3.14, the anticipated changes in waste composition within African cities from 2010 to 2025 indicate a decrease in organic waste content and a rise in paper and packaging waste. These shifts in waste composition have significant implications for waste management technology and

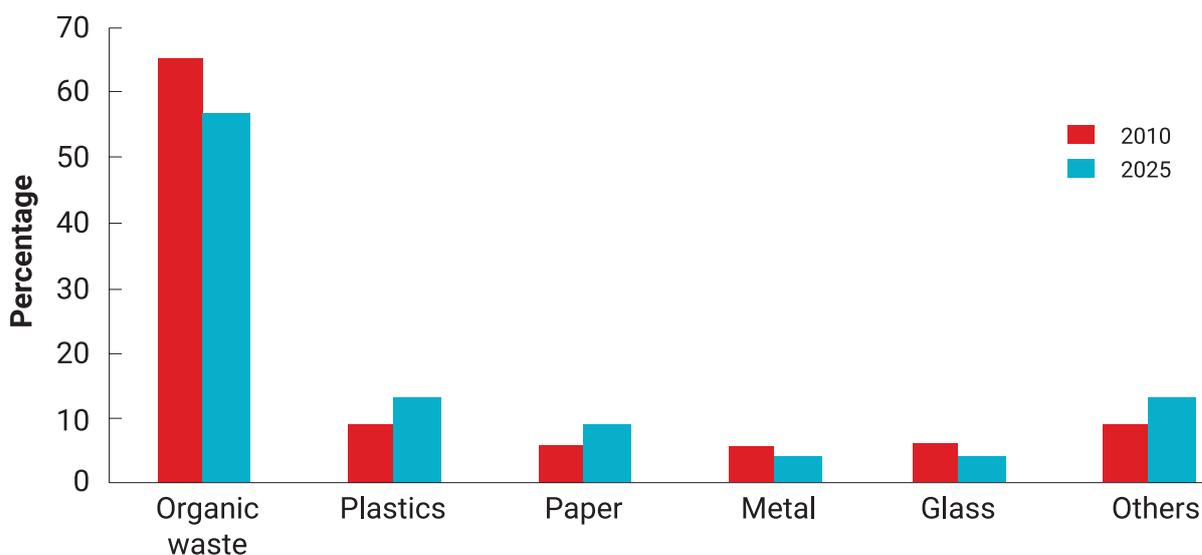


Figure 3.14: Changes in the composition of waste, 2010-2015 (UNEP, 2018a)

infrastructure choices, emphasising the importance of waste separation and integrated waste management approaches. (UNEP, 2018a).

Hazardous waste generation in Africa is rising due to the emergence of waste streams like e-waste, health care risk waste (HCRW), and obsolete agricultural chemicals (UNEP, 2018a). In Africa, the lack of proper systems for managing household and other hazardous waste leads to improper disposal of items like paint, batteries, household cleaners, and pesticides. These substances are often discarded down sewers or with municipal waste, posing environmental and human health risks (Edokpayi et al., 2017; Mmerekki et al., 2017).

E-WASTE

In 2016, Africa generated approximately 2.2 million tonnes of e-waste. The three countries with the highest e-waste generation in Africa are Egypt (0.5 Mt), South Africa, and Algeria (0.3 Mt) (Baldé et al., 2015). There is considerable variation in per capita e-waste generation among African countries, with Seychelles (11.5 kg), Libya (11.0 kg), and Mauritius (8.6 kg) having per capita e-waste generation

figures comparable to those of developed nations (Baldé et al., 2015). Apart from local e-waste generation, there is also the factor of transboundary importation, especially in West Africa, which serves as the primary trading route for used electrical and electronic equipment (EEE) and end-of-life electronic devices entering Africa. For instance, one of the most impactful e-waste dumpsites is located at Agbogbloshie in Accra, Ghana. This site receives approximately 192,000 tonnes of e-waste yearly, leading to soil, air, and water pollution. The adverse effects of this contamination result in severe health issues for around 10,000 scavengers who rely on sorting and recycling activities for their livelihoods (UNEP, 2015a).

Sound e-waste management in Africa encounters major challenges: insufficient infrastructure for environmentally sound management, lack of specific legislation for e-waste, limited frameworks for product take-back, and inadequate public awareness about the risks of uncontrolled importation of near-end-of-life and end-of-life e-waste. To address this issue, an enforcement program was tailored for specific African countries, including Benin, Egypt, Ghana, Nigeria, and Tunisia, to monitor

and regulate transboundary movements of used EEE. Also, in 2008, the E-waste Africa project was initiated as a response to the growing concerns regarding electronic waste management. The project received funding from the European Commission, the Governments of Norway and the United Kingdom of Great Britain and Northern Ireland, and NVMP, a Dutch association specialising in the disposal of metal and electrical products. The Secretariat of the Basel Convention (SBC) managed the project. Designed as a comprehensive program, its primary objectives are to improve the environmental governance of e-waste and foster favourable social and economic conditions for partnerships and small businesses within the recycling sector in Africa (UNEP, 2018a).

PLASTIC WASTE

Global plastic production surpasses 400 million tonnes annually, with an alarming 19 to 23 million tonnes ending up in lakes, rivers and oceans. Regrettably, the recycling rate for plastic remains below 10 per cent of the world's total plastic production. Although Africa presently accounts for only 5 per cent of plastic production and 4 per cent of consumption globally, the continent's growing population and urbanisation drive an increase in single-use plastic, resulting in heightened environmental pollution and health risks (WHO Africa, 2023).

Plastic pollution in Africa has severe consequences for human populations and ecosystems. Improper disposal of plastic waste, especially single-use plastics, can contaminate marine and freshwater sources such as oceans, rivers, lakes and groundwater. Plastics degrade into microplastics consumed by humans and marine organisms, posing potential health risks (Wu et al., 2022; Li et al., 2020). In addition, toxic chemicals in plastics can leach into the environment, potentially infiltrating the human food chain. Prolonged exposure to these chemicals and microplastics through contaminated food or water can lead to adverse health effects, including endocrine

disruption, developmental problems and increased cancer risk (WHO Africa, 2023).

Inadequate plastic waste disposal also creates breeding grounds for disease-carrying mosquitoes, while burning plastic waste emits harmful pollutants into the air, contributing to respiratory issues and worsening air pollution-related diseases. The uncontrolled disposal of plastic is expected to diminish soil permeability, ultimately disrupting the natural water cycle and degrading soil quality for agricultural purposes (Fei et al., 2023). Consequently, plastic pollution carries significant environmental and socio-economic ramifications, including ecosystem degradation. These consequences can indirectly affect public health by disrupting the equilibrium of ecosystems that offer vital services such as water purification, carbon sequestration and disease regulation. In addition, plastic pollution can undermine local economies and livelihoods by contributing to food insecurity.

Addressing the environmental impacts of plastic pollution in Africa requires comprehensive measures, including improved waste management practices focused on reducing, reusing and recycling. Public awareness campaigns and policy interventions are also necessary. By actively combating plastic pollution and promoting sustainable alternatives, human health can be safeguarded, ecosystems preserved, and sustainable development fostered. Many African countries have shown commitment by implementing bans on single-use plastic bags, but further efforts are needed to enhance policies on plastic production, usage and waste management. Strengthening capacities and establishing monitoring and evaluation mechanisms are crucial (WHO Africa, 2023).

The recent discussions on the UN's Treaty on Plastic Pollution in Paris in May 2023 offer hope for accelerating the development and implementation of national and regional policies. The anticipated adoption of the treaty in 2024 is expected to support these efforts. Business opportunities exist in plastic waste

recycling, with the potential to leverage digital tools. For instance, some private sector players already use blockchain-based traceability apps to connect informal waste pickers with recycling firms in real time (UNEP, 2023a).

3.5 Conclusion

Africa faces the Triple Planetary Crisis, encompassing biodiversity loss, climate change, and pollution, which presents challenges and opportunities for sustainable development. To address biodiversity loss, Africa can lead the way by implementing the targets of the Kunming-Montreal Global Biodiversity Framework. Promoting biodiversity-friendly practices, sustainable land management, ecological restoration, and sustainable fisheries can play a vital role in preserving the continent's natural heritage. Africa also has a unique opportunity to become a trailblazer in renewable energy solutions to combat climate change. Harnessing abundant solar, wind, and geothermal resources can power sustainable development while enabling

the transition to low-carbon transportation and sustainable mining. Tackling pollution will require a multi-faceted approach, encompassing clean technologies for cooking, low-carbon transportation, waste management systems, and circular economy principles.

Despite the daunting nature of these challenges, Africa's efforts to address the Triple Planetary Crisis come hand-in-hand with opportunities for innovation, green job creation, and economic growth. By creating a conducive policy and business environment for sustainable practices and investments, the international community's support is crucial in achieving this vision, as the planet's fate is interconnected with Africa's success in tackling these global challenges.



Goat herder atlas mountains. Photo Credits: UNEP



Photo Credits: SWITCH Africa Green





CHAPTER

04

Green Business Opportunities



Photo Credits: SWITCH Africa Green

4.1 Climate smart opportunities for a net-zero transition

A simple definition of 'net zero' widely used defines this as a state of balance between emissions and emissions reductions. The challenge is how to transition to a net zero energy system by 2050 while ensuring stable and affordable energy supplies, providing universal energy access, and enabling robust economic growth. Governments and business leaders across all sectors are grappling with demonstrating delivery of net zero. Some of the pathways are briefly described in this Chapter.

4.1.1 Renewable energy

Energy plays a pivotal role in Africa's developmental trajectory, with the improvement of livelihoods and access to opportunities hinging on the expansion of reliable, affordable and sustainable energy access. This importance is becoming evident and is magnified by the anticipated far-reaching impacts of climate change on the African continent. Additionally,

the significant potential for industrial growth, job creation and environmental stewardship is closely intertwined with the broader availability of sustainable energy sources. The interconnection between energy and industrialisation is clearly established in the African Union's (AU) Agenda 2063. Renewable energy presents African economies with opportunities for economic expansion, cost-effective technologies to enhance energy accessibility and quality, and the potential for industrial development along new value chains. It also holds significant potential for reducing the continent's trade deficits, developing new local value chains and creating local employment opportunities while reducing the environmental impacts of fossil fuel-sourced power generation and traditional biomass for heating and cooking. Africa has the potential to achieve an average increase of approximately 6.4 per cent in GDP from

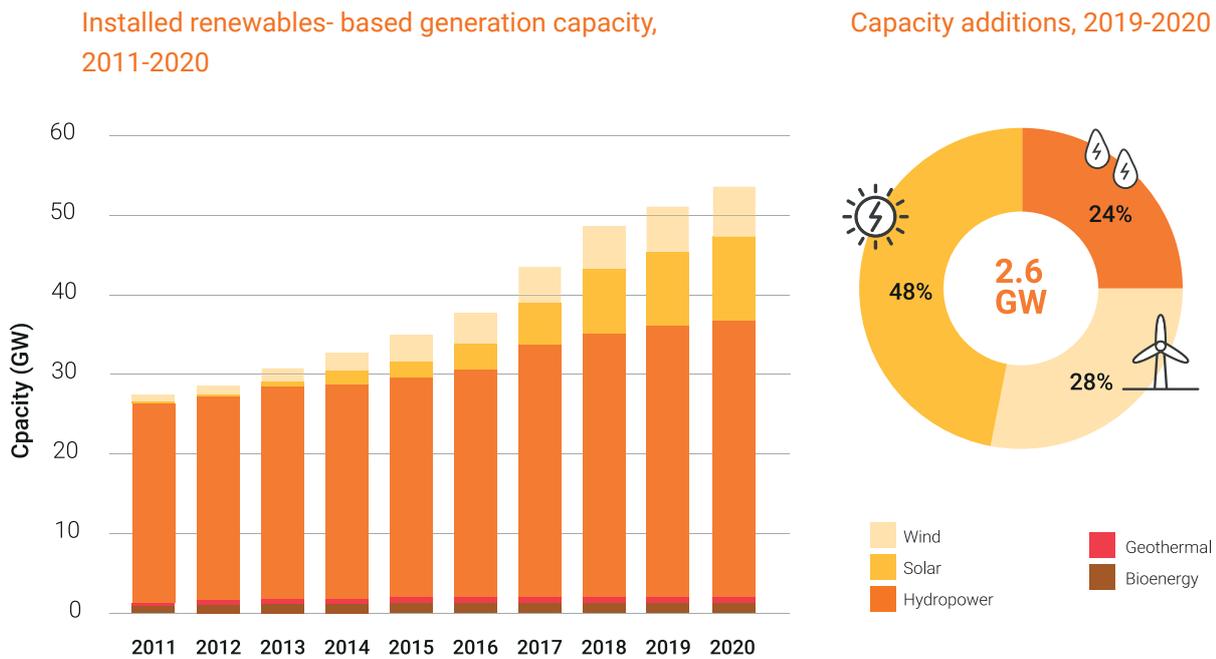


Figure 4.1: Installed renewable energy-based generation capacity and capacity additions (IRENA, 2022)

2021 to 2050, which is directly attributed to the energy transition (IRENA and AFDB, 2022).

Besides hydropower, other renewable energy sources, such as solar, wind, geothermal and bioenergy, make insignificant contributions to Africa's energy mix. Africa's share of installed renewables-based electricity generation capacity worldwide is less than 3 per cent despite the vast renewable energy resources available on the continent.

However, there has been a noticeable increase in renewable energy deployment in recent years, with a 7 per cent rise in renewables-based generation capacity over the past decade (2010-2020). Solar energy witnessed the most substantial additions during this period. Much of this growth is attributed to large-scale projects in individual countries, particularly in developing utility-scale hydropower and solar photovoltaic (PV) installations. Figure 4.1 shows Africa's installed renewable-based generation capacity as of 2020.

4.1.2 Africa's renewable energy potential

The global energy transition has market impacts that alter the energy sector's demand for goods and services. Expanding Africa's vast renewable energy sources will increase employment opportunities and stimulate economic activity in the manufacturing, construction, installation, operations and maintenance sectors. Opportunities lie in localising aspects of the renewable energy value chain. In Africa, establishing regional supply chains within the renewable energy sector would contribute to the energy transition and result in a net increase in employment opportunities. The global demand for metals and minerals necessary for renewable energy and other transitional technologies is experiencing rapid growth and is expected to escalate further. Numerous African countries possess abundant reserves of these resources. Local manufacturing of renewable energy components is also an area for industrial and business growth in Africa, offering a way for national governments to reduce dependence on commodity exports and build economic resilience.

Hydropower is currently the largest renewable electricity source in Africa, with a sizeable unexploited potential estimated at 1753 GW, with Angola, Ethiopia, the Democratic Republic of the Congo, Madagascar, Mozambique and Zambia at the forefront of this untapped potential. The sum of existing, committed, planned, and candidate hydropower plants in Africa is estimated at 131 GW (IRENA and AFDB, 2022), representing only 7.5 per cent of the continent's hydropower potential.

Solar energy has emerged as Africa's fastest-growing renewable energy source and will be a crucial driver of new capacity additions in the coming decades (IRENA, 2018). From 2011 to 2020, solar capacity experienced an impressive compound annual growth rate (CAGR) of 54 per cent, surpassing wind (22.5 per cent) by two and a half times, geothermal (14.7 per cent) by almost four times and hydropower (3.2 per cent) by nearly 17 times (IRENA and AFDB, 2022). Africa is said to have some tremendous solar power generation potential in the world, with IRENA estimating this potential as 7900 GW, assuming a 1 per cent land-utilisation factor (IRENA and AFDB, 2022).

Wind power resources in Africa, especially in certain regions of North Africa and the Sahel area, continue to be significantly underutilised. The installed wind power generation capacity was 6.5 GW at the end of 2020. In contrast, the continent is estimated to have a technical potential of 461 GW, assuming a 1 per cent land-utilisation factor, with Ethiopia, Algeria, Namibia and Mauritania having the most significant potential (IRENA and AFDB, 2022).

Geothermal resources on the continent are predominantly located in the East Africa Rift System, where an estimated untapped potential of 15 GW exists (BGR, 2021). As of the end of 2020, Kenya was the continent's sole substantial geothermal power producer, with a generation capacity of 823.8 MW. Ethiopia operated a pilot plant with a capacity of 7.3

MW (IRENA and AFDB, 2022).

Bioenergy in the form of biomass used for cooking is the most widely used energy source in Africa, done through inefficient, traditional methods. Modern applications for energy generation accounted for only 1 per cent of all renewable electricity generation in 2019. Several African countries show the potential for utilising advanced biofuels within the transportation sector. The US Energy Information Administration suggests that West Africa alone possesses the capacity to produce over 100 Mt per year of agricultural residues, which can be converted into biofuels, such as ethanol and biobutanol, or utilised for electricity generation (IRENA and AFDB, 2022).

Green hydrogen: With multiple low-carbon hydrogen projects underway, the continent has the production potential of 5,000 Mt of hydrogen per year at less than \$2 per kilogram, cheaper than any other region worldwide (Frost and Sullivan 2022).

Metals and Minerals for the Renewable energy value chain: Energy sources for climate-smart technologies will rely heavily on metals and mining industries. For instance, generating 1 TWh of electricity from solar and wind technologies could consume up to 300 per cent and 200 per cent more metals, respectively, compared to a gas-fired power plant, on a copper-equivalent basis. Similarly, manufacturing battery or fuel-cell electric vehicles (EVs) will require more materials than constructing an internal combustion engine (ICE) vehicle. The potential of development in this industry is the largest in Africa as it is home to significant reserves of these critical minerals. As discussed in Chapter 2, the continent boasts ample reserves of crucial inputs, such as cobalt, manganese and lithium. For instance, Africa possesses approximately 40 per cent of the world's cobalt, manganese and platinum group metal reserves, crucial for batteries and hydrogen technologies. These resources allow Africa to position itself as a major participant in

What are the opportunities situated on the continent?



Figure 4.2: Renewables manufacturing opportunity rankings (SEforALL, 2023)

the battery value chain, moving beyond mining and venturing into battery production (Frost and Sullivan 2022). These resource-rich reserves make Africa an appealing choice for businesses seeking to establish renewable energy manufacturing facilities close to the supply chains of these raw materials (IRENA and AFDB, 2022). Figure 4.2 shows a Sustainable Energy for All assessment, ranking several African countries' opportunity levels for solar assembling, and mineral and metal refining (SEforALL, 2023).

There are multi-sector investment and business opportunities in Africa's renewable energy market and energy value chain, which have remained largely untapped, some of which include:

- ◆ **Renewable energy generation:** Investing in renewable energy projects, such as solar, wind, hydrothermal and geothermal power plants, using innovative business models and structures to meet the increasing energy demand in Africa. Opportunities include developing and operating renewable energy projects
- ◆ **Battery minerals and storage materials:** Expanding mining activities for battery minerals and storage materials used in clean energy technologies, such as lithium, cobalt, nickel and graphite. These minerals are essential for producing batteries for electric vehicles and energy storage systems.
- ◆ **Mini-grid and off-grid solutions:** Building and operating mini-grid and off-grid systems to provide electricity access to rural and remote areas not connected to the main power grid. Opportunities involve deploying solar home systems, microgrids and decentralised renewable energy solutions.
- ◆ **Renewable energy equipment manufacturing:** Setting up local manufacturing facilities to produce renewable energy equipment, including solar PV panels, wind turbines and energy storage systems, to meet rising demands for clean energy technologies in Africa.

and selling clean electricity to the grid or directly to consumers.

- ♦ **Energy storage solutions:** Developing and implementing energy storage technologies, such as battery storage systems, to address the intermittent nature of renewable energy sources and ensure a stable and reliable power supply.
- ♦ **Clean cooking solutions:** Providing clean cooking technologies and fuels, such as improved cookstoves and biogas systems, to replace traditional biomass cooking methods. These solutions help reduce indoor air pollution and deforestation while improving health and livelihoods.
- ♦ **Pay-as-you-go (payg) solutions:** Businesses offering digital-enabled PAYG solutions for renewable energy products, such as solar lanterns, solar-powered water pumps and mini-grids. These solutions allow customers to pay for energy usage in small increments via mobile money platforms, making renewable energy more accessible and affordable.
- ♦ **Energy financing and crowd-funding platforms:** Establishing digital platforms that connect renewable energy project developers with potential investors or crowdfunding opportunities. These platforms can facilitate financing renewable energy projects, including solar installations, wind farms or biomass facilities.
- ♦ **Solar-powered water pumps:** Design and supply solar-powered water pumps which offer a reliable and sustainable solution for irrigation, livestock watering and community water supply in rural areas. These pumps use solar energy to pump water from wells, rivers or other water sources, eliminating the need for fuel-powered pumps and reducing operational costs.
- ♦ **Solar water heaters:** Design and supply solar water heaters utilising solar energy to heat water for domestic or commercial use. These systems can significantly reduce the energy required for water heating, particularly in regions with abundant sunlight. Solar water heaters are a cost-effective and sustainable alternative to electric or gas-powered water heaters.
- ♦ **Green hydrogen production:** Investing in producing and utilising green hydrogen from renewable sources for industrial, transportation, and energy storage applications.
- ♦ **Renewable energy integration in mining:** Developing and implementing renewable energy solutions to power mining operations. Opportunities include installing solar PV systems, wind turbines or hybrid systems that combine renewable energy with storage technologies to reduce reliance on fossil fuels and decrease greenhouse gas emissions.
- ♦ **Renewable energy integration services:** Assisting businesses and industries in integrating renewable energy sources, such as solar power, wind power and biomass, into their energy mix. Opportunities include feasibility assessments, system design and installation, and ongoing maintenance services.
- ♦ **Smart grid solutions:** Implementing digital-enabled smart grid solutions that integrate renewable energy generation, storage and demand management. These solutions optimise energy distribution, enable grid resilience and support the integration of distributed renewable energy resources.
- ♦ **Research and development (R&D):** Investing in research and development activities to explore innovative and sustainable mining technologies. Opportunities for R&D include developing new extraction techniques, improved mineral processing methods and utilising advanced analytics and automation to enhance efficiency and reduce environmental impacts.

BOX 1:

Technology-driven distributed solar utility model (African Business, 2021)

Arnergy Solar - Diaspora Initiative for Clean Energy Remittances

Arnergy, a prominent distributed utility company in Nigeria that provides solar energy solutions, has introduced a remarkable programme called the Diaspora Initiative. This innovative scheme allows members of the Nigerian diaspora to invest in solar solutions on behalf of local individuals and businesses. This pioneering initiative, the first of its kind from an African solar company, empowers Nigerians residing abroad to acquire off-grid solar panels and storage systems installed in households and businesses throughout Nigeria.

As part of this service, Nigerian diaspora members can acquire Arnergy's comprehensive range of distributed utility models powered by advanced lithium-ion-based batteries. These batteries offer a sustainable alternative to fossil fuel generators, ensuring a more dependable electricity supply while promoting environmental sustainability. With the inclusion of storage solutions and an average lifespan of 10 years, Arnergy's distributed utility models provide a reliable and long-lasting energy solution.

Arnergy's innovative remote monitoring technology, SolarBase, further enhances the customer experience. Customers can monitor and control their energy consumption in real time via the convenience of mobile or web applications. This breakthrough technology allows individuals and businesses greater control over their household energy usage and operating expenses, providing them with valuable insights and the ability to optimise their energy consumption effectively.

Arnergy's technology-driven solar models represent a noteworthy innovation in addressing Nigeria's pressing energy reliability crisis, which costs the country an estimated \$29 billion annually. To ensure widespread accessibility, Arnergy offers both outright purchase options and lease-to-own arrangements for its solar solutions. These flexible payment options are made possible through a strategic partnership with the international payment's platform, Flutterwave, pioneering a novel approach to remittances targeting millions of Nigerians' urgent energy needs. This collaboration creates a transformative pathway to address the critical energy challenges faced by communities nationwide.



Adamma hostel Solar Project. Photo credit: Arnergy | <https://arnergy.com/adamma-hostel/>

- ◆ **Carbon offsetting and emissions reduction:** Implementing carbon offset projects and initiatives to mitigate greenhouse gas emissions associated with mining activities. Opportunities involve investing in reforestation, renewable energy projects and participating in carbon credit programmes to achieve carbon neutrality or reduce the carbon footprint of mining operations.
- ◆ **Project development and financing:** Offering project development services and financing options for clean energy infrastructure projects, including project design, feasibility studies, project management and access to capital.
- ◆ **Energy consulting and advisory services:** Providing consulting and advisory services to governments, businesses and communities on energy planning, policy development, regulatory frameworks and sustainable energy solutions.



Photo credit: SWITCH Africa Green

4.1.3 Energy efficiency in Africa

With the impending changes to Africa's population and urbanisation, there will be significant energy demand implications for industry, transport, buildings, cooling and agriculture. In addition to expediting the implementation of renewable energy sources, enhancing the efficiency of buildings, cooking, cooling, and appliances would contribute to the energy security and accessibility of Africans. In practice, energy access and energy efficiency are closely interconnected. Enhancing energy efficiency expands the capacity for improving access while providing energy access in an energy-efficient manner, enabling more cost-effective energy access compared to retrofitting at a later stage. Continued growth in energy consumption without implementing energy-efficient measures will contribute to increased greenhouse gas (GHG) emissions. However, by prioritising energy

efficiency, it is possible to achieve substantial reductions in GHG emissions, particularly in energy-intensive industries and transportation sectors. Simultaneously, energy efficiency measures can lower operational costs and enhance air quality.

Implementing energy-efficiency policies lowers electricity expenses considerably for businesses and individuals, including low-income and vulnerable populations. Furthermore, energy efficiency initiatives offer opportunities for local job creation, benefiting both men and women. These employment opportunities span various sectors, such as manufacturing efficient appliances and building materials, industrial energy efficiency and building retrofits (USAID, 2022).

There are tremendous opportunities in the African energy-efficiency market for businesses that can implement new approaches and business models. In the past, energy-efficiency business models predominantly focused on specific products or technologies. However, there is a shift towards new business models that prioritise user-centred energy services. Two emerging models in this realm are Cooling as a Service (CaaS) and Energy Savings Insurance (ESI). Cooling as a Service allows customers to make decisions based on the life-cycle cost rather than the upfront purchase price of cooling equipment. This model eliminates the need for upfront investment, as customers pay for the actual amount of cooling used rather than investing in the equipment and infrastructure responsible for delivering the cooling. For instance, CaaS implementations can be found in Nigeria, Kenya and South Africa, offering opportunities for technology providers, financial institutions and insurance companies seeking innovative and proven solutions. On the other hand, ESI is a scheme that guarantees clients monetary energy savings resulting from a specific project. It achieves this through a combination of risk mitigation instruments, including performance contracts, third-party validation, and performance insurance. ESI assures clients that the projected energy savings will be realised.

These new business models centred around user-centric energy services present exciting opportunities for technology providers, financial institutions and insurance companies looking to engage in innovative and proven solutions in the field of energy efficiency.

Some of the business opportunities in the African energy efficiency market include:

- ◆ **Energy auditing and consulting:** Providing energy auditing and consulting services to help businesses, industries and institutions identify energy-saving opportunities and develop energy efficiency strategies. These services can involve

conducting energy audits, analysing energy consumption patterns and recommending energy-efficient technologies and practices.

- ◆ **Energy-efficient lighting solutions:** Developing and offering energy-efficient lighting products and solutions, such as LED lighting systems, to replace traditional incandescent or fluorescent lighting. Solutions include providing lighting design services, retrofitting existing lighting systems and promoting the adoption of energy-saving lighting technologies.

- ◆ **Building energy management and monitoring systems:** Installing and maintaining energy management systems for buildings, including smart thermostats, occupancy sensors and energy monitoring devices that provide real-time energy usage data. These systems help optimise energy consumption, improve operational efficiency, reduce energy waste in commercial, residential and institutional buildings and include energy analytics, remote monitoring and energy reporting services.

- ◆ **Energy efficiency mobile applications:** Developing mobile applications that offer energy efficiency tips, real-time energy consumption monitoring and personalised recommendations for energy savings. These applications can help users track their energy usage, identify energy-saving opportunities and encourage sustainable behaviours.

- ◆ **Energy-efficient appliances and equipment:** Supplying energy-efficient appliances, equipment, products and machinery to industries, commercial establishments and households. These can include energy-efficient refrigerators, ceiling fans, air conditioners, motors, pumps, evaporative coolers and other innovative products that can help mitigate the heat in hot climates while minimising energy consumption.

BOX 2:

Lighting Africa through LED lighting

The African LED Lighting Market size is expected to grow from \$3.71 billion in 2023 to \$5.49 billion by 2028, at a CAGR of 8.17 per cent during the forecast period. (Mordor Intelligence and Advisory 2023a)

LED technology is taking over almost every application of lighting, as LEDs are more reliable, robust, power-efficient and cleaner than conventional sources like compact fluorescent lamps (CFLs) and incandescent lights.

Light Emitting Diode, or LED, is a semiconductor chip's electronic component, emitting light as current passes through it. The transition of electrons among the energy bands results in a release of energy in the form of light. An array of small LEDs on a chipset or a vertical array is used as a light source, sold commercially in different forms, including lamps, batons, bulbs and strips. LEDs are environment-friendly compared to other light alternatives and are gaining popularity worldwide, including in Africa.

Since other light sources have harmful heating effects and greenhouse gases, LEDs are promoted internationally to tackle the detrimental impact of different lighting options. The use of LED helps addresses the power shortage and carbon footprints directly and indirectly. Hence, governments in the African region are also promoting the use and sales of LEDs. For instance, according to africa.com, in May 2021, an amendment was proposed by representatives from Africa to the Minamata Convention on Mercury. The restraint from the special exemptions for mercury in lighting would pave the way for LED for mass adoption, giving power grids relief through energy-saving across the regions. However, electricity penetration remains a significant hurdle, affecting the demand for LED lighting. Governments and private organisations are looking forward to expanding the reach of electricity through off-grid power alternatives and boosting conventional and renewable energy generation projects.

BOX 3:

Example of efficiency of white roofs (Vandana, 2023)

The white roofs cooling women's homes in Indian slums - an excerpt from a BBC article

The roof in Pinky's home in western India glistens in the bright sunlight. Covered in white solar reflective paint, it helps to limit the oppressive heat – which can reach 47.8C (118F) in June – from infiltrating her home during the hottest months. Pinky and her four siblings, who are from the Bhil tribe – one of the largest tribes in India – live in a two-room home in Badi Bhil Basti, a slum in Jodhpur, the second largest city in the state of Rajasthan. Both their parents have died.

In March, Pinky and other women from Badi Bhil Basti applied white solar reflective paint to their roofs. They learned about the paint in the community meetings led by Mahila Housing Trust (MHT), a non-profit that helps poor women in Indian cities build heat resilience. From the top of the hill where they live, one can see brown and beige homes, many with gleaming white roofs.

"We painted the roof ourselves. It felt very good to paint one's own home," says 19-year-old Pinky, who only uses her first name. She is a high school student and part-time tutor to local children. Since applying the paint, Pinky has noticed that her home feels cooler. Now Pinky and her students can sit downstairs during the afternoon and focus on studying.



Photo credit: BBC.com | <https://www.bbc.com/future/article/20230628-the-white-roofs-cooling-womens-homes-in-indian-slums>

♦ **Cool roof:** Solar reflective paint, also known as cool roof or solar reflective coating, is designed to reflect sunlight and reduce surface heat absorption. The reflective paint is typically applied to roofs, walls and other exterior surfaces of buildings to minimise heat transfer and improve energy efficiency. 'Cool' white roofs are seen as an easy urban climate solution. Studies have shown they can reduce energy demands and create lower ambient temperatures. Painting 'cool roofs' white is an energy-saving approach already being rolled out in some major cities. Commercially available white paints reflect between 80 and 90 per cent of sunlight, which is significant as every 1 per cent of reflectance translates to 10 W/m² less heat from the Sun. New York has recently coated over 929,000 m² of white rooftops in the United States. The State of California has already updated building codes to promote cool roofs. Overall, painting roofs white is a simple solution which could be applied in many heat-stressed locations worldwide. However, there are also challenges in making cool roofs accessible to some of the world's

poorest communities. The most significant barrier is their price which governments must subsidise. The efficiency of a white roof is given in Box 3 using an example from India.

♦ **Energy-efficient building design and construction:** Offering architectural and engineering services focusing on energy-efficient building design and construction practices. These include incorporating passive design strategies, such as white roofs for cooling, optimising insulation and utilising renewable energy technologies to create energy-efficient and sustainable buildings.

♦ **Energy-efficient cookstoves:** Design and supply clean and energy-efficient cookstoves that use advanced combustion technologies to minimise fuel consumption and reduce indoor air pollution. These stoves are designed to burn biomass such as wood or agricultural waste more efficiently, reducing fuel requirements and improving cooking efficiency.



Women in Nigeria. Photo credit: UNEP



Figure 4.3: Dimensional benefits of sustainable infrastructure (Gulati and Scholtz 2020)

4.1.4 Sustainable infrastructure

The UN defines sustainable infrastructure as systems that are planned, designed, constructed, operated and decommissioned to ensure economic, financial, social, environmental (including climate resilience) and institutional sustainability over the entire infrastructure life cycle. These systems include built infrastructure, natural infrastructure or a hybrid that contains elements of both (UNEP, 2023b). To attain the Global Goals by 2030 and achieve net-zero emissions by 2050, substantial investments in sustainable and resilient infrastructure are necessary. The Organisation for Economic Co-operation and Development (OECD) has projected that an annual investment of \$6.9 trillion will be required until 2050 to meet development objectives and create a low-carbon, climate-resilient future (UNEP, 2023b). Figure 4.3 shows the benefits of sustainable infrastructure along its key environmental, social and economic dimensions.

The projected pace of urbanisation in African cities resulting from demographic and economic growth provides an opportunity to achieve inclusive growth, poverty reduction and improvements in living standards while making cities more sustainable and resilient through the integration of sustainable infrastructure systems into urban and peri-urban infrastructure development (Gulati and Scholtz 2020).

Africa benefits from not having the vast challenge of legacy infrastructure, as most of it is yet to be built. In this regard, opportunities abound for the continent to achieve the Global Goals and Agenda 2063 through targeted investments in green, sustainable and climate-resilient infrastructure. However, capital investments in Africa have been only minor and slow to progress, with two main perceived concerns cited by investors: inadequate investment-ready projects to absorb large capital and a lack of platforms with

robust governance structures and processes to manage large capital (Hako, 2022).

Initiatives that address the challenges for investments and scale of sustainable infrastructure in Africa are underway. For instance, the Alliance for Green Infrastructure in Africa (AGIA) was launched by the African Union, AfDB and Africa50, in collaboration with other global partners, during the UN COP27 summit in 2022 to enable the scale and acceleration of finance for green infrastructure projects in Africa. The objective of the AGIA is to secure funding of up to \$500 million for initial project preparation and development. This funding aims to enhance the feasibility and attractiveness of projects, ultimately creating a pipeline of investment opportunities of up to \$10 billion for the private sector. The sectors of focus for AGIA are energy, water and sanitation, transport, health infrastructure, urban and rural infrastructure, and broadband infrastructure. Apart from focusing on untapped green investments, AGIA plans to also deploy resources to green existing brown infrastructure, such as the conversion of heavy fuel oil and diesel plants to gas and hybrid power industries, greening non-power infrastructure, such as transport systems using compressed natural gas, capturing flared gas, and converting into liquified petroleum gas, gas-to-power and fertiliser manufacture. Other areas include infrastructure support for developing green hydrogen and lithium-ion batteries for the global electric vehicle (EV) market (African Business, 2022).

Four pillars have been identified for collective action under the AGIA as follows (AfDB, 2022b):

◆ **Project Preparation and Development:** This aspect focuses on advancing projects from initial concepts to viable and financially attractive propositions. It also aims to establish a robust pipeline of green infrastructure projects that meet the criteria for securing financing.

◆ **Project Ratings:** This component involves setting standards for green eligibility and project evaluation guidelines for infrastructure projects. It also offers technical support to enhance the capabilities of public sector entities in assessing and rating projects.

◆ **Co-financing and De-risking:** This pillar aims to reduce investment risks and facilitate financing by providing suitable instruments. It also establishes a framework to attract equity and debt investments from AGIA members and other sources for green infrastructure projects.

◆ **Institutional Investors:** This pillar mobilises funds from global and African institutional investors. It aims to leverage the domestic and international capital markets to promote green bond issuances and secure project financing.

A report by Frost and Sullivan Africa announced at the Africa NDC Investment Summit at COP27 also highlights ongoing and committed sustainable infrastructure projects on the continent to serve as a rich base of opportunities already in place. As of 2022, 360 ongoing and committed projects in Africa were worth over \$100 billion. Of these projects, 12 per cent, worth \$44 billion, were ongoing, 15 per cent, worth \$57 billion, were committed, 68 per cent, worth \$257 billion, were tentative, and 5 per cent, worth \$18 billion, were cancelled (Frost and Sullivan 2022). Figure 4.4 provides a snapshot of the status of Africa's infrastructure projects in the energy, information and communications technology (ICT), logistics, mining and construction sectors. While the construction sector is attracting the most significant proportion of investments in value, the energy sector, driven by renewable energy projects, is attracting the most projects by number.

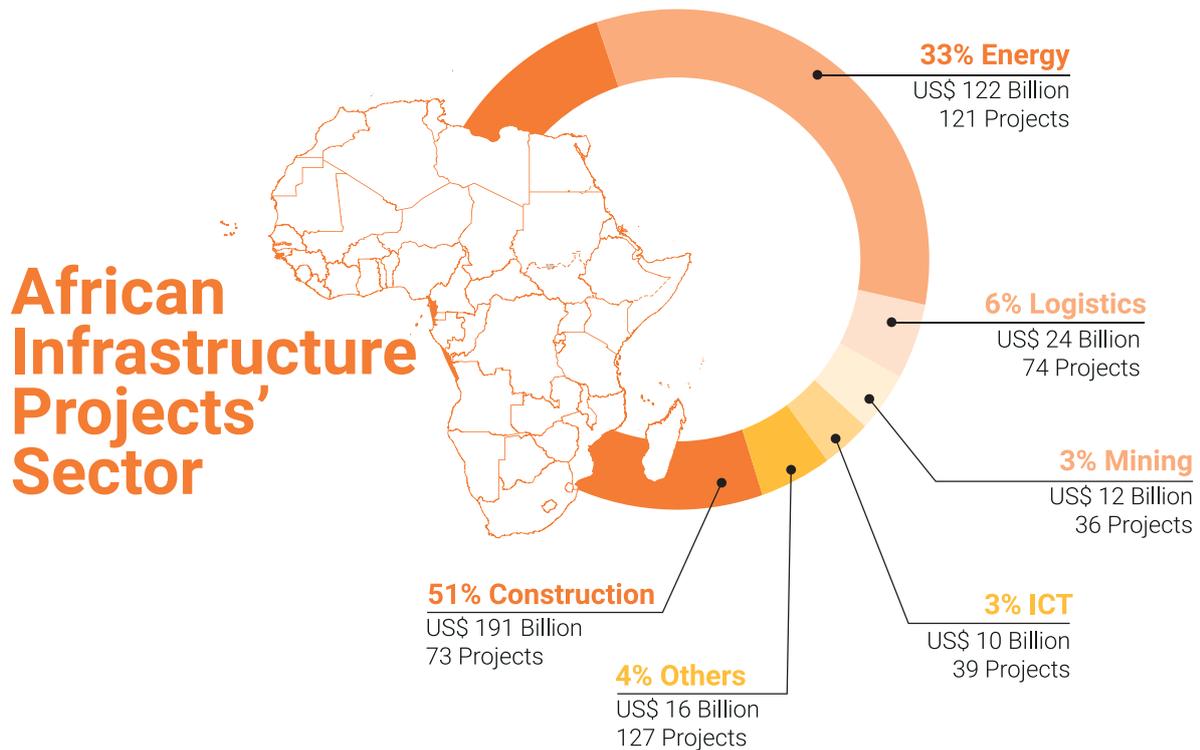


Figure 4.4: Status of Africa's infrastructure projects by industry sector, value and volume, 2022 (Frost and Sullivan 2022)

4.1.5 Sustainable infrastructure business opportunities in Africa

SUSTAINABLE DIGITAL INFRASTRUCTURE involves greening ICT through increased access, quality and affordable digital connectivity in Africa. Examples of sustainable digital infrastructure business opportunities in Africa include:

- ♦ **Internet connectivity solutions:** Africa has a significant digital divide, and there is a growing demand for Internet connectivity. Businesses can invest in building and expanding broadband networks, developing innovative technologies for internet access in remote areas and providing affordable and reliable internet connectivity solutions to bridge the digital divide.
- ♦ **Data centres and cloud computing:** As digitalisation continues to advance, there is an increasing need for data centres and cloud computing services. Despite Africa being home to approximately 17 per cent of the world's

population, its current share of the global data centre capacity is less than 1 per cent (ITU, 2021). Businesses can establish energy-efficient data centres, leverage renewable energy sources for powering data centres and offer cloud-based solutions that help organisations store, process and manage data efficiently.

- ♦ **Renewable energy integration:** Powering digital infrastructure with renewable energy sources can contribute to sustainability and reduce carbon emissions. Businesses can invest in integrating renewable energy systems, such as solar or wind, into data centres, telecom towers and internet exchange points to create sustainable and resilient digital infrastructure.
- ♦ **E-waste management:** With the rise of digital devices, there is growing concern about electronic waste (e-waste) management. Businesses can establish e-waste recycling facilities, provide

e-waste collection and disposal services, and promote responsible disposal and recycling practices to minimise the environmental impact of electronic devices.

♦ **Digital payments and fintech solutions:** Africa has seen significant growth in digital payments and fintech solutions. Businesses can develop mobile payment platforms, digital wallets and fintech solutions tailored to the African market, promoting financial inclusion, reducing cash dependence and enabling secure and efficient digital transactions.

♦ **Smart city solutions:** Building smart cities that leverage digital technologies can improve urban efficiency, sustainability and quality of life. Businesses can offer smart city solutions, such as intelligent transportation systems, smart energy management, waste management systems and smart governance platforms to enhance urban sustainability and resilience.

♦ **Digital skills training and education:** Enhancing digital literacy and skills is essential for maximising the benefits of digital infrastructure. Businesses can provide training programmes, online courses and digital skills development initiatives to empower individuals, entrepreneurs and businesses with the necessary digital competencies.

♦ **Internet of Things (IoT) solutions:** IoT technologies enable connection and communication between devices, creating opportunities for efficiency and optimisation. Businesses can develop IoT solutions tailored to sectors like agriculture, energy management, healthcare and transportation to improve resource utilisation, monitoring and decision-making processes.

♦ **Cybersecurity solutions:** Cybersecurity becomes crucial with increased reliance on digital infrastructure. Businesses can provide cybersecurity services, develop secure network solutions, and offer data protection and encryption solutions to safeguard digital infrastructure from cyber threats.

♦ **Data analytics and Artificial Intelligence (AI):** By leveraging the power of data analytics and AI to extract valuable insights, optimise processes and improve decision-making. Opportunities include developing AI-powered solutions for healthcare, agriculture, mining, logistics and other sectors to drive efficiency, sustainability and innovation.

SUSTAINABLE HEALTHCARE INFRASTRUCTURE:

The World Health Organisation defines a sustainable health system as one that improves, maintains or restores health while minimising negative impacts on the environment and leveraging opportunities to restore and enhance it to the benefit of the health and well-being of current and future generations (WHO, 2017). Figure 4.5 shows business areas enabled by technology and collaboration in regions with low healthcare access and quality (HAQ), focused on disease prevention, improving access to healthcare resources, service quality and affordability.

Examples of business opportunities in sustainable healthcare infrastructure include:

♦ **Renewable energy solutions:** Providing renewable energy solutions for healthcare facilities, such as solar power systems or biogas generators, can help overcome energy challenges and ensure a reliable and sustainable power supply. Opportunities include installing solar panels, energy storage systems and energy-efficient lighting and equipment.

- Water and sanitation infrastructure:** Establishing sustainable water and sanitation infrastructure within healthcare facilities plays a critical role in upholding hygiene standards and mitigating the transmission of diseases. Businesses can focus on providing clean water supply systems, wastewater treatment solutions, water-efficient fixtures and sanitation facilities.
- Telemedicine and digital health:** Expanding telemedicine and digital health services can bridge the gap in healthcare access, particularly in remote or underserved areas. Businesses can

develop telemedicine platforms, mobile health applications and remote monitoring devices to enhance healthcare delivery and reach more patients.

- Medical and pharmaceutical waste management:** Proper medical waste management systems are essential for maintaining a clean and safe healthcare environment. Businesses can offer services for collecting, transporting, treating and disposing of medical and pharmaceutical waste, ensuring compliance with environmental regulations.

		CLINICAL COMPETENCY		PATIENT JOURNEY			
WHO Health System Building Blocks		R&D	EDUCATION	AWARENESS & PREVENTION	CONSULTATION & REFERRAL	DIAGNOSIS & TREATMENT	FOLLOW UP & LONG-TERM CARE
PROVIDER	Service delivery			<ul style="list-style-type: none"> Multi channel wellness and prevention info Mental health protection Affordable and simple health checkup 	Remote consultation		Online disease/ health mgmt. tool
	Health workforce		Distant learning programs E-knowledge bank			Clinical Decision Support System (CDSS)	
	Information	Infrastructure to support ICT adoption					
		Public health research		Notifiable disease report and info sharing system	Hospital information system (HIS)		
SUPPLIER	Medical products, vaccines and technologies	Research support	Qualified vaccines Vaccine storage & transportation			<ul style="list-style-type: none"> Cost-effective and easy- operating testing AI imaging and reporting 	
			Pharmaceutical supply management		Affordable medicine		
PAYER	Financing	Technology enabled affordable and wide coverage solutions Fund & payment tracking platform Flexible financing solutions for medical devices					

Figure 4.5: Major business opportunities enabled by technology and collaborations in low HAQ regions (UNGC, 2020)

- ◆ **Sustainable building design:** Designing healthcare facilities with sustainable principles in mind can reduce energy consumption, improve indoor air quality and enhance the overall environmental performance of the infrastructure. Businesses can specialise in sustainable building design, construction and green building certifications, such as the Leadership in Energy and Environmental Design (LEED) certification. Integrating nature into hospital building designs and retrofitting existing buildings presents viable business opportunities.
- ◆ **Medical equipment and technology:** Providing sustainable medical equipment and technology solutions can help healthcare facilities improve patient care while minimising environmental impact. Opportunities include offering energy-efficient medical devices, eco-friendly consumables, equipment maintenance services, development of vaccine technologies, innovative vaccine storage and transportation systems, rapid diagnostic test platforms, AI imaging and reporting to support automated diagnosis, automated pharmaceutical supply distribution and hospital information systems (HIS).
- ◆ **Healthcare infrastructure financing:** Facilitating access to financing and investment options for sustainable healthcare infrastructure projects is a significant opportunity. Businesses can provide financial advisory services, develop innovative financing models or partner with financial institutions to support sustainable healthcare infrastructure development.
- ◆ **Digital training and capacity building platforms:** Developing training programmes and capacity-building initiatives focused on sustainable

healthcare practices can create business opportunities. Programmes could include e-knowledge repositories, wellness and prevention information, and online disease and health management tools. These programmes can target healthcare professionals, facility managers and technicians, providing them with the necessary skills and knowledge to implement sustainable practices.

- ◆ **Healthcare waste recycling and repurposing:** Establishing recycling and repurposing initiatives for healthcare waste, such as medical equipment refurbishment or recycling of plastic materials, can contribute to a circular economy approach in healthcare. Businesses can explore opportunities to collect, process and transform healthcare waste into valuable resources.

TRANSPORTATION INFRASTRUCTURE:

Business opportunities in sustainable transportation infrastructure in Africa contribute to reducing carbon emissions, improving air quality, enhancing mobility options, improving transportation efficiency and enhancing connectivity in Africa. Some of these opportunities include:

- ◆ **Electric Vehicles (EVs):** With the global shift towards clean energy, there is a growing opportunity for electric vehicles in Africa. Businesses can invest in manufacturing or importing electric vehicles, establishing charging infrastructure networks, and providing maintenance and repair services for EVs.
- ◆ **Public transportation systems:** There is a need for sustainable and efficient public transportation systems in African cities. Businesses can explore opportunities in developing and operating bus rapid transit (BRT) systems, light rail transit (LRT) networks and other mass transit solutions that reduce congestion and emissions.

- ♦ **Integration of mobility-as-a-service (maas) platforms:** MaaS platforms combine various transportation modes and services into a single, integrated system, providing users with convenient and sustainable mobility options. Businesses can develop MaaS platforms or collaborate with existing platforms to offer users seamless and sustainable transportation solutions.
- ♦ **Bike-sharing and e-scooter services:** Sustainable urban mobility options for two- and three-wheeler vehicle services like bike-sharing and e-scooters have gained popularity in many cities worldwide. Businesses can introduce bike-sharing schemes and e-scooter services in African cities, promoting eco-friendly transportation and reducing traffic congestion.
- ♦ **Sustainable freight and logistics:** Improving the efficiency and sustainability of freight and logistics operations is crucial for economic development. Businesses can offer sustainable freight solutions, such as low-emission fleets, optimised logistics networks and last-mile delivery services to reduce emissions and enhance supply chain sustainability.
- ♦ **Renewable energy-powered transportation:** Integrating renewable energy into transportation can contribute to sustainability. Businesses can invest in renewable energy-powered vehicles, such as solar-powered buses or solar energy-powered electric vehicle charging stations, to promote clean transportation alternatives.
- ♦ **Carpooling and ride-sharing platforms:** Carpooling and ride-sharing platforms can help reduce the number of vehicles on the road and promote efficient resource utilisation. Businesses can develop or partner with existing carpooling and ride-sharing platforms to facilitate shared mobility options and reduce individual car ownership.
- ♦ **Sustainable infrastructure development:** Developing sustainable transportation infrastructure is a significant business opportunity. Opportunities include building bike lanes, pedestrian-friendly sidewalks, and efficient traffic management systems to promote non-motorised transportation and improve road safety.
- ♦ **Smart mobility solutions:** By leveraging digital technologies and data analytics, businesses can offer smart mobility solutions that optimise transportation systems, improve traffic flow and provide real-time information to commuters. Opportunities include developing mobile applications, smart parking solutions and intelligent transportation management systems.
- ♦ **Fuel efficiency and alternative fuels:** Businesses can focus on promoting fuel-efficient vehicles and exploring alternative fuels, such as biofuels or hydrogen-powered vehicles. Opportunities include offering vehicle retrofitting services to improve fuel efficiency or establishing biofuel production facilities.
- ♦ **Alternative fuel infrastructure:** Developing infrastructure for alternative fuels, such as compressed natural gas refuelling stations, electric vehicle charging stations and hydrogen fueling stations, supports the adoption of cleaner and more sustainable transportation options.
- ♦ **Transport demand management:** Implementing transport demand management strategies can help optimise transportation systems and reduce congestion. Businesses can

BOX 4:

Examples of digital transport businesses in Africa (Njoroge and White 2023)

Sustainable Transport: BasiGo Kenya and SafeBoda Uganda

Kenyan electric bus startup, BasiGo, is set to roll out its first fleet of buses after a successful four-month pilot. The company has announced plans to introduce 100 electric buses by 2023 and a goal to hit 1,000 by 2030. BasiGo, which locally assembles buses produced by a Chinese company, Build Your Dreams (BYD) Automotive, has raised several rounds of funding and is partnering with local banks to offer flexible financing options. They operate a pay-as-you-drive model that allows operators to subscribe to a \$0.17 per kilometre fee, giving them access to a leased battery, charging services and maintenance.

The company also has a smart bus locator that uses GPS data to track buses in real time to reduce passenger wait times at bus stops. BasiGo will soon launch a platform that will give owners real-time monitoring of bus location and performance, operational insights and customisable reports on their electric bus.

SafeBoda, a Ugandan super app that operates in Kampala, Uganda, has grown tremendously from being a ride-hailing app for motorcycles to offering more services, such as food delivery services, airtime purchases, cashless payments, mobile money transactions and a savings scheme that offers 7 per cent annual interest.

SafeBoda has also recently launched a SafeCar option allowing users to hail taxis. With the tagline "Africa's Super App", the app is now a force in the transport and fintech sectors. SafeBoda has helped improve the transport sector in Kampala by allowing users to increase road and personal safety by providing safety lessons, helmets and reflector jackets. Riders have earned more credibility by being onboarded onto the platform and have the chance to earn more. Having onboarded thousands of Boda riders, there is also the opportunity to provide critical city data needed to plan or support trials of new business models. In 2020, Zombo partnered with SafeBoda to offer some of their riders the opportunity to test their e-bikes and battery-swapping stations. SafeBoda has also improved their riders' livelihoods, helping them earn at least 25 per cent more when repaying their loans and 50 per cent more once they own their motorcycles.



SafeBoda motorbikes in Uganda. Photo credit: Wikimedia commons

provide consultancy services, develop smart mobility plans and effectively offer innovative solutions to manage transportation demand.

NATURAL INFRASTRUCTURE refers to an interconnected system of environmental elements, whether natural or artificial, that function within urban and peri-urban areas to provide valuable ecosystem services. These services can include benefits like water purification, climate regulation, biodiversity conservation and recreational spaces. Green infrastructure encompasses natural components, such as forests, wetlands and parks, and human-made structures designed to mimic natural processes, such as green roofs, permeable pavements and rain gardens (Gulati and Scholtz 2020). Together, these elements work synergistically to enhance the sustainability and liveability of urban environments.

- ♦ **Green infrastructure and sustainable urban development:** Nature-based infrastructure plays a crucial role in sustainable urban development. Businesses can participate in designing and constructing green spaces, urban parks, green roofs, vertical gardens and soak-away gardens, enhancing urban biodiversity, mitigating the urban heat island effect and promoting sustainable living environments.
- ♦ **Water management and conservation:** Efficient water management is critical for sustainable development. Businesses can offer water conservation solutions, develop sustainable irrigation systems, implement rainwater harvesting techniques and support water conservation education and awareness campaigns to ensure the responsible use and conservation of water resources.
- ♦ **Environmental consulting and services:** As the demand for nature-based infrastructure and sustainable practices increases, there is a growing need for

environmental consulting and services. Businesses can offer expertise in environmental impact assessments, ecological surveys, conservation planning and sustainability consulting, providing guidance and support to ensure the integration of nature-based solutions in various development projects.

GREEN BUILDING INFRASTRUCTURE:

Several business opportunities in sustainable building infrastructure in Africa can contribute to reducing carbon emissions, conserving resources, improving indoor air quality and creating healthier and more sustainable built environments in Africa.

- ♦ **Green building design and construction:** Offering sustainable building design, construction and renovation services. Opportunities include incorporating energy-efficient features, renewable energy systems, water-saving technologies and eco-friendly materials into building projects.
- ♦ **Energy-efficient building systems:** Providing energy-efficient building systems and technologies, such as LED lighting solutions, hot water and cooling solutions, insulation and smart building management systems. These systems help reduce energy consumption and lower operating costs for building owners.
- ♦ **Renewable energy integration:** Installation of renewable energy systems to generate clean and renewable electricity and heat. Opportunities can include both grid-tied systems and off-grid solutions for remote areas.
- ♦ **Sustainable materials and products:** Manufacturing or supplying eco-friendly building materials, such as sustainable timber, recycled materials, low volatile organic compound (VOC) paints and energy-efficient appliances. These products contribute to reducing the environmental impact of the construction industry.

- ♦ **Green roofing and water management:** Providing green roof solutions and rainwater harvesting systems to enhance building sustainability. Green roofs help reduce energy consumption, improve stormwater management and provide additional green spaces in urban areas.
- ♦ **Waste management and recycling:** Offering waste management and recycling services for construction and demolition waste. Opportunities include recycling construction materials, promoting waste reduction strategies and implementing sustainable waste disposal practices.
- ♦ **Energy performance and sustainability assessment:** Conducting energy audits, building performance evaluations and sustainability assessments to identify areas for improvement and optimise the energy efficiency and sustainability of buildings.
- ♦ **Sustainable building certification:** Providing consulting services for green building certification programmes to help building owners achieve and showcase their sustainability goals.
- ♦ **Green infrastructure & landscaping:** Designing and implementing green infrastructure solutions, such as rain gardens, permeable pavements and urban green spaces, enhancing the sustainability and resilience of buildings and their surroundings.
- ♦ **Education and training:** Offering educational and training programmes on sustainable building practices, energy efficiency and green technologies to raise awareness and build capacity in the construction industry.



Community discussions in a rural household. Photo credit: UNEP

4.1.6 Sustainable agricultural supply chains

Various participants within the agri-food system, including farmers, food processors, distributors, retailers, consumers and food waste managers, collectively contribute to establishing and maintaining a sustainable food system. Each actor within the value chain has a unique role in this endeavour (WWF, 2023a). Some of the business opportunities across the agricultural supply chain include:

- ♦ **Organic farming:** Organic produce demand is increasing globally, and African countries have great potential for organic farming due to abundant arable and fertile land. Businesses can establish organic farms, obtain organic certifications and supply organic fruits, vegetables, grains and other products to local and international markets.
- ♦ **Land restoration:** Reversing land degradation by leveraging sustainable agriculture and forestry value chains is a viable business opportunity that offers an alternative to deforestation-linked agricultural expansion, creates jobs, fights climate change and desertification, and restores lost biodiversity and ecosystems.
- ♦ **Climate smart agriculture and farming inputs:** There is a demand for high-quality seeds, organic or biofertilisers, biopesticides, efficient irrigation systems and other agricultural inputs. Business opportunities exist in producing, distributing and marketing these inputs. Developing climate-smart agricultural practices, such as conservation agriculture, selling climate-resilient seeds and seedlings, agroforestry and providing training services on sustainable farming practices are business opportunities that can be harnessed and scaled in Africa.
- ♦ **Farming technology and equipment:** The adoption of modern agricultural technologies and machinery is rising. Businesses can offer innovative tools, equipment and technology solutions to improve farming efficiency and productivity.
- ♦ **Local and urban farming:** Developing urban farming initiatives, rooftop gardens and hydroponic systems to grow fresh produce in urban areas. Opportunities include setting up community gardens, vertical farming units and microgreens production, providing local and fresh food options while reducing the environmental impact of long-distance transportation.
- ♦ **Agribusiness consulting and advisory services:** Many farmers require professional advice and guidance on farm management practices, market trends, financial management and sustainability. Consulting firms can provide valuable services to farmers and agribusinesses.
- ♦ **Farm-to-market logistics and direct market linkages:** Efficient transportation, storage and handling of agricultural products are critical for minimising post-harvest losses. Business opportunities exist in establishing energy-efficient cold chains, warehousing facilities and transportation networks. Establishing direct linkages between farmers and consumers, such as through farmers' markets, community-supported agriculture (CSA) programmes and online platforms, can create business opportunities that facilitate the sale of fresh, locally produced food directly to consumers.

BOX 5:

**Example of a land restoration venture
(Iyer et al., 2021)**

Tilaa: Land Restoration in Northern Ghana

After seeing his homeland in northern Ghana slowly succumb to the encroaching Sahara Desert, Sadik Ibn Abdulai, established Tilaa, a company that collaborates with farmers to cultivate cashews, produce animal feed, honey and other bee products.

Through the strategic integration of beehives and cashew trees into existing croplands, Ibn Abdulai and his team are actively assisting a network of over 500 women farmers in adopting land-use practices that are environmentally sustainable. This approach also helps to protect their land from the threat of desertification.

Cashew trees, renowned for their resilience in dry and sandy soils, can withstand drought and high temperatures. These trees are, therefore, an excellent fit for the climatic conditions prevalent in northern Ghana, where Tilaa operates. By promoting the cultivation of cashew trees alongside other agricultural activities, Tilaa empowers these women farmers and contributes to climate-friendly practices that contribute to the long-term health and productivity of the land. Bees pollinate the surrounding area's cashew trees and other crops, increasing yields. In turn, the trees produce fruit, improve the soil quality and curb erosion through their extensive root systems. A significant achievement is that women are now engaged in tree cultivation, a source of income. They sell their produce, such as cashews, honey and other bee products, to Tilaa, which processes, packages and sells them domestically and internationally.

Since its establishment in 2015, Tilaa has provided more than 120,000 cashew saplings, restoring 300 hectares of degraded land. The women within the company's network have reported a fourfold increase in disposable incomes, from \$500 to \$2,000. This positive change has eliminated their need to resort to unsustainable practices like illegal tree cutting to make ends meet. Furthermore, Tilaa ensures that its farmers are automatically enrolled in Ghana's National Health Insurance Scheme, providing them with access to healthcare. Additionally, the company establishes a revolving loan fund to support farmers in pursuing other economic ventures, fostering further growth and economic stability.



Sadik, founder Tilaa, standing alongside the concrete beehives. Photo credit: <https://becauseinternational.org/stories/tilaa-ghana-because-accelerator>

BOX 6:

Deploying precision agriculture in Africa (UNEP, 2018b; UNDP, 2021)

Wefarm is an innovative and accessible platform that facilitates information sharing among farmers through text messages, eliminating the need for an Internet connection or leaving their farms. This free peer-to-peer service enables farmers to ask questions and receive responses from fellow farmers worldwide in minutes. By leveraging the collective knowledge and experiences of the farming community, Wefarm empowers farmers to enhance their crop yields, address the challenges posed by climate change, access quality seeds, and gain valuable pricing insights. Additionally, the platform is also accessible online. Over 660,000 farmers in Kenya and Uganda benefit from this service, and there are plans for expansion to other African countries.

Another success story is Cowtribe, a pioneering startup that leverages mobile technology to provide livestock farmers in Ghana with essential animal health services. Cowtribe's subscriber platform connects farmers with veterinary services, offering features like vaccination reminders, outbreak alerts, and guidance on animal husbandry management. In cases where a farmer requires veterinary assistance, Cowtribe diligently coordinates the operation to ensure a qualified veterinarian delivers the necessary treatment, even in remote "last mile" farms that are typically hard to reach. Using mobile technology, Cowtribe improves access to crucial veterinary care, supporting livestock health and well-being and ultimately empowering Ghana's farmers.

AfriScout, also known as the "shepherd's eye in the sky," is a mobile service offered by Project Concern International. It is a valuable resource for pastoralists in Kenya, Ethiopia, and Tanzania by providing real-time information on water and vegetation conditions through local grazing maps. By leveraging satellite images, the AfriScout app enables pastoralists to locate suitable grazing areas more easily, ultimately reducing livestock mortality risk. This innovative tool empowers pastoral communities by equipping them with crucial data collected from satellite imagery, ensuring better livestock management and mitigating the challenges of finding adequate grazing resources.

PlantVillage is a digital platform for farms to obtain pest and plant disease management advice. All farmers need to do is snap a picture of their crops, upload them and await diagnosis from a plant disease expert. The platform has aggregated over 50,000 infected plant images and has since become the world's largest open-access library of crop health knowledge. Moreover, the application has forum rooms to facilitate peer-to-peer discussion and information sharing. On top of the digital platform, PlantVillage has developed a digital assistant application called Nuru. Farmers can upload a picture of an infested plant leaf to Nuru and receive an AI identification of the suspected disease. The application can diagnose cassava, maize, potato and wheat diseases without an Internet connection. It runs machine learning models using the smartphone's processing power and an offline database of images collected and annotated by crop disease professionals. All farmers need to input is crop type, location and planting date. The application is proven to be twice as accurate as extension workers. More than 18,000 plant disease reports have been generated on the platform by users across 40 nations. The application has also been integrated with the West African viral epidemiology platform to extend services to West and Central Africa. The aim is to use it to combat cassava brown streak disease in that region.

- ♦ **Value-added processing and sustainable packaging:** Adding value to agricultural products through sustainable processing techniques can enhance profitability. Opportunities exist in food processing, packaging and value-added product development for Africa's numerous commodities that would otherwise be exported, processed outside the continent's shores and imported at higher prices. In addition, there are business opportunities in sustainable packaging solutions, such as biodegradable or compostable packaging materials, to reduce agricultural products' environmental impact and carbon footprint.
- ♦ **Agri-marketing and distribution:** Connecting farmers with domestic and international markets is essential for agricultural trade. Businesses can focus on marketing, branding and distribution services to bridge the gap between producers and consumers.
- ♦ **Agricultural financing and insurance:** Access to affordable financing and insurance services is crucial for farmers and agribusinesses. Companies can provide tailored financial products, insurance coverage and risk management services specific to the agricultural sector while leveraging digitisation opportunities to bridge the gap.
- ♦ **Agricultural technology solutions:** Developing and implementing innovative technologies, such as precision agriculture, smart farming systems and remote sensing, can optimise resource utilisation and improve productivity. Opportunities exist for technology providers and developers.
- ♦ **Traceability and certification systems:** With increasing consumer demand for transparency and ethical sourcing, businesses can develop traceability systems and certification programmes. These systems enable farmers to demonstrate compliance with sustainability standards, ensuring consumers that the agricultural products they purchase are sustainably produced.
- ♦ **Sustainable livestock farming:** Promoting sustainable livestock farming practices, including rotational grazing, feed optimisation and manure management, can reduce the environmental impact of the livestock sector. Businesses can offer sustainable animal feed, breeding services and livestock management solutions.
- ♦ **Agri-tourism and farm experiences:** There is a growing interest in agri-tourism, where visitors can experience farm life, participate in farm activities and purchase farm-fresh products. Opportunities exist in establishing farm stays, farm tours and agri-tourism destinations.
- ♦ **Agricultural waste management:** Developing innovative solutions for managing agricultural waste, such as composting facilities and biogas production, provides both environmental and economic benefits. Businesses can explore opportunities to turn agricultural waste into valuable products, such as organic fertilisers and renewable energy.

4.2 Sustainable resource management

Sustainable resource management is essential to ensure the responsible use and conservation of nature and its resources by employing practices that balance economic, social, and environmental considerations. Businesses can leverage nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future. Some of the subsectors critical for the implementation of sustainable resource management in Africa are discussed in this section.

4.2.1 Sustainable blue economy

The sustainable blue economy is a model of economic growth and development that strives to balance the economic benefits derived from oceans, seas and coasts with the preservation of environmental and social sustainability (UNECA, 2016) (Figure 4.6). This concept emerged during the 1992 Earth Summit in Rio de Janeiro, Brazil and aims to ensure that economic endeavours associated with marine environments, such as fishing, shipping, tourism, marine biotechnology, wind power, underwater mining and others, are conducted in a manner that not only fosters economic expansion and job creation but also conserves and enhances the aquatic ecosystems on which these activities rely (AUIBAR, 2019).

The blue economy presents many opportunities today, particularly for Africa, since the continent is endowed with significant aquatic and maritime resources. Africa spans an approximate area of 30.37 million km² and boasts a coastline of around 30,500 km, which is relatively uninterrupted and vastly underexploited (Orme, 2014; Nicol, 2023). A well-harnessed blue economy can drive income generation and prosperity for Africans, underpinning diverse economic sectors, stimulating job creation, supporting local



Photo credit: SWITCH Africa Green

livelihoods and ensuring food security. Table 4.1 lists ecosystem services this economy can provide on the continent.

However, to fully unlock the potential benefits of the blue economy, it is crucial to conduct activities sustainably, carefully balancing economic growth with environmental preservation. Challenges such as local overfishing, habitat destruction and pollution highlight the need for meticulous management and oversight (UNECA, 2016). Therefore, a sustainable blue economy necessitates an integrated and holistic approach that recognises the value of productive freshwater and ocean ecosystems and acknowledges their vital role in supporting aquatic and maritime-based economies.

African governments have recognised these challenges and are taking action at national, regional and pan-African levels to promote sustainable development through the blue economy. The concept of the blue economy has gained momentum as a strategic priority for African countries, with support from international organisations and regional institutions, such as the African Union, in establishing robust policy frameworks, developing supportive infrastructure and

Blue economy



Figure 4.6: Representation of the concept of the blue economy and its dimensions (UNECA, 2016)

fostering innovative technologies. Moreover, the private sector plays a crucial role in shaping this sustainable economy and is actively designing strategies to reap significant benefits from its implementation.

STATES OF SELECT SECTOR ACTIVITIES RELATED TO THE BLUE ECONOMY IN AFRICA

With its abundant aquatic and marine resources, Africa offers significant potential for growth in the blue economy via several sectors contributing to sustainable economic activity within marine environments. The Indian Ocean, the Gulf of Guinea and the coastal waters of East Africa are among the world's most abundant tuna fishing grounds; therefore, the potential for aquaculture in Africa is considerable (Ababouch Lahsen, 2015).

In 2018, in its report on the Africa Blue Economy Strategy, the AU showcased the importance of the size of this economy on the continent. It is estimated that African blue economy sectors generated as much as \$296 billion and 49 million jobs in 2018. It anticipates that the value will increase to \$576 billion with a corresponding increase of 78 million employments by 2063, corresponding to approximately 5 per cent of the active African population in 2063.

Although the economy is set to play a significant role in future growth on the continent, it faces diverging potential, size, sustainability issues, and geo-localisation that can be captured through a brief sectorial analysis. Figure 4.7 displays the significance of these sectors.



Photo credit: SWITCH Africa Green

Table 4.1: Sectors included in the blue economy and areas for improvement in Africa (ADB, 2022)

FOCUS AREA	MARKET SEGMENT/SECTOR	OBJECTIVE
Ecosystem and natural resource management	Fishing	Sustainably manage, conserve, and restore the health and resilience of coastal, marine and river ecosystems.
	Fisheries	Improve environmental sustainability and socioeconomic benefits derived from seafood value chains.
	Seafood processing and distribution	
	Aquaculture and mariculture	
	Algaculture	
Pollution control	Solid waste management	Reduce marine debris and its impacts on marine life, coastal livelihoods and human health.
	Resource efficiency and circular economy	
	Non-point source pollution management	Reduce coastal and marine environment pollution (nutrients, sediments, chemicals).
	Wastewater management	Reduce volume and damage to the coastal and marine environment from wastewater pollution.
Sustainable development and infrastructure	Coastal and marine tourism	Improve coastal and marine tourism's environmental, economic, social and cultural sustainability.
	Coastal resilience	Enhance the resilience of coastal communities to damage from natural hazards and climate change impacts.
	Community infrastructure	Improve coastal community infrastructure to enhance amenity, recreational and cultural values.
	Green ports and shipping	Increase sustainability of maritime infrastructure and transport.
	Offshore wind renewable energy	Increase marine renewable power to Asian Development Bank developing member countries, communities and enterprises.
	Marine tidal, wave and geothermal renewable energy	

Africa's Blue economy

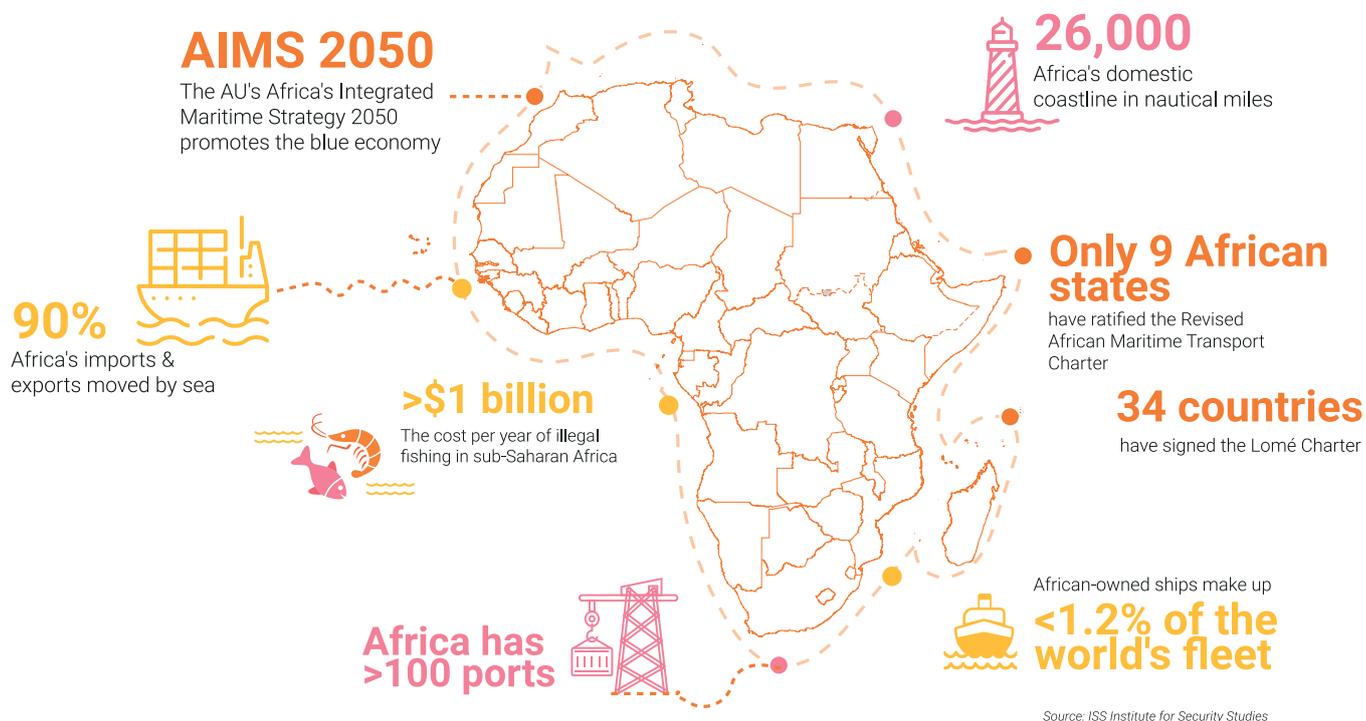


Figure 4.7: Representation of the volume and value of Africa's blue economy (ISS, 2017)

FISHERIES AND AQUACULTURE

Fisheries and aquaculture are important sectors of the blue economy and contribute significantly to Africa's income, employment and food security. Fisheries involve capturing wild fish and seafood from natural water bodies, such as oceans, seas, lakes and rivers. In 2018, the fisheries sector employed approximately 13 million people, and the total gross value-added of African fisheries was estimated at \$21 billion, equivalent to 1.26 per cent of the continent's GDP (\$1.9 trillion). However, economic contributions vary significantly across countries (AU-IBAR, 2019). Challenges such as overfishing, overcapacity and governance issues currently hinder the growth of the fisheries sector, making it unlikely to see output growth until 2063.

On the other hand, aquaculture is a rapidly growing sector within the blue economy. It involves fish farming, including the breeding, rearing and harvesting fish, shellfish and

aquatic plants in controlled environments. Africa's aquaculture industry has experienced impressive growth rates since 2006, particularly in Egypt and Nigeria. Aquaculture is a relatively new sector on the continent, so it does not face immediate sustainability issues. However, its growth remains limited to a few countries, indicating untapped potential across much of Africa. With the increasing demand for fish, aquaculture is expected to play an increasingly crucial role in bridging the gap between supply and demand (AU-IBAR, 2019). Figure 4.8 shows the total fishery production in African countries in 2021.

ENERGY GENERATION

The energy generation sector may be the highest prospect of economic growth in the African blue economy. Harnessing ocean energy includes many sources, such as tidal energy, wave energy, offshore wind energy, marine current energy, marine biomass and more innovative energy sources. Despite the limited access to ocean renewable energy, the

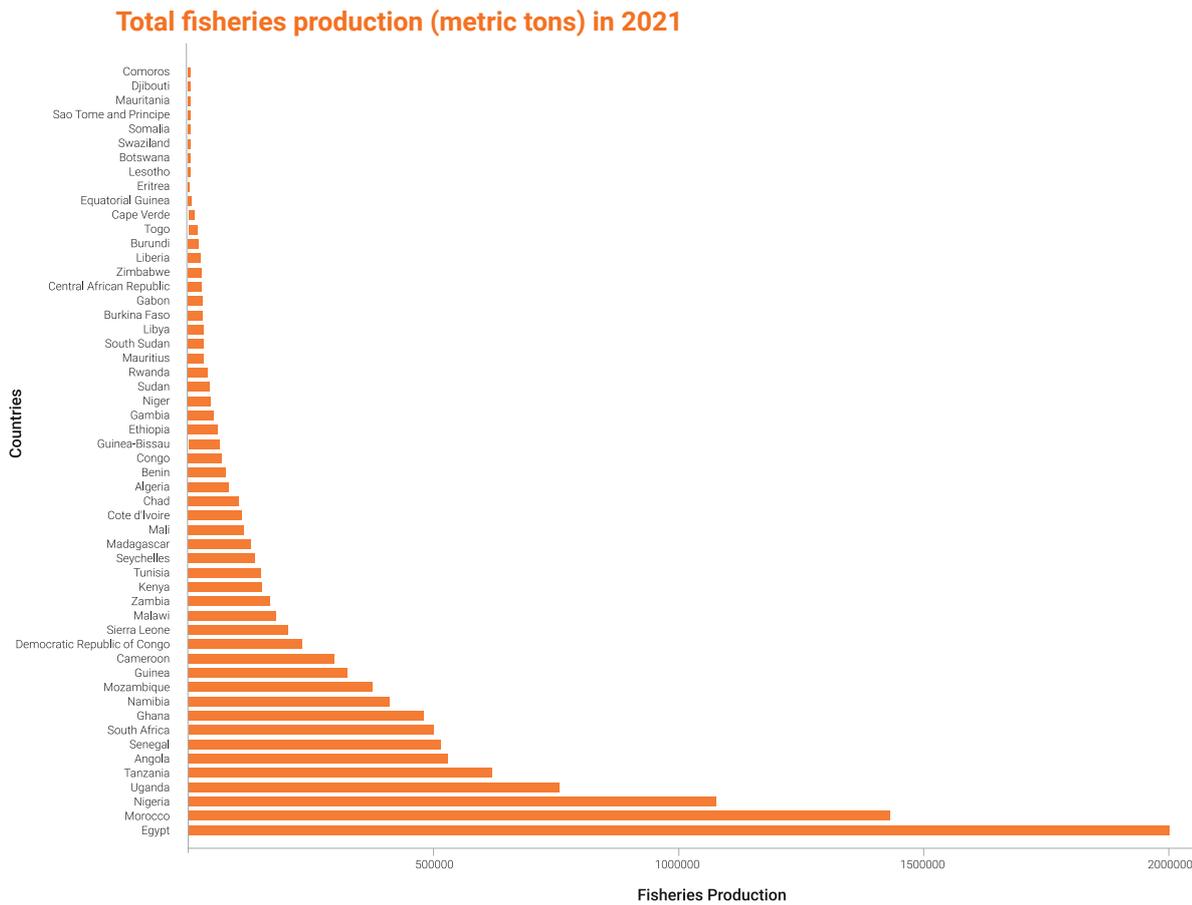


Figure 4.8: Total fishery production in 2021 per African countries (WB, 2022b)

International Energy Agency (IEA) estimates that ocean renewable energy has a power output potential equivalent of between 100 to 400 per cent of the global current energy demand (UNECA, 2016). It can therefore be a significant contributor to Africa's low-carbon transition. Figure 4.9 shows the potential energy generation sources within the blue economy.

Despite technical and policy challenges, several African countries have started incorporating blue energy into their energy mix. Ghana is exploring the exploitation of wave energy with its Seabased project with a 100 MW potential (Seabased, 2019), and Mauritius is investing in Floating Solar Photovoltaics which will eventually contribute an additional 30MW to electricity generation (Africa Energy Portal, 2023). There is also a potential for deep-seabed and seawater mining, which could add significant value to the economy provided sufficient investments are directed toward exploiting these renewable natural resources (AU-IBAR, 2019).

On the other hand, the ocean energy sector includes traditional offshore resources like oil and gas, with major producing countries, such as Angola, Nigeria and South Africa, set to experience growth in revenue of 75 per cent by 2063. With increased investment in research and development, the sector could significantly contribute to meeting Africa's rising energy demands while promoting sustainability (AU-IBAR, 2019). Conditional upon proper carbon capture storage (CCS) measures and the implementation of strict regulations against oil spillage, these energy sources can also be paramount for economic growth with limited environmental harm (Biniek et al., 2022).

PORT DEVELOPMENT AND SHIPPING SECTOR

Although marine transport accounted for 70 per cent of global trade by value and 80 per cent by volume worldwide, Africa contributed a modest 3 per cent to global trade volumes in 2017. Nevertheless, African ports can modernise and expand rapidly. Creating sub-regional maritime shipping companies and developing efficient

BOX 7:**Blue economy approach in the fisheries sector
(UNEP, 2015b; UNECA, 2016)****TRY Oyster Women's Community Association in The Gambia**

The TRY Oyster Women's Community Association in The Gambia provides a compelling example of the effective execution of a blue economy approach in the fishery sector via the engagement of inter-ministerial and environmentalist actors. Initiated in 2007 with 40 oyster harvesters from a single community, TRY has now grown into an organised group of more than 500 members across 15 communities in the Greater Banjul area.

According to UNEP, TRY is the first women's association in Sub-Saharan Africa to gain exclusive usage rights to a fishery by a national government, granted under the Cockle and Oyster Fishery Co-Management Plan for the Tanbi Wetlands National Park in 2013 (UNEP, 2015b). This accomplishment is rooted in a participatory, ecosystem-based process reflecting principles of environmental integrity, good governance and effective inter-ministerial coordination. Indeed, the United Nations Economic Commission for Africa (UNECA) shows that TRY's work expands beyond just environmental management by demonstrating critical aspects of the blue economy approach, including social inclusiveness, capacity building, job creation and the sustainable guidance of small-scale operators (UNECA, 2016).

More specifically, the Association encourages cooperative organisation among its members, promoting the sharing of sustainable oyster harvesting techniques and small-scale enterprise development training. It has led to significant social inclusion of oyster women into the formal economy as they faced unfair economic, social and environmental conditions. As this cooperative model has improved working and sanitary conditions, facilitated the coordination of oyster processing, packaging and marketing, and boosted the price per kilogram for oysters, it led to the economic upliftment of the oyster women and their communities.

In addition to direct economic gains, TRY's initiatives positioned itself in a sustainable blue economy with local environmental successes, such as the reforestation of 33.5 ha of local mangroves and the community's education about environmentally responsible resource management (UNECA, 2016).

The key to TRY's success is its strong commitment to a participatory process, broad stakeholder consultation and adaptive management based on local ecological and scientific knowledge. It was made possible via inter-ministerial collaboration between multiple Gambian departments, which has been integral in effectively managing different aspects of the Tanbi Wetlands National Park. TRY serves as a testament to the powerful synergy of social inclusion, sustainable management and inter-agency coordination in promoting the principles of the Green and Blue Economy.

Powering the Blue economy

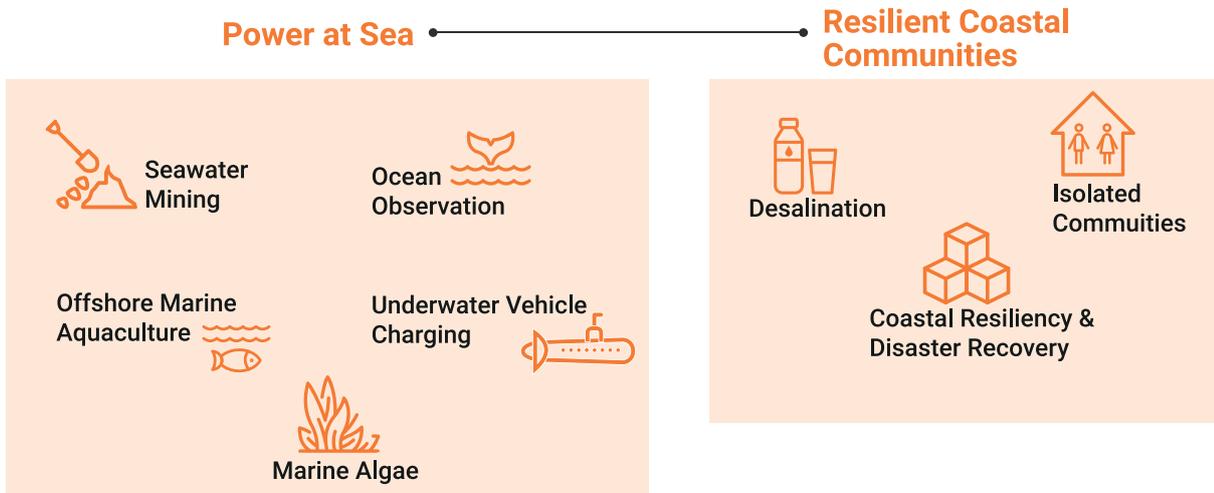


Figure 4.9: Potential sources of sustainable energy in the Blue Economy (LiVecchi et al., 2019)

transport corridors could further boost Africa's role in international shipping (AU-IBAR, 2019).

Furthermore, the AU estimates that the sector's growth is poised to continue over the following decades. The value added of the African shipping sector was approximately \$22 billion in 2018, projected to grow to \$30 billion by 2030 and \$48 billion by 2063. Notably, this growth will depend on strategic investments in port infrastructure, shipping technology, and maritime education and training (AU-IBAR, 2019).

COASTAL RESILIENCE

Enhancing coastal resilience is crucial for a sustainable blue economy. Climate change impacts pose significant risks to coastal communities and infrastructure. By investing in climate-resilient infrastructure, promoting conservation and supporting the livelihoods of coastal communities, Africa can protect its valuable coastal and marine resources (AU-IBAR, 2019).

Significantly, coastal resilience also includes the development of green infrastructure, such as mangrove plantations and coral reef restoration, which protect the coastlines, and support biodiversity and carbon sequestration. With adequate funding and strategic planning,

enhancing coastal resilience can ensure the sustainable growth of Africa's Blue economy (AU-IBAR, 2019).

SUSTAINABILITY CONCERNS REGARDING THE AFRICAN BLUE ECONOMY

Africa's ambitious pursuit of benefits from a sustainable blue economy faces numerous challenges related to governance, environmental conservation, social inclusion and industrial development. Regarding the governance and environmental challenges, the AU reports an escalating menace of illegal fishing, which leads to an estimated \$10 billion loss in catch annually and poses a substantial threat to the economic vitality of affected nations, particularly those in the Gulf of Guinea and Southwest Indian Ocean (AU-IBAR, 2019). The FAO reports a significant decline in the share of fish stocks within biologically sustainable levels, from 90 per cent in 1974 to 66 per cent in 2017, due mainly to illegal fishing. The potential economic gain from restoring fish stocks and reducing fishing capacity to an optimal level is \$50 billion per year. There is also the constant threat of mangrove deforestation. Inadequate data, poorly designed regulations and insufficient enforcement are primarily to blame for these fish stock challenges (WB, 2022b).

Compounded with these challenges are overall institutional and governance issues that hinder policy formulation and implementation related to the blue economy. For instance, many environmental laws and policies stem from an era when blue economy and climate change considerations were absent from the development agenda (AU-IBAR, 2019).

In the Anthropocene, these laws are urgent as the effects of environmental pollution are aggravated by climate change and ocean acidification that are wreaking havoc on African livelihoods, particularly those dependent on ocean and freshwater resources. Worsening floods, droughts, erratic weather and global warming, have spurred internal migrations and conflicts and threatened critical infrastructure. Reports show that adaptation measures are needed to cope with these projected impacts, even at the 1.5- 2°C warming threshold beyond which Africa's capacity to cope would be severely curtailed (UNECA, 2016).

As regards the social obstacles on the continent, there is a further need to include all layers of its population in its economy to leverage the blue economy's potential. This issue particularly relates to the inclusion of women (UNECA, 2016). Women have less access to natural resources, property rights, and advantages than men, although they manage home responsibilities, food security, and child-rearing. Their dominance in the blue economy is in small-scale fisheries and post-harvest activities, such as processing and marketing in industrial fisheries. For instance, women market up to 80 per cent of the seafood in West Africa.

Similarly, including youths will be paramount for the sustainable blue economy owing to their considerable contribution to the total population and their unwillingness to pursue their lives in rural areas where blue economy resources are often left unproductive. Furthermore, there is an exclusion of small local communities, which are frequently small producers with

limited technology and whose subsistence lies around the benefit of the blue economy because of their inability to access formal markets (UNECA, 2016).

Africa faces significant challenges regarding industrial development, such as the limited capacity of small- and medium-sized enterprises (SMEs) to scale up circular economy projects, the lack of industrial infrastructure for certain circular economy activities in the blue economy sectors and the absence of the supply chains required for developing a market based on circular products (CPMR and MedWaves, 2022). Despite the expectation of fast growth in this sector, the African blue economy attracts less investment than the blue economy of other regions. For example, only Small Island Developing States (SIDS) have substantially integrated the concept of sustainable blue investment in their private sector. These countries are Cabo Verde, Comoros, Guinea Bissau, Mauritius, Sao Tome and Principe, and Seychelles. The significant exploit from some of these countries has been their ability to brand themselves as a holiday destination for high-end beach-resort tourists, thereby allowing the private sector to access investment for activities related to the blue economy (UNECA, 2014). On average, this status is different in other African countries.

Finally, more skills and awareness are required for circular economy development, especially in the blue economy. The circular economy is an economic system that aims to design out pollution and waste, keep materials and products in use, and regenerate natural systems. Unlike a traditional linear economy which operates on a 'take-make-waste' model, a circular economy focuses on a 'reduce, reuse, recycle' model. The objective is to prolong resources utilisation to their fullest extent, extracting optimal value during their active lifespan and subsequently recovering and regenerating materials at the end of their useful life. Often, circular economy in the blue

BOX 8:

**Example of circularity in the blue economy
(CPMR and MedWaves, 2022)**

Case of Private SME Success in the Sustainable Blue Economy: SEA SKIN

The company SEA SKIN, based in Morocco, developed an ingenious business model that converts fish skin into leather products. Their business is part of a circular economy where waste from fisheries and aquaculture production and activities are reused for profit. They create a wide range of goods, such as handbags and shoes made from fish skin, integrating fishermen's wives in precarious situations.

Most importantly, their actions are amid everyday economic activities since raw materials, such as raw fish skin, are collected from restaurants and fillet plants. These materials are then handed to the women of the community, who remove any lingering remnants of meat and peel the skin before rinsing it clean. The skin is then tanned using products made from vegetables, after which it is flattened and allowed to dry. Once dry, it is made into premium leather goods attracting international customers.



Photo credit: SWITCH Africa Green

economy sectors is perceived as an obligation dictated by environmental regulations rather than a business opportunity. This issue applies to SMEs and large companies (CPMR and MedWaves, 2022).

INITIATIVES TO SUPPORT THE BLUE ECONOMY

In response to these new challenges, African governments have changed their vision of the required actions in the blue economy. Previously, their focus was primarily on increasing the fisheries and offshore oil output. Although most actions on the continent still pertain to output from fisheries, governments are now engaged in more sustainable practices, such as:

- ◆ Halting harmful subsidies in the fishery sector, which directly affect overfishing in underperforming companies (Ababouch Lahsen, 2015),
- ◆ Increasing the use of fiscal instruments to promote a circular-economy approach to improve infrastructure and services in solid waste management, and
- ◆ Strengthening plastic waste monitoring to prevent and proactively remove pollution (Christie et al., 2013).

The most noticeable public actions in the blue economy have been performed at the regional level. Sustainable use of resources in this economy requires cooperative efforts by countries. Hence, several international institutions serve as platforms for furthering sustainability issues in the blue economy.

At the forefront, international commitments such as SDG 14 focusing on the conservation and sustainable use of the oceans, seas and marine resources, underpin the adoption of sustainable blue practices on the continent in political circles. This global goal, to which most African nations subscribe, underscores the international consensus around the vital importance of sustainable

ocean development and the blue economy's central role in achieving it.

In Africa, the AU is a powerful platform for regional support of policy change. In 2014, African ministers adopted a strategy for reform and a policy framework for fisheries and aquaculture. This included improving governance and institutional arrangements, developing sustainable small-scale fisheries, promoting responsible and equitable fish trade and marketing, and developing coordinated mechanisms among Regional Economic Communities (RECs). The AU's 2050 Africa's Integrated Maritime Strategy mentions fisheries challenges. Hence, in cooperation with FAO, initiatives such as the 'Blue Growth Initiative (BGI)', New Partnership for Africa's Development (NEPAD) and other African organisations, the AU advocates this policy framework and reform plan.

Furthermore, FAO, UNDP, World Bank, AfDB, EU and bilateral contributors run many initiatives to support local stakeholders to prosper in the domain of a sustainable blue economy (Ababouch Lahsen, 2015). These institutions have pushed the realisation of numerous projects on the continent by supporting improved technologies, including feed technologies through Public-Private Partnerships, developing efficient resource-driven farming systems, and introducing new strains and breeds for production. Notable success stories, such as Collaborative Actions for Sustainable Tourism (COAST) and TRY Oyster Women's Community Association in The Gambia, have shown that sustainable practices in the blue economy can yield inclusive benefits in the present and the long run.

PRIVATE SECTOR ROLE IN THE AFRICAN SUSTAINABLE BLUE ECONOMY

The sustainable blue economy in Africa presents many business opportunities for private companies, spanning sectors such as fisheries, aquaculture, tourism, transport,

energy, biotechnology and waste management. With its diverse marine ecosystems, Africa's blue economy is yet to realise its full potential, particularly as it offers unique prospects for catalysing economic growth, fostering social inclusion and promoting environmental sustainability.

Africa's coastal and marine resources are fertile ground for a wide range of lucrative business opportunities. The fisheries sector, for instance, which employs millions of Africans, presents a potential for improved practices, better management and value-added processing. From sustainably harvesting fish species to integrating more efficient, eco-friendly technologies for fishing, there is a broad scope for private enterprises to drive growth and profitability while promoting sustainability. Simultaneously, the aquaculture sector in Africa is relatively underdeveloped, providing a promising avenue for businesses. Aquaculture meets the increasing demand for fish and seafood and helps reduce pressure on wild fisheries. The critical challenge for the private actor is the imported technology that is already successful in other places in the world. Technologies such as aquaponics, integrated multi-trophic aquaculture and recirculating aquaculture systems (RAS) are suitable for many African SMEs. Hence, businesses specialising in these technologies or offering consultancy services in sustainable aquaculture can find numerous opportunities in this nascent market (CPMR and MedWaves, 2022).

With abundant and diverse marine life, picturesque beaches and a rich cultural heritage, Africa is an attractive destination for ecotourism. The growing global awareness of environmental conservation has led to an increase in ecotourism. Private companies can offer innovative solutions, such as sustainable travel packages, eco-lodges, conservation projects and other eco-friendly tourism activities in this area. Countries with large coastal areas

should aim to attain tourist levels as high as those of the SIDS while avoiding pollution threats that exist in this sector (UNECA, 2014).

The issue of ocean pollution, especially plastic waste, also offers business opportunities in waste management and recycling. Private enterprises can develop and deploy innovative waste collection, processing and recycling solutions, contributing to cleaner oceans while reaping economic benefits. Although it does not refer to plastic waste, SEA SKIN, an SME in Morocco, offers a successful business model that utilises waste from the ocean to generate profits (see Box 8).

Transport and shipping represent critical sectors within the blue economy, and Africa, with its strategic location, extensive coastline and numerous ports, is well-positioned to capitalise on these. Private companies can take advantage of opportunities to develop sustainable shipping solutions, optimise port operations and provide services that decrease the carbon footprint of maritime transport. There is a considerable need to transform the current infrastructure on the continent into eco-friendly assets as more and more countries tax carbon emissions.

Finally, marine biotechnology is an emerging sector for private companies in Africa, harnessing the potential of marine organisms for commercial applications, such as pharmaceuticals, cosmetics and food additives. Companies specialising in biotechnology can explore this relatively untapped market, capitalising on Africa's rich marine biodiversity. For instance, although they are somewhat left out of African diets and traditional medicine, algae contain high levels of calcium, iron, vitamins A, C and K, potassium, selenium and magnesium. Businesses that can market these goods on the continent have large potential profits ahead of them.

BOX 9:

Collaborative Actions for Sustainable Tourism (COAST) project (Manning, 2010; UNIDO, 2023; WB, 2022b)

As coastal tourism threatens the coastal and marine ecosystems through pollution, contamination, and degradation, several international organisations and governments of countries joined forces to provide solutions based on a sustainable blue economy in the tourism sector in Africa. This joint effort is the Collaborative Actions for Sustainable Tourism (COAST) Project. It has been implemented in nine sub-Saharan African countries within four of Africa's five Large Marine Ecosystems (LMEs). They are Cameroon, Gambia, Ghana, Nigeria, Senegal, Kenya, Tanzania, Mozambique, and Seychelles, to mitigate the environmental threats posed by coastal tourism activities.

The COAST Project seeks to demonstrate best practices and strategies to reduce the degradation of marine and coastal environments of transboundary significance and enhance sustainable tourism practices. This goal is achieved through four primary objectives as described in the brochure of the project provided by (UNIDO, 2023.):

- *Establishing Best Available Practices and Technologies (BAPs and BATs) to reduce contaminants and promote sustainable tourism investments. This includes implementing Environmental Management Systems, and eco-certification schemes, developing ecotourism initiatives to alleviate poverty and support biodiversity conservation, and improving reef recreation management.*
- *Developing mechanisms for sustainable governance and management that reduce the degradation of coastal ecosystems caused by land-based tourism pollution.*
- *Delivering training and capacity support to promote a sustainable reduction in coastal ecosystem degradation within the tourism sector.*
- *Developing information capture, processing, and management mechanisms to promote information dissemination and learning.*

Each country involved in the COAST Project has implemented a demonstration project. For instance, Kenya demonstrates ecotourism, environmental management, and reef and marine recreation management. Training and capacity-building workshops for Demo Site Management Committee members at the COAST Project Demo Site are supporting project implementation. Specifically, ecotourism community groups are meant to receive 80 beehives from the members. The project is set to repair six community canoes and builds a 100-meter mangrove boardwalk (nature trail) at Dabaso - Mida Creek to boost ecotourism. The project also combines ecotourism with green methods. Hotels will use the United Nations Industrial Development Organization (UNIDO) Transfer of Environmentally Sound Technology (TEST) methodology to implement wastewater management, solar energy, water heating and environmental management systems (WB, 2022b).

Other countries involved in the project engage in similar demonstration projects, each focusing on different aspects of sustainable tourism, including community-based ecotourism, environmental management systems, cultural heritage and coastal tourism planning and management (Manning, 2010).

These collective efforts contribute to a sustainable blue economy by ensuring responsible tourism practices, contributing to GDP, offering alternative livelihoods, and protecting coastal and marine ecosystems.

4.2.2 Sustainable Tourism

Sustainable tourism is defined by the United Nations World Tourism Organization (UNWTO) as tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities. Ecotourism is a niche segment of tourism in natural areas. Sustainable tourism and ecotourism encompass several common principles, making them akin in nature. However, sustainable tourism has a broader scope. Ecotourism encompasses various forms of tourism that possess the following characteristics (UNWTO, 2023):

- ◊ All nature-based tourism activities, where the primary motivation of tourists is to observe and appreciate nature and the traditional cultures found in natural areas.
- ◊ Incorporates educational and interpretive elements to enhance visitors' understanding and appreciation of the environment.
- ◊ Typically organised by specialised tour operators for small groups, although it may not be exclusively limited to this. Local, small-scale businesses often serve as service providers at the destinations.
- ◊ Strives to minimise negative impacts on the natural and socio-cultural environment.
- ◊ Contributes to the preservation of natural areas that serve as ecotourism attractions by:
 - ◊ Generating economic benefits for local communities, organisations and authorities responsible for managing natural areas with conservation objectives.
 - ◊ Creating alternative employment and income opportunities for local communities.
 - ◊ Raising awareness among locals and tourists about the importance of conserving natural and cultural assets.



Photo credit: SWITCH Africa Green

MARINE TOURISM

Marine and coastal tourism presents vast opportunities for sustainable development in Africa. This sector contributed \$80 billion to the economy in 2018, approximately 3.4 per cent of the continent's GDP (WB, 2022b). It was estimated to provide 24 million jobs in Africa and is growing at an annual rate of 5.6 per cent, surpassing the global average in 2018. With continued development and investment, the marine tourism sector can potentially exceed \$100 billion in value added by 2030 while employing 28 million people (AU-IBAR, 2019). Incorporating sustainability principles into marine tourism builds the resilience required to create a robust and adaptable sector capable of weathering disruptions like pandemics, climate change impacts, and economic fluctuations. The tourism sector in Mauritius and Seychelles, which are primarily dependent on this sector, shows the ability of African countries to match standards in other parts of the world (Signe, 2018). For instance, Sustainable Island Mauritius (SIM) is a project funded by the European Union in the framework of the SWITCH Africa Green programme. The overall objective of SIM is to promote sustainable tourism in Mauritius by demonstrating and scaling up self-sustaining mechanisms for improving sustainability impacts along the value chain and improving awareness and the market of sustainable tourism products. The SIM project supports the local set of standards from the Mauritius Standards

Bureau, the MS 165 that has been developed in consultation with the tourism actors. The locally developed Standards are on the same line as any other internationally recognised standards by the Global Sustainable Tourism Council and thus benefit the same reputation and credibility to the international markets.

The growth potential of marine tourism is enormous, as many areas remain underexploited in most countries. Developing sustainable tourism infrastructure, promoting local culture and conserving marine biodiversity are all vital strategies to unlock this potential, and governments will have to encourage the necessary changes needed in this sector (Christie et al., 2013). Furthermore, ensuring the enforcement of regulations to keep beaches, coastal areas, and riverbeds clean and attractive will ensure this sector carries the African economy in the long run.

Sustainable tourism in Africa offers numerous and varied business opportunities that capitalise on the continent's rich biodiversity, natural landscapes and cultural heritage. In particular, some ecotourism business opportunities in Africa include:

- ♦ **Nature-based adventure tourism:** Africa offers exceptional opportunities for nature-based adventure activities, such as hiking, trekking, mountaineering, river rafting, kayaking and birdwatching. Developing adventure tourism services and infrastructure can attract adventure enthusiasts and nature lovers.
- ♦ **Marine and coastal tourism:** Africa's extensive coastline and marine ecosystems present prospects for activities such as snorkelling, scuba diving, dolphin and whale watching, beach resorts and marine conservation projects.
- ♦ **Sustainable accommodation:** Developing eco-friendly and sustainable accommodations, including eco-lodges, tented camps, nature retreats, peer-to-peer systems such as Airbnb, green hotel and conference facilities, provide environmentally conscious travellers unique experiences and support conservation efforts.
- ♦ **Cultural and heritage tourism:** Africa's rich cultural heritage and historical sites offer opportunities for cultural tourism initiatives, including visits to ancient ruins, traditional villages, archaeological sites and cultural festivals.
- ♦ **Sustainable agriculture and farm tourism:** Promoting sustainable farming practices, agri-tourism, organic farming and farm-to-table experiences can showcase Africa's agricultural diversity and support local farmers.
- ♦ **Eco-education and research tourism:** Establishing educational programmes, field research projects, and eco-training centres can attract students, researchers and individuals interested in environmental conservation and sustainability.
- ♦ **Wildlife safaris and conservation tourism:** Africa is renowned for its diverse wildlife and iconic species like elephants, lions and rhinos. Establishing wildlife safaris and conservation-focused tourism ventures can provide opportunities for guided wildlife tours, eco-lodges, wildlife reserves and wildlife rehabilitation centres.
- ♦ **Community-Based tourism:** Engaging local communities in ecotourism initiatives can create sustainable livelihoods and empower communities. Community-based tourism projects can involve homestays, cultural tours, craft workshops, cultural performances and food hubs.

BOX 10:

Example of African food tourism (AfDB, 2018a)

Yolélé Foods: Subsistence Becomes Cash for Smallholder Communities

For over 20 years, my work has focused on sharing West Africa's culinary culture with a broader world. Born and raised in Senegal, I have operated ground-breaking restaurants and published award-winning cookbooks in the United States, all predicated on framing West African ingredients and traditions for an engaged American audience. Now, I have started a business called Yolélé to reach an even wider range of people.

Yolélé is centred on fonio, an ancient West African grain. Fonio has been grown throughout most of West Africa for over five thousand years. It is drought resistant and thrives in poor sandy soil where most other crops cannot take hold. Fonio's nutritional and culinary profiles address current consumer preferences in Europe and North America. It is relatively high in protein, iron and fibre and strong in methionine and cysteine, two essential amino acids deficient in most grains.

Fonio is served like rice or quinoa but cooks in just 5 minutes, like couscous. It tastes like couscous too, only it is gluten-free. Fonio is easy to grow but very hard to turn into food. Yolélé is transforming the whole Fonio value chain with the goal of making the Sahel more agriculturally productive. We have initiated crop trials with West African agronomists to improve the grain's yield. Working with NGOs, they will then train and equip smallholders. Yolélé is planning to build the world's first industrial-scale fonio mill to reduce the cost of processed fonio to make it more accessible for West African consumers. The mill will also comply with international quality standards so that fonio can be a viable export crop. This activity is all geared towards making the nutritious native fonio grain more widely and frequently consumed in West Africa.

Yolélé has already started to build a market for Fonio in North America, spurred on by my recent TED Talk on Fonio's transformative potential, which has gained well over a million views as of this writing. The hope is to catalyse investment in industrial capacity by demonstrating commercial export potential.



Photo credit: Yolele foods | <https://yolele.com/>

- ◆ **Culinary tourism:** Establishing food and cultural tours that showcase local cuisine, organising food festivals, culinary events and retreats, and establishing cooking workshops and culinary schools.
- ◆ **Transportation services:** opportunities for eco-friendly transport operators (electric or hybrid fleet), specialised guided tour vehicle rental services, self-driving zero emission rental services, low-emission boat cruises, bicycle, solar-powered bike and e-bike rental services.



Travellers in South Sudan. Photo credit: UNEP

Photo credit: SWITCH Africa Green



BOX 11:

Ecotourism and sustainable transportation synergy (City of Cape Town, 2023)

In partnership with Cape Town Tourism, South African Rail Commuter Corporation, Passenger Rail Agency of South Africa (PRASA/Metrorail), Southern Africa Tourism Services Association and the private sector, the City of Cape Town has developed eco-friendly tourism products to ensure more sustainable and responsible transport and access. These include:

- **MyCiti Bus Service:** An Integrated Rapid Transport system that is being rolled out across the metropole to enable residents and visitors to use public transport.
- **City Maps and Pedestrian Signage:** The City has strategic programmes to promote pedestrian tourism routes by establishing dedicated pedestrian routes, improved signage, way-finding maps, street sign numbering and opening tourism offices throughout the Cape metropole.
- **Rail Services:** Metrorail has embarked on a service improvement plan, including new trains and a signalling system to reduce the reliance on private transport.
- **Southern Line Tourism Route:** The City of Cape Town, in partnership with PRASA and Cape Town Tourism, created a tourism rail route from the Cape Town Central Business District to Simon's Town. A hop-on, hop-off ticket was developed to ensure easier access along the route.
- **Green Cabs:** South Africa's first carbon-neutral transport service is based in Cape Town. The company's fleet of four taxis has been modified to run on a blend of liquefied petroleum gas (LPG) and biodiesel.
- **Cycle Routes:** The City of Cape has several cycling lanes and routes across the Peninsula, and more are to be developed in tandem with the rollout of the integrated rapid transport system. A private sector initiative, City Cycle Tours, offers eco-friendly cycling tours throughout the Cape Peninsula and Winelands.



4.3 Circular economy opportunities

A circular economy is an economic system designed to extract maximum use from resources and generate minimum waste for disposal.

4.3.1 Resource efficiency in manufacturing and sustainable business practices

The efficient use of resources within manufacturing, also called green manufacturing, involves renewing production processes and establishing environmentally friendly operations, resulting in fewer natural resources, reduction in pollution and waste, recycling and reuse of materials, and moderation of emissions. Resource-efficient manufacturing in Africa presents various business opportunities across different sectors. For instance, the waste and recycling market is projected to experience rapid global growth in the coming years due



Photo credit: UNEP

to technological advancements, evolving legislation and increased demand for higher volumes of recycled materials, especially from the global south. Africa is poised to contribute significantly to meeting this demand and the demand for other sustainable products and services. Businesses operating in Africa can leverage the global and local market for these products and Africa's abundant resources to support the achievement of the continent's SDGs and 2063 Agenda.



Photo credit: SWITCH Africa Green

4.3.2 Plastics

Over the past few decades, there has been a significant surge in global plastic production and consumption. From 1950 to 2015, the production of plastics worldwide increased nearly 200-fold, reaching a staggering 381 Mt per year (Ritchie and Roser 2022). This trend, however, is relatively less pronounced in African countries, with per capita plastic consumption remaining relatively low. Nevertheless, projections indicate that countries such as Egypt, Nigeria, South Africa, Algeria, Morocco and Tunisia are expected to double plastic imports by 2030 (Babayemi et al., 2019). This anticipated growth is driven by rapid population, urbanisation and attendant growth in consumer markets. The circular economy approach to plastics manufacturing in Africa offers a wide range of business prospects along the plastics value chain for both local and export markets, some of which include:

- ◆ **Recycling infrastructure:** Less than 10 per cent of the world's annual plastic production is recycled (WHO, 2023b). Creating and expanding recycling facilities that process and convert plastic waste into valuable raw materials or new products is a significant business opportunity in Africa. Opportunities involve establishing collection systems, sorting centres and recycling plants to recover and treat different types of plastic waste.
- ◆ **Plastic reprocessing and upcycling:** Investing in technologies and processes to reprocess plastic waste into high-quality materials for further manufacturing or repurposing them into new products. Opportunities include initiatives such as producing plastic pellets, moulding plastic components and developing innovative plastic-based goods.
- ◆ **Plastic waste collection and sorting:** Establishing businesses dedicated to collecting, sorting and aggregating plastic waste from various sources, including households, businesses and industries. Activities require implementing efficient collection systems, forging partnerships with waste management entities and implementing effective sorting methods.
- ◆ **Sustainable packaging design:** Providing design and consulting services for sustainable packaging solutions that minimise plastic waste, enhance recyclability and optimise material use. Opportunities include designing packaging incorporating recycled content, utilising lightweight materials and embracing eco-friendly design principles.
- ◆ **Resource recovery and waste-to-energy:** Investing in technologies that convert plastic waste into energy through pyrolysis or gasification. Ventures include establishing waste-to-energy plants capable of generating electricity, heat or fuel from plastic waste while minimising its environmental impact.
- ◆ **Reverse logistics and take-back programmes:** Implementing systems that facilitate the return, collection and responsible disposal or recycling of plastic products at the end of their life cycle. Opportunities entail partnering with retailers, manufacturers and consumers to implement take-back programmes and promote responsible plastic waste management.
- ◆ **Plastic waste education and awareness:** Developing businesses focused on educating the public, businesses and industries on the importance of reducing plastic waste, recycling and adopting responsible plastic consumption practices. Opportunities include offering training, consulting services and awareness campaigns to drive

behaviour change and encourage adopting sustainable practices.

♦ **Collaboration and innovation hubs:** Establishing collaborative platforms and innovation hubs that bring together stakeholders from various sectors to foster creativity, knowledge sharing and developing new ideas and technologies for plastic waste management and recycling.

♦ **Plastic waste data and analytics:** Developing businesses specialising in collecting, analysing and providing insights on plastic waste data. Opportunities involve offering data management solutions, waste

tracking systems and analytic tools to facilitate informed decision-making and efficient resource allocation within the circular economy for plastics.

♦ **Sustainable packaging alternatives:** Developing and manufacturing environmentally friendly alternatives to conventional plastic packaging, such as biodegradable or compostable materials. These ventures involve producing eco-conscious packaging solutions for industries like personal care, food and beverage, and consumer goods.



Photo credit: SWITCH Africa Green

4.3.3 E-waste

Over a relatively brief period, electrical and electronic products have swiftly become indispensable in today's world, fundamentally altering how individuals work, travel and enjoy their leisure time globally. As with global trends, the demand for electrical and electronic equipment (EEE) has increased in Africa. For example, the continent is recognised as the global leader of the fastest-growing mobile phone market, paving the way for numerous economic and educational prospects. However, with the rapid growth in electronics sales in Africa, there is also a corresponding rise in e-waste generation, fuelled by international trade and domestic consumption (AfDB, 2014). This challenge presents opportunities for businesses in Africa, some of which include:

- ♦ **E-waste collection and recycling:** Establishing collection centres or partnering with existing recycling facilities to gather and recycle electronic waste safely and in an environmentally friendly manner. Activities include dismantling, separating and recovering valuable materials from electronic devices.
- ♦ **Resource recovery and material recycling:** Investing in technologies and processes to recover valuable materials from electronic waste, such as precious metals and rare earth elements. Opportunities include setting up facilities for extracting and recycling valuable resources from electronic devices.
- ♦ **Refurbishment and repair services:** Providing repair and refurbishment services for electronic devices, extending their lifespan and reducing the need for new products. Service opportunities include repairing and upgrading smartphones, laptops and other electronic devices to promote reuse and minimise electronic waste.
- ♦ **E-waste management platforms:** Developing digital platforms or mobile applications that facilitate collecting, tracking, and managing e-waste. These platforms can connect consumers, businesses and e-waste recycling centres, making it easier to dispose of electronic waste responsibly.
- ♦ **E-waste recycling marketplaces:** Creating online marketplaces where businesses and individuals can buy and sell recycled electronic components or refurbished electronic devices. Such platforms can help extend the lifespan of electronics and reduce the demand for new devices.
- ♦ **E-waste pickup and logistics solutions:** Developing digital platforms or applications that enable users to schedule e-waste pickups from their homes or businesses. These solutions can facilitate convenient and efficient electronic waste collection, promoting responsible disposal.
- ♦ **E-waste management systems:** Developing comprehensive e-waste management systems covering electronic waste collection, transportation and disposal. Opportunities include establishing partnerships with governments, municipalities and organisations to implement efficient and sustainable e-waste management practices.
- ♦ **E-waste data management systems:** Building digital systems that track and analyse e-waste generation, collection and recycling data. This data can be valuable for policymakers, recyclers and manufacturers to make informed decisions and develop sustainable strategies. Opportunities include offering data management solutions, tracking systems and analytics tools for the e-waste sector.



E-waste recycling, Green Fund. Photo Credits: UNEP

- ◆ **Sustainable electronics design:** Designing and manufacturing electronics focusing on sustainability, including eco-friendly materials, energy efficiency and recyclability. This involves developing electronic products with a reduced environmental impact throughout their lifecycle, from production to disposal.
- ◆ **E-waste awareness and education:** Providing educational programmes and awareness campaigns to inform consumers, businesses and communities about the importance of proper e-waste management and the benefits of a circular economy.
- ◆ **Reverse logistics and take-back programmes:** Implementing take-back programmes and reverse logistics systems to facilitate the return and responsible disposal of electronic products at the end of their life. This involves partnering with manufacturers, retailers and consumers to promote responsible recycling and prevent e-waste from ending in landfills.
- ◆ **Circular business models:** Develop innovative business models that promote circularity in the electronics industry, such as leasing or subscription services, where customers can access electronic devices without owning them outright. These business models encourage product reuse, repair and recycling

BOX 12:

E-waste management in Nigeria (Ellen Macarthur Foundation, 2023b)

E-Terra Waste Management, Nigeria

E-Terra Technologies Limited is Nigeria's leading e-waste management company. It offers e-waste collection, recycling, and shredding of hardware and data. The company manages e-waste by either refurbishing or recycling locally, providing refurbished products and harvesting components for reuse in manufacturing new products. Hazardous components are sent to recycling partners (local and international) for further processing and proper disposal.

In 2017, E-Terra acquired an internationally standardised cathode ray tubes (CRT) recycling facility, making it the first company in Nigeria and West Africa with updated technology to safely and securely process 200 CRTs per day. E-Terra's cable recycling equipment can strip and shred 100 kg of cables per hour in an environmentally friendly manner.

E-Terra also possesses bulb recycling equipment that can safely treat and scrap 1,500 spent fluorescent tubes per day. Overall, E-Terra's pioneering recycling processes reduce the need for mining for new metals and materials and minimise workers' exposure to the toxic components of e-waste.



Photo Credits: E-Terra | <https://www.etterra.com.ng/articles/top-4-ways-nigeria-can-successfully-tackle-e-waste-crisis/>

4.3.4 Fashion and textiles

The garment and footwear market in sub-Saharan Africa is valued at approximately \$31 billion, with the textile industry in Africa projected to exhibit a compound annual growth rate (CAGR) of around 5 per cent from 2019 to 2024 (Mordor Intelligence, 2023b). The popularity of African designs, textiles and garments is rising in Africa and globally. With a rising population and expanding middle class, the demand for locally produced and imported clothing is expected to increase. Countries like Rwanda and South Africa are taking initiatives to revitalise their national textile industries. Moreover, African fashion designers are gaining recognition on the global stage. The African fashion industry catalyses economic inclusion, fosters innovation and promotes cultural identity (Ellen MacArthur Foundation, 2023c). These present numerous opportunities for businesses to participate and contribute toward achieving the sustainability of the African textile industry value chain.

- ◆ **Sustainable material sourcing:** Developing eco-friendly materials like organic cotton, recycled fibres and natural dyes for the fashion and textile industry. Opportunities also involve forming partnerships with local farmers, artisans and suppliers to ensure responsible sourcing practices.
- ◆ **Recycling and upcycling:** Implementing initiatives to recycle and upcycle textiles, reducing waste and giving new life to discarded clothing and fabrics. Opportunities may involve establishing textile recycling facilities, creating product lines from upcycled materials, or providing textile waste collection and sorting services.
- ◆ **Ethical and fair-trade manufacturing:** Setting up ethical manufacturing plants in the fashion and textile industry that adhere to fair trade practices. Practices include ensuring fair wages, safe working conditions, supply chain transparency, and

developing certification programmes and labels for ethical fashion.

- ◆ **Rental and sharing models:** Introducing clothing rental and sharing platforms to encourage garment reuse and reduce the need for new production. Opportunities involve creating online platforms or physical stores where customers can rent or share clothing items for a limited time.
- ◆ **Repair and alteration services:** Establishing businesses that offer repair and alteration services, extending the lifespan of clothing items by fixing damage or providing customisation options. These businesses promote a culture of repair and maintenance instead of disposal.
- ◆ **Consumer education and awareness:** Developing educational campaigns and initiatives to raise consumer awareness of the environmental impacts of the fashion industry and the implications of sustainable fashion choices. This includes information on eco-friendly materials, responsible purchasing practices and garment care.
- ◆ **Collaborative platforms and innovation hubs:** Creating platforms and hubs that facilitate collaboration among designers, manufacturers, researchers and entrepreneurs to foster creativity, knowledge sharing and the development of sustainable solutions in the fashion and textile industry.
- ◆ **Sustainable fashion consulting and certification:** Offering consulting services to fashion brands and manufacturers, guiding them in adopting sustainable practices and obtaining certifications that validate their commitment to circular economy principles. Operations may include advising on sustainable sourcing, production methods and supply chain management.

BOX 13:

Circularity in textile manufacturing in Tunisia (Ellen Macarthur Foundation, 2023c)

Demco, Tunisia

Demco is a jeanswear, sportswear and knitwear manufacturer based in Tunisia. They work with European, African and Asian suppliers and hire 3,500 workers across multiple factories located in Tunisia.

Demco has a strong sustainability policy roadmap and believes that environmental waste equals financial waste. In their manufacturing facilities, more than 50 per cent of the water used is recycled and reused in production, and 100 per cent is treated. Moreover, 30 per cent of the factories' energy needs are covered by solar panels. All the process waste is sorted, collected and sold to certified recycling partners.

Finally, Demco only uses contamination-free yarns. The demand for products from manufacturers championing the circular economy in their operations is rising. According to Demco, over the last few years, the demand for organic cotton fabric has increased by 1000 per cent, and the demand for recycled fabrics has increased by 400 per cent.

Demco has ambitious expansion plans to collect locally and import unsold garments and recycle them in Tunisia to meet the growing demand for recycled fabric.



Demco product range. Photo Credits: Demco | <https://www.facebook.com/demcointer/photos>

BOX 14:

Upcycling Food Waste in Tanzania (Ellen Macarthur Foundation, 2023d)

Chanzi, Tanzania

Chanzi, a start-up based in Tanzania, sources food waste from farms and businesses, and uses black soldier fly larvae to convert this waste into insect feed for fish and poultry farms and organic fertilisers to support healthy crop growth. For \$1,000 of organic waste costs, revenues of \$3,300 in insect feed and \$700 in organic fertiliser are generated.

Chanzi's facilities are designed to be built and operated using local materials and equipment, meaning much lower capital costs and reduced construction times than other insect production systems. This makes them very cost competitive, with feed costs 25 to 40 per cent lower than conventional fish meal and soya. The health and growth rate of livestock fed on insect feed is also improved. Each Chanzi facility uses millions of larvae, generates over 20 full-time jobs and processes 18,000 kg of organic waste daily, converting it into 1,000 kg of animal feed and 2,000 kg of organic fertiliser.

The most important beneficiary of Chanzi's system could be the environment. The current linear animal feed industry is immensely inefficient and nature-degrading. Fish feed production impacts marine food chains and generates significant carbon emissions as boats travel further and further. Growing insects on waste brings feed production closer to consumption centres, and the by-products can help regenerate soils.



Photo Credits: Chanzi | <https://www.chanzi.co/post/bugs-on-the-menu-how-edible-insects-are-revolutionizing-the-future-of-food>

4.3.5 Agro-food industry

African cities face a growing demand for food, resulting in increased organic waste generation. Meeting the food needs of African cities while effectively managing urban organic waste presents a significant challenge for the future but also creates opportunities for businesses that help ensure a reliable and healthy food supply while preserving the continent's food cultures, diverse ingredients and rich biodiversity (Ellen MacArthur Foundation, 2023d). The agro-food industry in Africa presents several business opportunities in the circular economy, some of which include:

- ◆ **Efficient supply chain management:** Establishing efficient supply chain management systems to reduce food waste and losses throughout the agro-food industry. Opportunities include supporting businesses focused on post-harvest handling, storage, transportation and distribution processes to ensure minimal spoilage and maximise the utilisation of food resources.
- ◆ **Food waste reduction and valorisation:** Developing initiatives for food waste reduction and diversion from landfills. Opportunities can involve establishing partnerships with food retailers, restaurants and households to implement waste reduction strategies, such as surplus food redistribution, composting and anaerobic digestion for energy generation.
- ◆ **Packaging optimisation:** Designing and producing sustainable packaging solutions and alternatives to single-use plastic packaging for the agro-food industry. Opportunities include developing eco-friendly packaging materials, such as edible films or plant-based alternatives that protect and preserve food products, adopting lightweight packaging designs and promoting reusable or compostable packaging options to minimise waste generation.
- ◆ **Circular food systems:** Creating circular food systems promotes resource efficiency and reduces waste. Opportunities involve establishing food recovery and redistribution networks, community composting initiatives and developing local food economies that prioritise locally sourced and seasonal produce.
- ◆ **Value-added processing:** Encouraging value-added processing of agricultural products to minimise waste and increase raw material utilisation. Opportunities include developing food processing techniques that enable by-product extraction or converting agricultural residues into valuable products, such as biofuels, animal feed or natural fibres. Other examples are processing fruits into jams, juices and dried snacks or converting grains into flour, pasta and baked goods. Value-added processing helps reduce post-harvest losses and increases agricultural products' shelf life and market value.
- ◆ **Plant-based and alternative proteins:** Capitalising on the increasing demand for plant-based food products and alternative proteins. Opportunities involve manufacturing plant-based meat substitutes, cultured meat, dairy alternatives and innovative products derived from alternative protein sources, such as algae, insects and fungi.
- ◆ **Food safety and traceability systems:** Establishing food safety and traceability systems to ensure transparency, quality control and accountability by leveraging technology solutions, such as blockchain, IoT and data analytics to track and trace food products from farm to fork, enhancing consumer confidence and reducing the risk of foodborne illnesses.

- ◆ **Collaborative partnerships and knowledge sharing:** Facilitating collaboration and knowledge sharing among agro-food industry stakeholders to foster innovation, best practice and the adoption of circular economy principles. Opportunities include establishing platforms for sharing experiences, research findings and success stories to accelerate the transition towards Africa's more sustainable and circular agro-food industry.
- ◆ **Sustainable seafood and aquaculture:** Engaging in sustainable seafood production and aquaculture practices. Ventures include developing fish farms prioritising responsible feed, efficient water management, ecosystem conservation, promoting sustainable fishing practices and supporting local fishermen.
- ◆ **Food waste management and recovery:** Developing businesses focused on food waste management and recovery, including initiatives such as surplus food redistribution, composting and anaerobic digestion for energy generation. These activities reduce the environmental impact of food waste and create resource recovery opportunities.

4.3.6 Access to clean water and sanitation

The business opportunities in the circular economy for access to clean water and sanitation contribute to sustainable water management, water conservation, improved sanitation practices and achieving SDG 6: Clean Water and Sanitation. The circular economy approach to ensuring the availability and sustainable management of water and sanitation for all presents several business opportunities in Africa, including:

- ◆ **Water and sanitation infrastructure development:** Investing in the construction and maintenance of sanitation and water infrastructure, including water treatment plants, wastewater treatment facilities and sanitation systems. Opportunities involve leveraging innovative technologies and sustainable practices to ensure efficient and reliable access to clean water and proper sanitation services.
- ◆ **Water and sanitation service delivery models:** Developing innovative service delivery models that ensure sustainable access to clean water and sanitation for communities. Models can include public-private partnerships, community-managed systems and decentralised solutions that promote efficiency, affordability, and long-term sustainability.
- ◆ **Water conservation and resource management:** Implementing water conservation and resource management strategies to optimise water use, reduce waste and improve water efficiency. Opportunities include treating and repurposing wastewater for non-potable uses, such as irrigation, industrial processes and toilet flushing, thereby reducing freshwater demand and minimising water pollution. Initiatives, such as rainwater harvesting, water recycling and reuse, and efficient irrigation techniques, provide business

opportunities in industrial and urban settings.

♦ **Sanitation solutions and technologies:** Designing and producing sustainable and affordable sanitation solutions and technologies prioritising resource recovery, such as nutrient capture from human waste and producing fertiliser or biogas suitable for diverse settings, including urban and rural areas. Opportunities involve developing innovative toilet systems, decentralised sanitation and wastewater treatment systems, faecal sludge management and other innovative waste management solutions.

♦ **Water purification and treatment technologies:** Investing in water purification and treatment technologies that provide safe drinking water to communities. Ventures include developing point-of-use water filtration systems, solar-powered water treatment units and other innovative water treatment solutions.

♦ **Water monitoring and data management:** Developing businesses focused on water monitoring, data collection, and management to ensure the quality and safety of water sources. Opportunities can involve using sensors, remote monitoring systems and data analytics to track water quality, identify potential issues and enable informed decision-making.

♦ **Water and sanitation education and awareness:** Implementing educational programmes and awareness campaigns to promote water and sanitation hygiene practices, including proper handwashing, safe water handling and sanitation behaviour. Opportunities include providing training, workshops and community engagement initiatives to improve knowledge and change behaviours.

♦ **Resource recovery from wastewater:** Exploring opportunities to recover valuable resources from wastewater, such as energy, nutrients and biofuels. These involve implementing innovative technologies like anaerobic digestion, bioenergy generation and nutrient recovery systems to extract value from wastewater while reducing environmental impact.

♦ **Smart water management systems:** Implementing smart water management systems that utilise sensors, data analytics and real-time monitoring to optimise water usage, detect leaks and improve overall water efficiency. Opportunities include water management platforms for utilities, smart irrigation systems and water conservation technologies.

♦ **Water efficiency consulting and auditing:** Offering consulting and auditing services to businesses, municipalities and households to assess and improve water efficiency practices. Activities involve conducting water audits, identifying water-saving opportunities and implementing water conservation measures.



Flood waters affecting families. Photo Credits: UNEP

BOX 15:

Wastewater and Sanitation Management in Senegal (WB, 2022a)

Dakar's sanitation and stormwater utility, Office National de l'Assainissement du Sénégal (ONAS), is turning wastewater and sanitation by-products into assets with the help of the private sector. Senegal's innovative approach has made it a centre of expertise, with representatives of some 15 countries visiting Dakar to learn from the utility's experience.

The Dakar utility began piloting new strategies to deal with shortfalls in water supply affecting customers and the region's horticulturalists and farmers. The utility began to sell treated wastewater to nearby farmers to help ease water shortages for horticulturalists. It later extended the system to irrigate the crops of hundreds of market gardeners near its Cambérène wastewater treatment plant. The facility plans to increase its capacity for wastewater treatment from 19,000 m³/day to 92,000 m³/day.

The Cambérène wastewater plant also began recovering the biogas generated in the wastewater treatment process to promote efficiency and reduce operational costs. The biogas is used to generate heat and power in an onsite cogeneration system to power the facility, resulting in a 28 per cent savings in energy use.

The utility sells dried and stabilised faecal sludge to farmers and flower growers as fertilisers. The faecal sludge is processed by the wastewater treatment plant run by ONAS and a faecal sludge treatment plant run by a private company, with both plants located at the Cambérène complex. The proximity and collaboration between the two plants ensures economies of scale and are also close to where their products can be reused efficiently.



Vehicle bumpers and lights in the Magazine, Ghana. Photo Credits: Adam Cohn/ Flickr

4.3.7 Automotive Market

The African automotive market is primarily characterised by imported used vehicles from Europe and North America. It is estimated that approximately 40 per cent of the total 14 million used light-duty vehicles exported from Europe, the USA and Japan between 2015 and 2018 were destined for Africa (McCarthy, 2020). The fast-growing middle class seeking affordable and convenient mobility options drives this demand for used automobiles. With road transport accounting for at least 90 per cent of passenger transportation in Africa, owning a car is a popular choice for many individuals (AfDB, 2014).

The production of new vehicles in Africa is relatively low, and automotive assembly factories in the past two decades have struggled to compete against the increasing international competition. As a result of these factors, used vehicles continue to dominate the African market and play a significant role in the circular economy transition of the automotive industry. The continent has a

booming culture of automotive repair and refurbishment which can be leveraged in the circular economy transition of the sector (Ellen Macarthur Foundation, 2023e). Some of these opportunities include:

- ♦ **Vehicle recycling and parts reuse:** Establishing vehicle recycling facilities to dismantle and recycle end-of-life vehicles. Operations include recovering valuable materials, such as metals and plastics, and refurbishing and reusing functional parts for resale.
- ♦ **Remanufacturing and refurbishment:** Setting up remanufacturing and refurbishment centres to restore used automotive components and parts to their original condition. Parts include engines, transmissions, brakes, other mechanical parts, and interior and exterior components.

- ◆ **Battery recycling and repurposing:** Developing recycling facilities and processes to recover and repurpose used automotive batteries, especially in the context of the growing electric vehicle market. Opportunities involve extracting valuable metals and materials for reuse or repurposing batteries for energy storage applications.
- ◆ **Shared mobility solutions:** Investing in shared mobility platforms, such as car-sharing and ride-hailing services, optimising vehicle utilisation and reducing the need for private car ownership. Shared mobility promotes more efficient use of resources and reduces the environmental impact of individual vehicle ownership.
- ◆ **Repair and maintenance services:** Establishing automotive repair and maintenance businesses that focus on prolonging the lifespan of vehicles through regular servicing and repairs. Offerings include promoting preventive maintenance practices and offering specialised repair services for hybrid and electric vehicles.
- ◆ **Circular supply chain management:** Optimising supply chain management practices in the automotive industry to reduce waste, improve efficiency and enhance sustainability. Activities include implementing reverse logistics systems for parts and materials, promoting recycling and reuse in the supply chain, and collaborating with suppliers to adopt circular economy principles.
- ◆ **Training and skill development:** Providing training and skill development programmes for technicians and mechanics to equip them with the knowledge and expertise required for working with circular economy practices in the automotive industry. Opportunities include training on vehicle recycling, remanufacturing, and sustainable repair and maintenance techniques.
- ◆ **Collaboration and innovation hubs:** Establishing collaborative platforms and innovation hubs that bring together industry stakeholders, researchers and entrepreneurs to foster creativity, knowledge sharing and the development of sustainable solutions in the automotive sector.

BOX 16:

**Circularity for automobiles in Ghana
(Ellen Macarthur Foundation, 2023e)**

Suame Magazine Automotive Centre, Ghana

The Suame Magazine Automotive Centre is an ingenious automotive refurbishing cluster established over 60 years ago. This cluster system is one of Africa's most significant industrial clusters. It comprises over 100,000 members who provide interdependent skills and services on dismantling, refurbishing, repurposing and remanufacturing for the local automotive industry.

The extensive array of cluster members reduces capital, skills and local technology constraints peculiar to most African automotive markets. The cluster has an automotive circular activity index of 20 per cent vehicle repairs and refurbishment, 25 per cent maintenance, 10 per cent metal work refabrication, 25 per cent materials and vehicle accessories sales, and 20 per cent spare parts sales. It provides services, technical skills and employment, and supports the cascading of automotive materials for three neighbouring countries.



*The Magazine Area
Photo Credits: Adam Cohn/ Flickr*

4.4 Conclusion

Several promising business opportunities in Africa have been identified across various sectors and subsectors, including clean energy, sustainable infrastructure, agricultural supply chains, blue economy, ecotourism and the circular economy. These findings indicate a growing demand and potential for sustainable and innovative solutions in these areas, and the case studies show how innovative solutions developed by SMEs contribute to achieving SDGs and Africa's 2063 Agenda. Africa's unique circumstances and developmental stage present significant advantages for the growth and expansion of green enterprises.

Africa has abundant renewable energy resources that remain largely untapped, creating opportunities for investments in solar, wind, hydro, biomass, geothermal and green hydrogen generation and equipment manufacturing projects. With the continent holding approximately 40 per cent share of the global cobalt, manganese, and platinum group metal reserves, value chain development opportunities in the metals and mining sector present viable business opportunities that are very important for the global net-zero transition ambitions. With such reserves, Africa can establish itself as a key player in the battery value chain, expanding beyond mining activities and venturing into battery production. The energy efficiency sector, which goes hand in hand with deploying renewable energy solutions, presents avenues for businesses to provide products and services that reduce energy consumption and promote sustainable practices. By implementing energy-efficient technologies and practices across industries, buildings, and transportation, significant energy savings can be achieved, leading to reduced costs and environmental impacts. Energy-efficient lighting systems, smart buildings, and efficient industrial processes are just a few examples of the potential in this sector.

Sustainable agriculture also offers numerous opportunities for African businesses to promote food security, climate resilience, and environmental conservation. Organic farming, precision agriculture, and agroforestry are some of the approaches that can be adopted to enhance productivity while minimising negative impacts on ecosystems. Sustainable Infrastructure development presents a significant avenue for green business growth in Africa, as seen by the pipeline of ongoing and committed infrastructure projects worth about \$100 billion as of 2022. Building sustainable cities, incorporating green building practices, leveraging sustainable digital infrastructure, and investing in eco-friendly transportation systems can reduce emissions, improve air quality, and enhance the quality of life for urban populations.

The blue economy, encompassing sustainable ocean-based industries, is a promising sector for Africa's coastal nations. Examples include marine renewable energy, sustainable fisheries, aquaculture, and marine tourism. By developing business ventures that embrace responsible practices and conservation efforts, African countries can harness the economic potential of their coastal resources while preserving marine ecosystems.

While the circular economy offers prospects for businesses to key into ventures in resource efficiency, waste management, and recycling, leading to economic, social and environmental benefits, ecotourism showcases opportunities to develop responsible tourism initiatives that preserve natural habitats, promote conservation, and support local communities.

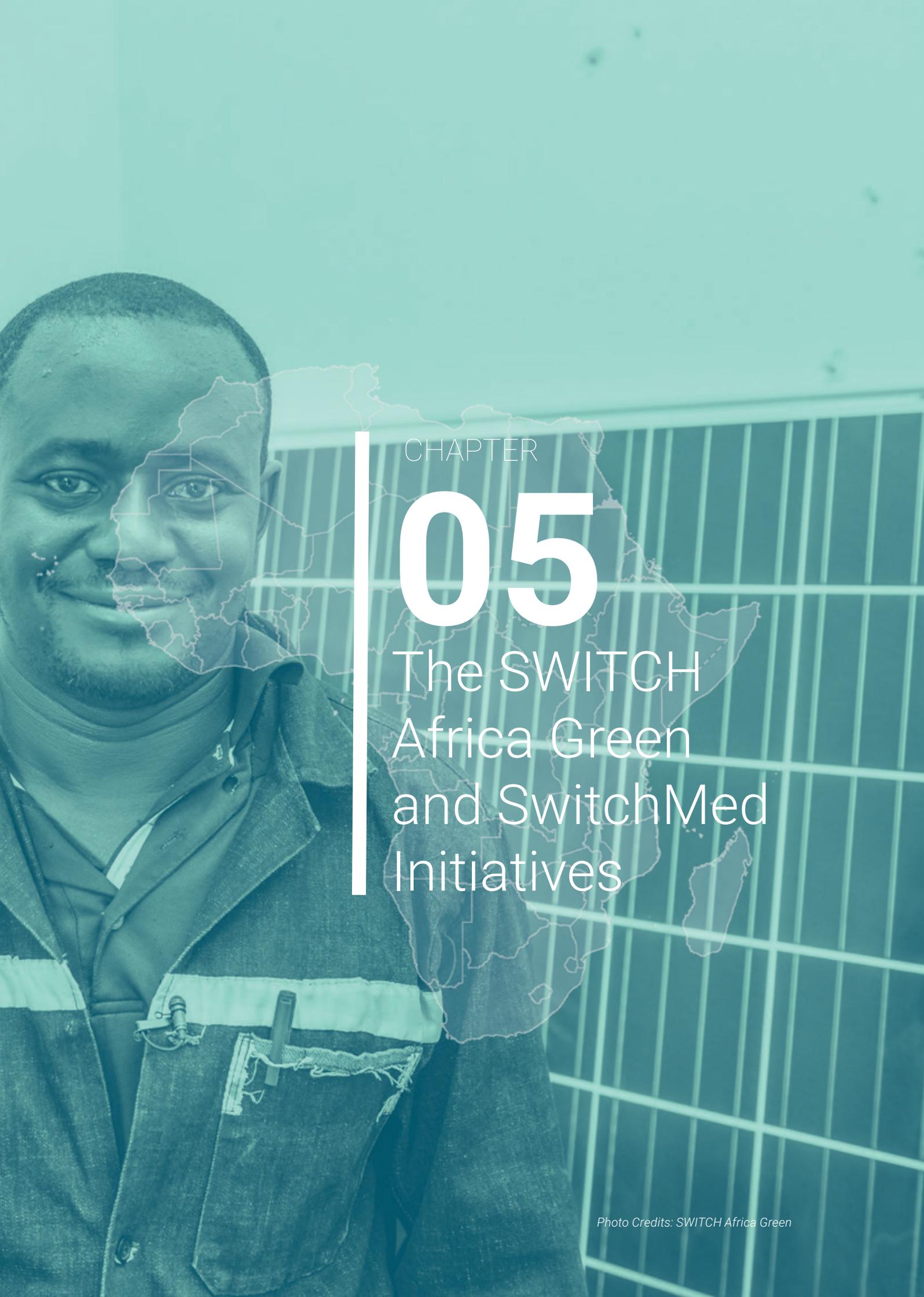


Photo Credits: SWITCH Africa Green



switchafrica
GREEN

erting



CHAPTER

05

The SWITCH
Africa Green
and SwitchMed
Initiatives



Photo Credits: SWITCH Africa Green

5.1 Introduction

The SWITCH to Green (S2G) Initiative was launched by the European Commission Directorate International Partnership as a gateway to facilitate the transition to an inclusive green economy. According to the United Nations Environment Programme (UNEP), a green economy is one that results

in improved human well-being and social equity while significantly reducing environmental risks and ecological scarcities. In simple terms, a green economy can be considered as one that is low in carbon, resource efficient, and socially inclusive (UNEP, 2023c). Figure 5.1 shows the three pillars of the green economy:

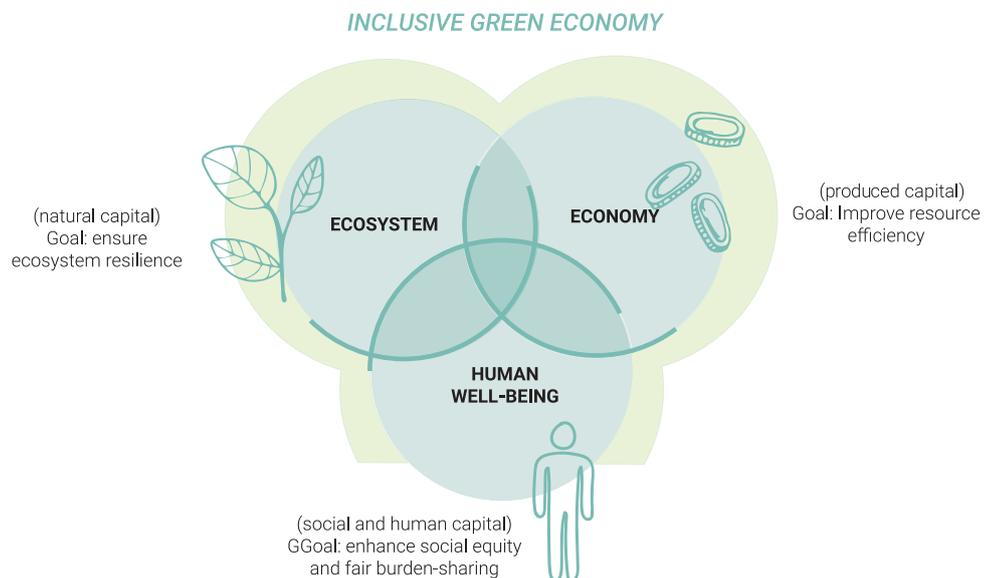


Figure 5.1: *The inclusive green economy pillars (EAA, 2014)*

ecosystem, economy, and human well-being. It is considered a balanced and realistic pathway to sustainable development with a focus on resource efficiency and ecosystems as building blocks of the economy while considering the impact of environmental degradation on long-term human development and economic growth.

The European Union's SWITCH to Green initiative aims to facilitate the transition to an inclusive green economy that generates growth, creates decent jobs and helps reduce poverty while reducing environmental impacts. Through policy-level cooperation, the SWITCH to Green programme creates suitable incentive structures and instruments while supporting private sector initiatives to promote sustainable consumption and production practices and develop green businesses (SWITCH to Green, 2023a). In this regard, actions promoting green businesses across many European Union international cooperation sectors are expected to contribute to the transition to a

green economy. Figure 5.2 shows the main contributions to the green economy from the relevant sectors of European Union international cooperation.

The SWITCH to Green initiative acts as a conduit for complementary programmes to improve the overall coordination and visibility of current and future European Union-funded international cooperation initiatives on green and circular economy. The complementary programmes contribute to implementing the 2030 Agenda for Sustainable Development, specifically goal 12: "Ensuring sustainable consumption and production patterns" (SWITCH to Green, 2023a).

The SWITCH regional programmes, Switch Asia, SWITCH Africa Green and SwitchMed, are programmes the SWITCH to Green initiative builds upon. The European Union developed and funded the programmes to support governments and the private sector in the regions in transitioning to an inclusive green economy through the adoption of sustainable consumption and production practices.

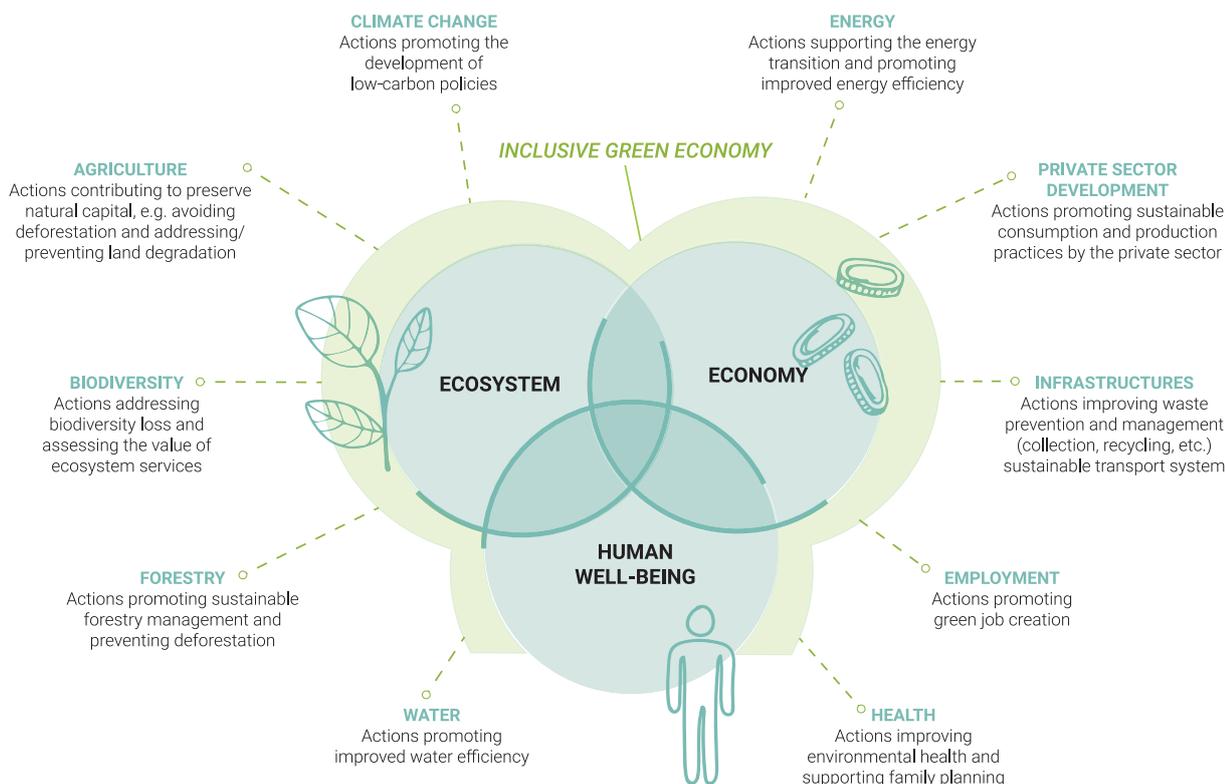


Figure 5.2: Major contributions from relevant sectors of EU cooperation to the inclusive green economy (European Commission, 2018)

5.2 SWITCH Africa Green

The European Union launched the SWITCH Africa Green programme in 2013 to support African stakeholders in achieving sustainable development by transitioning to an inclusive green economy based on sustainable consumption and production. Through a partnership between UNEP and EU delegations in participating countries, SWITCH Africa Green provides opportunities for the private sector to transition to more resource-efficient, environmentally-sound business practices. These practices lead to increased profitability, green job creation, and poverty reduction (SWITCH Africa Green, 2023a). The programme consists of three major interconnected components designed to reinforce each other at the country level:

- ♦ Policy support – creating a conducive environment for green business development that allows for private sector-led inclusive green growth.

- ♦ Green business development – supporting micro, small, and medium enterprises (MSMEs) by providing grants to intermediary organisations, empowering them to commence and develop green businesses and adopt or apply sustainable consumption and production practices and patterns.

- ♦ Networking facility – creating a broader awareness and understanding of green business development in the region through distilling and sharing knowledge, lessons learnt, and best practices in sustainable consumption and production, and green business.

The SWITCH Africa Green programme focuses on seven countries in sub-Saharan Africa: Burkina Faso, Ethiopia, Ghana, Kenya, Mauritius, South Africa, and Uganda, as shown in Figure 5.3. The programme aims for the following outcomes in each of these countries:



Figure 5.3: SWITCH Africa Green participating countries (SWITCH to Green, 2023a)

- ◆ Equipping MSMEs and business service providers with tools to explore opportunities for green business development.
 - ◆ Better informing public and private consumers.
 - ◆ Cultivating an environment that supports clear policies, sound regulatory frameworks, appropriate incentives and taxes, and other fiscal and market-based instruments that influence key sectors in African countries.
1. Energy efficiency
 2. Eco-labelling and standards
 3. Water efficiency
 4. Eco-innovation, and
 5. Sustainable trade.

The SWITCH Africa Green programme provides financial and technical support for the development of policy frameworks that support the greening of four high-priority sectors identified based on national needs and priorities: agriculture, manufacturing, integrated waste management, and tourism.

To support the development of these four sectors, five thematic cross-cutting areas are prioritised:

Collaboration from different sectors is needed to integrate sustainability principles into each value chain component to achieve a green economy. Figure 5.4 provides the SWITCH Africa Green framework connecting the priority sectors to the programme's key themes and intended outcomes. SWITCH Africa Green has a wide range of stakeholders, including national and local government representatives, regional economic communities, other programmes under the European Union's SWITCH to Green initiative, other sustainable consumption and production programmes, United Nations agencies, development partners, financial institutions, businesses, research institutions, academia and non-state actors (SWITCH Africa Green, 2023b). The programme has produced many reports and publications, including programme brochures; green

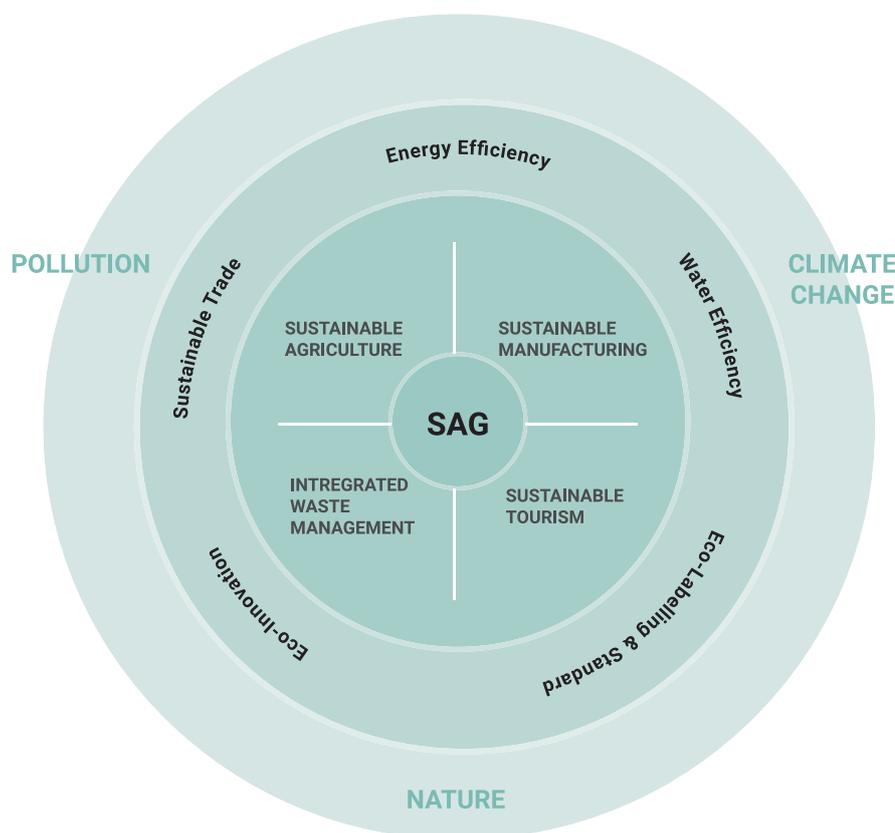


Figure 5.4: The SWITCH Africa Green Framework

economy toolkits, manuals and guidelines; national and sectoral policies and strategies; country implementation plans and reports; regional sectoral meetings; project impact sheets and factsheets; and communiques (SWITCH to Green, 2023b).

During the first phase of SWITCH Africa Green, from February 2014 to February 2020, grants were awarded to 34 project grantees along the programme’s specific priority sectors. The EU provided funding of €19 million in this phase, supporting over 3,000 MSMEs to adopt sustainable consumption and production practices across the four priority sectors and the five cross-cutting themes. Projects implemented were selected based on national priorities, and Table 5.1 summarises the priority sectors for each participating country.



Photo Credits: SWITCH Africa Green

Table 5.1: *Priority Sectors for participating countries*

COUNTRY	INTEGRATED WASTE MANAGEMENT	AGRICULTURE	MANUFACTURING	TOURISM
BURKINA FASO	✓		✓	✓
GHANA	✓		✓	✓
KENYA		✓	✓	✓
MAURITIUS		✓	✓	✓
SOUTH AFRICA	✓	✓	✓	
UGANDA		✓	✓	✓

5.2.1 Overview of SWITCH Africa Green projects

Given that Africa’s natural resources are fundamental to the livelihoods of its residents, the 34 projects implemented under the first phase of the SWITCH Africa Green programme were centred around capturing market opportunities for green products and services that consider resource efficiency across the life cycle and also the development of green business opportunities for local MSMEs in the priority sectors. In addition, the projects also

focus on awareness creation, capacity building, and networking for MSMEs to apply sustainable consumption and production practices and then scale them up. Table 5.2 shows a summary of the project details in each of the participating countries. There were also three multi-country projects which comprised initiatives that cut across the six participating countries (SWITCH Africa Green, 2023c).

Table 5.2: Summary of projects implemented through SWITCH Africa Green

COUNTRY	PROJECT NAME	FUNDING	TIMELINE
BURKINA FASO	Groupe De Recherche Et D'analyse Appliquées Pour Le Développement	\$ 200,000	24 Months
	Cashew as a source of Renewable Energy for Small and Medium Enterprises (SMEs) in Burkina Faso	\$169,888	30 Months
	Enabling Burkinabe SMEs to Start Solar Energy Production	\$200,000	30 Months
	Transformation of Household Waste into Fertiliser	\$200,000	30 Months
GHANA	One-Stop Business and Policy Centre for the Establishment of Eco-innovative MSMEs and Supporting Policies in the E-waste and End-of-Life Vehicle Sector (ECOBPC)	\$237,412	36 Months
	Implementing Industrial Symbiosis and Environmental Management Systems for SMEs in Three Regions in Ghana	\$234,000	36 Months
	Promotion of Biogas Technologies	\$249,999	24 Months
	Improved Institutional Biomass Cook Stoves and Ovens for Small and Medium Scale Agro-Processing Industries in Ghana (Renewable Energy Project)	\$250,000	24 Months
KENYA	Greening SME Leather Clusters and Leather Tanning Industry	\$248,508	24 Months
	Enhancing Sustainable Tourism Innovation for Community Empowerment in Kenya	\$249,979	36 Months
	Up-Scaling Sustainable Commercial Production of Medicinal Plants by Community-Based Conservation Groups at Kakamega Forest in Kenya	\$250,000	36 Months
	Capacity Enhancement for Green Business Development and Eco-Entrepreneurship in Agricultural Sector	\$249,966	36 Months
MAURITIUS	Greening the Mauritian Tourism Industry	\$250,000	30 Months
	A Model for Sustainable Production and Consumption Practices and Eco-Entrepreneurship Development	\$203,146	30 Months
	Increase Capacity Building of the Fisher's Community of Rodrigues through Training for the Bio Cultivation of the Gombava Lime Plants and its Chilli Paste	\$230,500	24 Months
	Promoting Sustainable Local Agriculture Through Green Retail and Green Hospitality	\$249,655	24 Months
	National Energy Efficiency Program – PNEE	\$250,000	24 Months
	Developing Capacity Amongst Rodriguans to Adopt Green Businesses Through Training to Key Stakeholders and the Development of a Green Business Guidebook	\$250,000	30 Months

SOUTH AFRICA	Awareness Creation and Capacity Building on Eco-labelling for the Agricultural Sector	\$210,000	24 Months
	Meat Naturally Initiative: Embedding Sustainability in South Africa's Emerging Red Meat Sector	\$250,000	30 Months
	Collaborating to Facilitate Investments and Shifts to a Green Economy That Can Improve Social Wellbeing and the Provision of Ecosystems Services in the Port Elizabeth Western Catchment Areas	\$250,000	30 Months
	Sustainable Production and Commercialization Strategies in the Agri-Food Sector in South Africa	\$248,033	30 Months
	Management of Sustainable Energy Production from Integrated Waste Management and Agricultural Processing Systems	\$250,000	24 Months
	Promoting Sustainable Consumption and Production in South African Agricultural Value Chains	\$250,000	30 Months
UGANDA	Upscaling Generation, Commercialisation and Utilisation of Biomass Waste-Based Green Energy Sources in Uganda	\$200,000	24 Months
	Demand-Side Management of Water Use in MSMEs in Uganda Through Promotion of Water Use Efficiency Techniques and Practices	\$200,000	36 Months
	Demand-Side Management of Energy Use in MSMEs In Uganda Through Promotion of Energy Efficiency Techniques and Practices	\$200,000	36 Months
	Eco-Agriculture-Sesame Livelihoods and Organic-Green Business Opportunities for Young Rural People	\$194,411	36 Months
	Promoting Inclusive Green Business Practices in the Tourism Sector	\$200,000	24 Months
	Promoting Sustainable Product Innovation and Energy Efficient Practices Among Small Scale Industries in Uganda	\$200,000	36 Months
MULTI-COUNTRY	Enhancing Resource Productivity and Environmental Performance of MSMEs in 6 African Countries through the Concept of Industrial Symbiosis	\$1,500,000	30 Months
	Empowering Business Development Agencies and Non-State and Subnational Actors, and to Advocate Sustainable Consumption and Production Practices and Support Eco Entrepreneurs in Their Development & Transition Towards Green Inclusive Businesses	\$1,500,000	30 Months
	Promoting Eco-Entrepreneurship in Africa	\$1,500,000	30 Months

BURKINA FASO

Burkina Faso has taken several measures focused on sustainably using the country's natural resources and protecting the environment to ensure the socioeconomic development of the current generation while considering future generations' needs (SWITCH Africa Green, 2023c).

The SWITCH Africa Green has supported Burkina Faso with four projects benefitting three key sectors: agriculture, manufacturing and tourism. The following is an example of one of the projects implemented under the integrated waste management priority sector.

PROJECT TITLE:

Cashew as a Source of Renewable Energy for Small and Medium Enterprises (SMEs) in Burkina Faso

Budget: \$169,888 • Timeline: 30 months • Location: Burkina Faso



Cashew processing in Burkina Faso.
Photo Credits: SWITCH Africa Green

PROJECT OBJECTIVE:

Introduce renewable fuel for SMEs through the recovery and recycling of cashew waste from the cashew industry as a substitute for the use of wood fuel. This was achieved by converting the waste into briquettes to produce thermal energy for SMEs operating in agribusiness.

PROJECT BENEFITS:

- ◆ The renewable energy source (i.e., cashew waste) supports climate change mitigation by reducing greenhouse gas emissions from traditional biomass combustion.
- ◆ Provides nature-based solutions to climate change mitigation by preventing deforestation from cutting timber for fuel.
- ◆ Reduces air pollution from the inefficient combustion of wood as a thermal energy source.
- ◆ Reduces production costs for SMEs as incentive mechanisms are introduced to make briquettes cheaper than using wood.
- ◆ Enables a circular economy where waste from the cashew industry becomes an input for the energy industry.
- ◆ Provides job opportunities arising from creating a cashew waste recovery and recycling value chain.

GHANA

Ghana experiences continuous environmental degradation due to unsustainable consumption of its natural resources such as forests, minerals, water bodies and fisheries. Improved resource efficiency and cleaner production measures can aid in actualising the country's sustainable development (SWITCH Africa Green, 2023c).

SWITCH Africa Green has supported Ghana with five projects benefitting three key sectors: integrated waste management, manufacturing and tourism. The following is an example of one of the projects implemented under the integrated waste management priority sector.

PROJECT TITLE:

Hanisa E-Waste Model (Hemod)

Budget: \$250,000 • Timeline: 24 months • Location: Greater Accra Region

Agbobbloshie, Oyibi and Other Suburbs of Accra



Electronic Waste in Ghana.

Photo Credits: SWITCH Africa Green

PROJECT OBJECTIVE:

Creating a sustainable e-waste management system that leads to the re-use and recycling of waste electrical and electronic equipment (WEEE) through the establishment of a structured approach to awareness creation, education, collection, dismantling, sorting and the safe disposal of hazardous components, as well as the export of recyclables as a revenue source.

PROJECT BENEFITS:

- ◆ Prevents environmental pollution, toxicity and degradation through the proper disposal of electronic equipment and toxic e-waste in an eco-friendly manner.
- ◆ Minimises health risks by preventing the exposure of scavengers to lead, mercury, and other toxic e-waste.
- ◆ Sustainable precious metals recovery mechanisms can provide economic and environmental benefits by increasing the recovery rate and reducing the strain on mining for rare earth minerals.
- ◆ Creates jobs and skills transfer for formal and informal waste-handling and management participants (SMEs and individual scavengers).
- ◆ Enables a circular economy where e-waste can be reused or recycled rather than discarded.

KENYA

In Kenya, GDP heavily relies on the country's natural resource sectors, which also supports 70 per cent of its national employment. These sectors include agriculture, tourism, forestry, energy, fishing, and water supply. As a result, policies and initiatives are being developed to ensure resource efficiency, management, and sustainable production (SWITCH Africa Green, 2023c).

The SWITCH Africa Green has supported Kenya with four projects benefitting three key sectors: agriculture, manufacturing and tourism. The following is an example of one of the projects implemented under the tourism priority sector.

PROJECT TITLE:

Enhancing Sustainable Tourism Innovation for Community Empowerment in Kenya

Budget: \$249,980 • Timeline: 36 months • Location: Kenya

PROJECT OBJECTIVE:

Promoting community-based tourism that improves rural livelihoods and reduces the cultural and natural strain on key tourist attractions, such as Kenya's seven main tourist parks. Targeting international best practice knowledge sharing for community-based tourism development in Kenya can support local livelihoods and the conservation of culture and the natural environment.



A tourist park in Kenya.
Photo Credits: SWITCH Africa Green

PROJECT BENEFITS:

- ◆ Reduces stress on natural resources from the concentration of tourists in the country's seven main parks through the adoption of sustainable operation measures.
- ◆ Knowledge and wealth creation for local communities through the diffusion and control of tourism resources.
- ◆ Provides tourists with an opportunity to discover local habitats and wildlife while gaining insights into traditional cultures, traditions and wisdom.
- ◆ Job creation from community tourism operations and activities.

MAURITIUS

Mauritius is dedicated to supporting the livelihoods of current and future generations of its people through a restructured economy, more robust macroeconomic management, innovative technologies, upgraded national infrastructure, and robust public services (SWITCH Africa Green, 2023c).

SWITCH Africa Green has supported Mauritius with six projects benefitting three key sectors: agriculture, manufacturing and tourism. The following is an example of one of the projects implemented under the agriculture priority sector.

PROJECT TITLE:

A Model for Sustainable Production and Consumption Practices and Eco-Entrepreneurship Development

Budget: \$203,146 • Timeline: 30 months • Location: Mauritius, Rodrigues Island

PROJECT OBJECTIVE:

Supporting Rodrigues Island in achieving its sustainable development goals by empowering the Centre de Formation Agricole Frere Remi to build on its existing operations and enhance agri-green business development and partnership. The Centre supports youth aged 12-18 to develop academic (maths, French and English) and vocational (livestock rearing, horticulture, floriculture, mosaiculture, phytotechnic and zootechnic) skills to empower them to set up their own micro-businesses.



Photo Credits: SWITCH Africa Green

PROJECT BENEFITS:

- ◆ Skill acquisition and green business development, providing sources of sustainable livelihoods for otherwise unengaged youths.
- ◆ Improved service delivery at the Centre through resource optimisation.
- ◆ Knowledge sharing and collaboration between students in neighbouring island nations.
- ◆ Dissemination of sustainable consumption and production patterns and practices within the community.

SOUTH AFRICA

South Africa's Department of Trade and Industry is making substantial efforts to contribute towards sustainable development. This is being carried out by integrating environmental and social considerations and performance measures into national policies and business operations to prevent further resource depletion and environmental degradation (SWITCH Africa Green, 2023c).

SWITCH Africa Green has supported South Africa with six projects benefitting three key sectors: agriculture, integrated waste management and manufacturing. The following is an example of one of the projects implemented under the agriculture priority sector.

PROJECT TITLE:

Sustainable Production and Commercialisation Strategies in the Agri-Food Sector in South Africa

Budget: \$248,033 • Timeline: 30 months • Location: South Africa



Photo Credits: SWITCH Africa Green

PROJECT OBJECTIVE:

The project, which focuses mainly on the agri-food smallholders' sector, aims to enable 30 small farmers in Limpopo to manage their natural resources, participate in sustainable irrigation practices, and strengthen their environmental efficiency to avoid resorting to short-term survival strategies that lead to environmental degradation.

PROJECT BENEFITS:

- ◆ Development of sustainable irrigation and resource management helps maintain the integrity of the country's surface water and physical environment.
- ◆ Reduction in food security threats through capacity building and knowledge dissemination from the projects in the agri-food sector.
- ◆ Incentivisation of investments in sustainable practices through the provision of market and non-market-based mechanisms.

UGANDA

Uganda is faced with environmental sustainability challenges due to deforestation, degradation of wetlands, riverbanks, lake shores, and water pollution. As part of achieving its 2040 vision which emphasises sustainable development, the country is focusing on preserving natural resources such as its forests and wetlands (SWITCH Africa Green, 2023c).

SWITCH Africa Green has supported six projects in Uganda, benefitting three key sectors: agriculture, manufacturing and tourism. The following is an example of one of the projects implemented under the manufacturing priority sector.

PROJECT TITLE:

Demand-Side Management of Water Use in MSMEs in Uganda Through Promotion of Water Use Efficiency Techniques and Practices

Budget: \$200,000 • Timeline: 36 months • Location: Uganda

divided into water management zones (hydrological zones)



Photo Credits: SWITCH Africa Green

PROJECT OBJECTIVE:

Enabling MSMEs in the manufacturing sector to improve their water-use efficiency and productivity by facilitating the adoption and optimisation of water-use efficient techniques and practices and replicating best practices to promote sustainable water use.

PROJECT BENEFITS:

- ◆ Adopting water optimisation and efficiency practices minimises the risks of water scarcity as well as the impact of wastewater discharged into the surrounding environment.
- ◆ The efficient use of water provides savings in MSMEs operational costs, resulting in increased profits.
- ◆ Knowledge acquisition of current technologies and green practices to improve overall manufacturing efficiencies.

MULTI-COUNTRY PROJECTS

Alongside all the individual projects implemented in the participating countries, SWITCH Africa Green has supported three multi-country projects benefitting all four key sectors: agriculture, integrated waste management, manufacturing and tourism. The projects cut across different aspects of transitioning

towards a sustainable consumption and production-based inclusive green economy. The following is an example of one of the projects implemented under the manufacturing sector, which has common priority in all six countries, in partnership with the African Roundtable on Sustainable Consumption and Production (ARSCP).

PROJECT TITLE:

Enhancing Resource Productivity and Environmental Performance of MSMEs in Six African Countries through the Concept of Industrial Symbiosis

Budget: \$1,500,000 • Timeline: 30 months

PARTNERS:

Burkina Faso Women Environmental Programme • Ghana National Cleaner Production Centre • Kenya National Cleaner Production Centre • Mauritius • National Cleaner Production Centre of South Africa • Uganda Cleaner Production Centre • Industrial Symbiosis Limited •

PROJECT OBJECTIVE:

Enabling resource efficiency and green businesses in six African countries centred around the concept of industrial symbiosis, which is the repurposing of underutilised resources and by-products. This objective is against the backdrop of the waste generation challenge in Africa arising from rapid urbanisation and industrialisation, and the manufacturing sector's role in the inefficient consumption of natural resources and waste generation.



Photo Credits: SWITCH Africa Green

PROJECT BENEFITS:

- ◆ Industrial symbiosis supports reducing pollution from waste as outputs from one industry become inputs for another.
- ◆ Industrial symbiosis improves resource efficiency, reducing the demand for new materials and helping to prevent environmental degradation.
- ◆ Capacity building and knowledge sharing among stakeholders responsible for delivering sustainable consumption and production in the six African countries.
- ◆ Development of an accessible toolkit to facilitate the promotion of industrial symbiosis as a tool for resource efficiency.





Photo Credits: SWITCH Africa Green

5.2.2 Key project results across sectors

The impacts of the implemented SWITCH Africa Green projects were reviewed and analysed, and the United Nations Environment Programme published sector reports for the four priority sectors of the programme. Based on SWITCH Africa Green surveys, grantee reports, on-site observations, case studies, desk and peer reviews, and regional stakeholder consultations, these sectoral reports were discussed and results validated at regional sector meetings in 2019. Project performance was categorised along sustainable development's economic, social and environmental dimensions using relevant key indicators. Figure 5.5 illustrates the results chain diagram used as a sectoral indicator guide framework showing

why and how the results were achieved under the green business development component of the programme. The following summarises the programme's impacts on the priority sectors based on the surveyed enterprises across the six participating countries.

AGRICULTURE

During the programme's first phase, an estimated \$2,985,745 was provided to fund various sustainable agriculture projects, benefitting 443 enterprises across the six participating countries. The distribution of the surveyed MSMEs by country is provided in Figure 5.6. The overall project objective is to decouple agricultural growth from environmental degradation whilst contributing to improved human well-being (SWITCH Africa Green, 2020a).

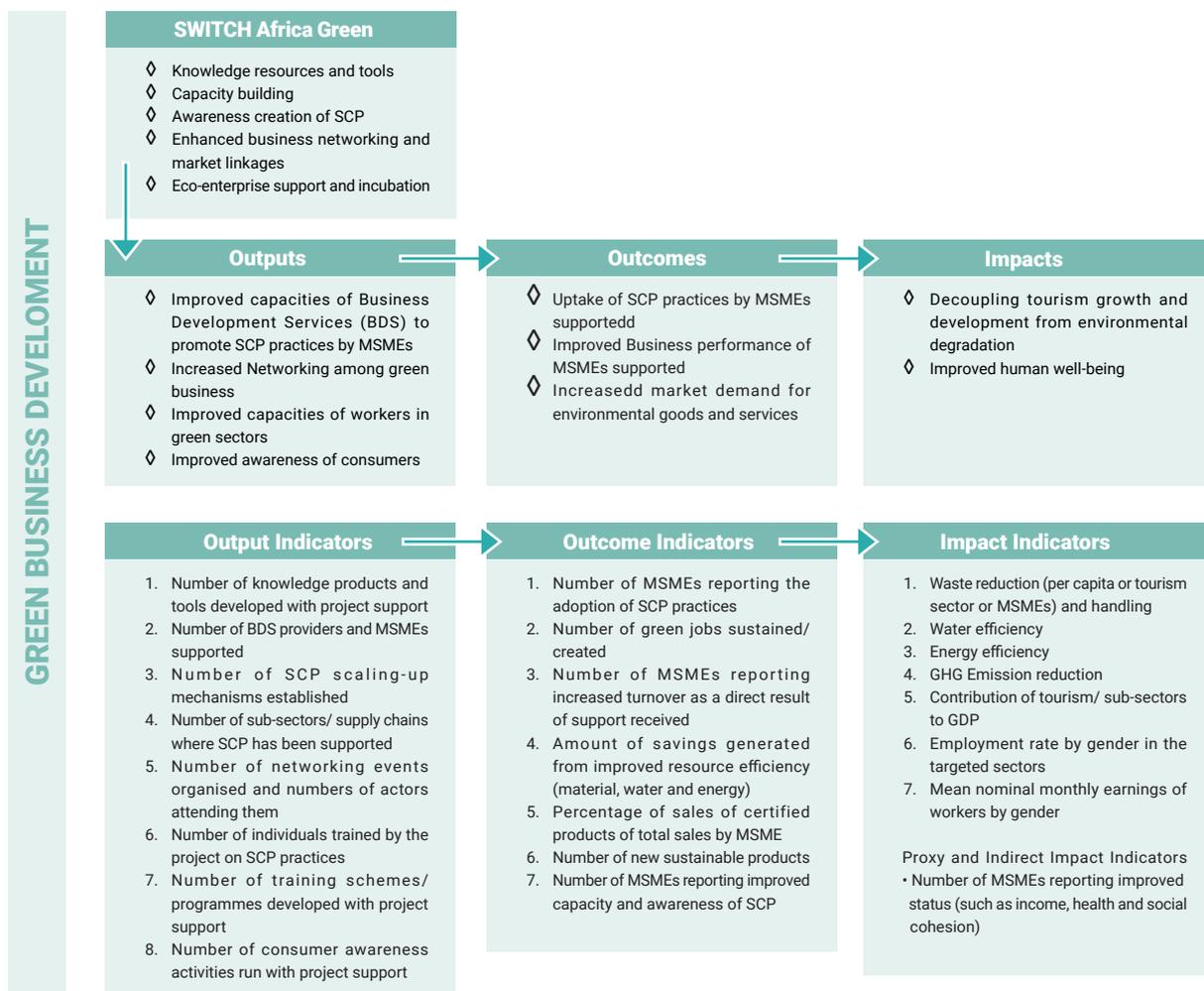


Figure 5.5: Green business development outputs, outcomes and impacts for SWITCH Africa Green

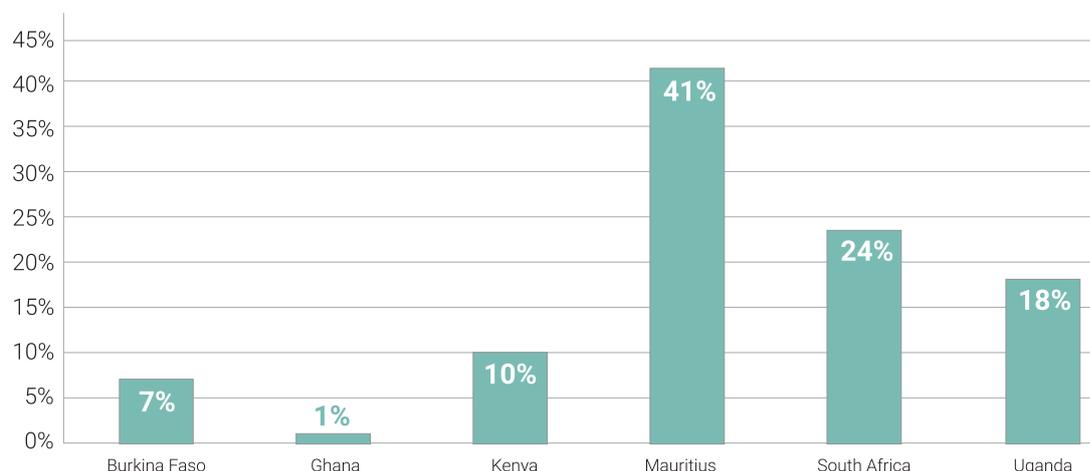


Figure 5.6: Distribution of surveyed MSMEs in the agriculture sector

Economic indicators:

- ◆ 62 per cent reported learning new technical and production skills, and 12 per cent indicated acquiring resource and business management skills in areas such as organic farming; weed and pest control and management; organic disease control and management; pre-harvest, harvesting, and post-harvest management; permaculture; certification; standards; market requirements; rangeland management; and animal nutrition and health.
- ◆ 91 per cent reported acquiring new business skills in areas such as bookkeeping, record keeping, entrepreneurship, marketing, communications, etc.
- ◆ Over 50 per cent indicated new business opportunities from expansion and new products.
- ◆ 61 per cent reported increased sales turnover.

Social indicators:

- ◆ 48 per cent of new jobs (9,983 jobs) were created due to implementing the SWITCH Africa Green programme.
- ◆ 63 per cent indicated improved health and safety at the workplace.

Environmental indicators:

- ◆ 52 per cent of the enterprises implemented water-efficiency interventions, including reuse, rainwater harvesting, water conservation, and installation of water-

saving devices.

- ◆ 18 per cent of the enterprises adopted energy-efficient technologies, such as solar water pumps and energy-saving stoves.
- ◆ 39 per cent of the enterprises depend on rain-fed agriculture through the implementation of rainwater harvesting interventions, thus underscoring the need for water-use efficiency and conservation.
- ◆ 63 per cent of the enterprises implemented waste reduction measures, i.e., reduce, reuse, and recycle (3R), including composting, use of waste for mulching, and use of waste as fuel.

MANUFACTURING

Manufacturing was identified as a priority sector in all six participating countries. During the programme's first phase, an estimated \$5,218,362 was provided to support various green manufacturing projects, benefitting 724 enterprises across the six participating countries. The distribution of the MSMEs surveyed by country is provided in Figure 5.7. The overall project objective is to decouple industrial growth from waste generation and adverse environmental effects whilst providing opportunities for social and economic enhancement (SWITCH Africa Green, 2020b).

Economic indicators:

- ◆ 51 per cent reported staff acquiring technical and production skills, and 27 per cent reported an improvement in business

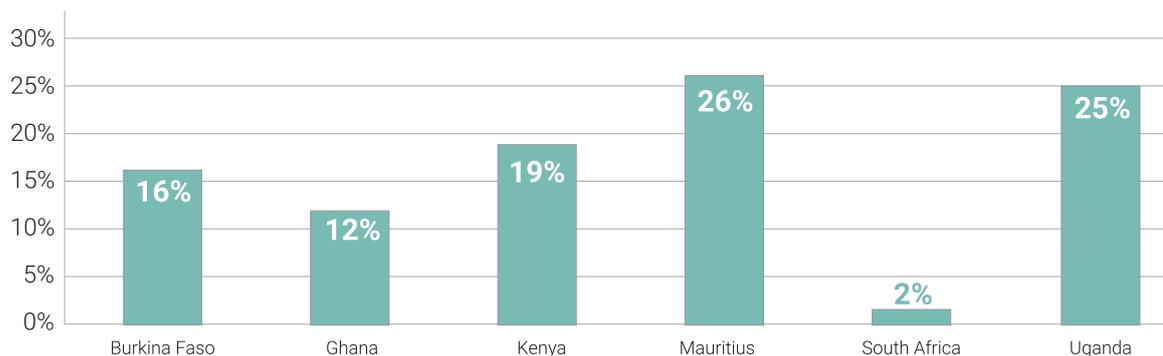


Figure 5.7: *Distribution of surveyed MSMEs in the manufacturing sector*

and resource management skills. These include water and energy management, occupational safety, waste management, recycling, record keeping, product development, marketing and environmental conservation.

- ◆ 82 per cent reported acquiring new business skills in areas such as bookkeeping, record keeping, entrepreneurship, marketing and communications, and technical skills.
- ◆ 76 per cent of the MSMEs recorded increased sales turnover as a direct result of the programme.
- ◆ 59 per cent of the surveyed enterprises reported new opportunities arising through business expansion, new products, improved resource management and access to new technologies.

Social indicators:

- ◆ 58 per cent reported that new jobs (3,470 jobs) had been created during the implementation of the SWITCH Africa Green programme.
- ◆ 51 per cent indicated an improvement in economic activity.
- ◆ 13 per cent reported an improvement in social cohesion.
- ◆ 62 per cent reported an improvement in health and safety.

Environmental indicators:

- ◆ 61 per cent reported implementing 3R interventions.

- ◆ 48 per cent of the enterprises implemented waste reduction and reuse measures involving recycling, reuse and production of new products, and 13 per cent implemented recycling interventions.

INTEGRATED WASTE MANAGEMENT

The integrated waste management sectoral intervention supported industrial symbiosis, waste to compost and energy, municipal waste management services, and e-waste management subsectors. An estimated \$2,837,412 was provided to fund integrated waste management projects, benefitting 964 enterprises across the six participating countries. The distribution of the MSMEs surveyed by sub-sector is shown in Figure 5.8. Note that not all countries had projects implemented in all the sub-sectors. The overall project objective is to decouple growth from waste generation and adverse environmental effects whilst contributing to human well-being (SWITCH Africa Green, 2020c).

Economic indicators:

- ◆ 89 per cent reported an increased capacity of personnel to implement sustainable consumption and production practices, with 72 per cent in biogas and 100 per cent in municipal waste management services.
- ◆ 64 per cent and 25 per cent reported enhanced technical, business and resource management skills, respectively.
- ◆ 83 per cent of the surveyed enterprises

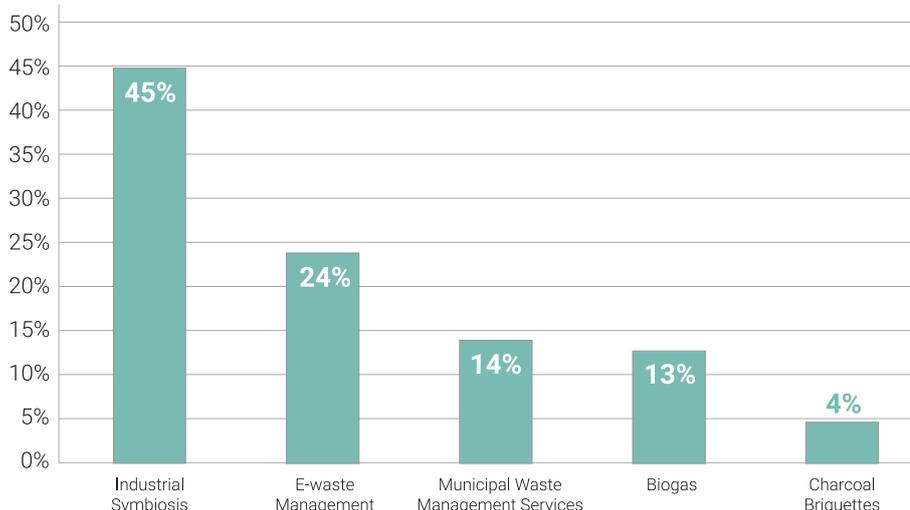


Figure 5.8: *Distribution of surveyed MSMEs in the integrated waste management sector*

reported improved business skills in areas such as bookkeeping, record keeping, business planning and management, and technical skills.

- ◆ 71 per cent reported new business opportunities from new products obtained from waste, business expansion and adoption of new technologies.
- ◆ 74 per cent recorded increased sales revenue attributed to improved production processes, marketing strategies and better business processes.

Social indicators:

- ◆ 68 per cent reported that new jobs (2,683 jobs) had been created during the implementation of the SWITCH Africa Green programme, with 63 per cent of these created in the industrial symbiosis subsector.
- ◆ 73 per cent reported improved working conditions due to using personal protective equipment (PPE) and implementing procedures to protect workers from health and safety hazards.

Environmental indicators:

- ◆ 73 per cent implemented 3R interventions, with 50 per cent in the biogas subsector and 91 per cent in the e-waste management subsectors.

TOURISM

SWITCH Africa Green-supported projects in the sustainable tourism sector were carried out in Uganda, Mauritius and Kenya. During the programme's first phase, an estimated \$699,980 was provided to support various sustainable tourism projects, benefitting 33 enterprises during the implementation period. The distribution of the MSMEs surveyed by country and type of business is provided in Figure 5.9. The overall project objective is to decouple tourism growth from waste generation and adverse environmental effects whilst providing opportunities for social and economic enhancement (SWITCH Africa Green, 2020d).

Economic indicators:

- ◆ 94 per cent indicated improved staff capacity to implement sustainable consumption and production practices, with about 50 per cent in technical skills and 41 per cent in business management.
- ◆ 76 per cent of the MSMEs reported implementing policy changes during the project, including waste management and efficient energy-use and water-use policies.
- ◆ 65 per cent reported the emergence of new business opportunities, including community-based tours and products, organic farming, tour guiding, camping facilities, etc.
- ◆ 65 per cent reported increased sales turnover attributed to improved product

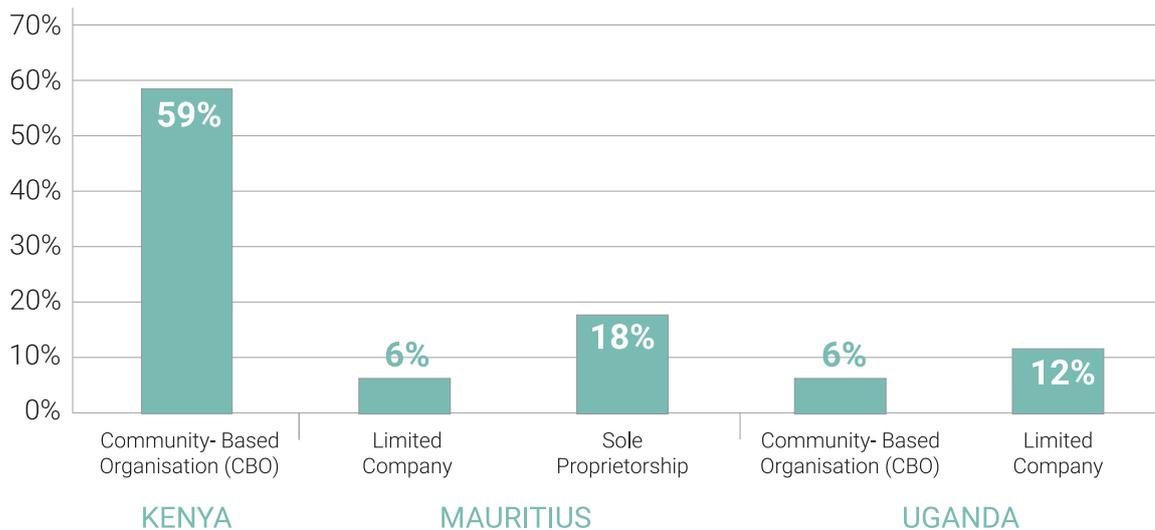


Figure 5.9: *Distribution of MSMEs surveyed in the tourism sector*

quality and marketing strategies. However, there are challenges associated with seasonality in the sector.

- ◆ 47 per cent recorded an increased reduction in production costs.
- ◆ 88 per cent noted improvement in business and production processes, sustainable consumption and production-based resource management, networking, and partnership.

Social indicators:

- ◆ Over 75 per cent reported creating new jobs (267 jobs) during programme implementation.
- ◆ 76 per cent reported a more cohesive and inclusive community.
- ◆ 59 per cent indicated an improvement in workplace health and safety.

Environmental indicators:

- ◆ 65 per cent implemented energy efficiency initiatives.
- ◆ 88 per cent implemented 3R interventions, including water and energy efficiency and waste management interventions.

5.2.3 Lessons learnt and recommendations from SWITCH Africa Green

Applying sustainable consumption and production patterns and practices in the four priority sectors offers multiple social, environmental, and economic benefits and opportunities. However, various challenges were experienced while implementing the SWITCH Africa Green initiatives. These challenges, when addressed, translate into opportunities to support the transition to an inclusive green economy and constitute part of the lessons learnt for future initiatives. From the implementation reports, the need for financial support was a recurring challenge identified in all the priority sectors, while lack of resources and behavioural change cut across at least three sectors. Other challenges included a lack of sustainable standards, trade and markets, lack of government support/policy, compliance with sustainable consumption and production, awareness creation and capacity building.

Further lessons learnt were discussed during the Regional Consultative Workshop held in Cairo from 22 - 24 May 2023. The major challenges that continue to hinder progress for a green, resource-efficient and more inclusive economy include poor public and policymaker awareness of the benefits of resource efficiency, policy gaps creating a bottleneck to advancing

the greening agenda, limited information and expertise on green manufacturing technology and practices, and further bottlenecks in opportunities for accessing green financing mechanisms. This results in a lack of technical support for implementing green innovations and diminishes the enforcement of environmental regulations and standards.

Key learning milestones include opportunities for service exchange provided by industrial symbiosis, collaborative work with research and universities on technology innovation, and catalysing policy transformation through pursuing business opportunities

from industrial waste generation profiling. Ethiopia launched SWITCH Africa Green in 2019, and the programme has been essential in advancing alternative renewable energy sources for irrigation, developing green industrialisation policy and incentives, and introducing innovative agricultural waste management streams for coffee husks. The main lessons learnt in Ethiopia include the need for streamlining guidance for renewable technologies, establishing credit facilities or revolving fund schemes for procuring renewable energy technologies, developing comprehensive renewable technology policies and guidelines for irrigation,

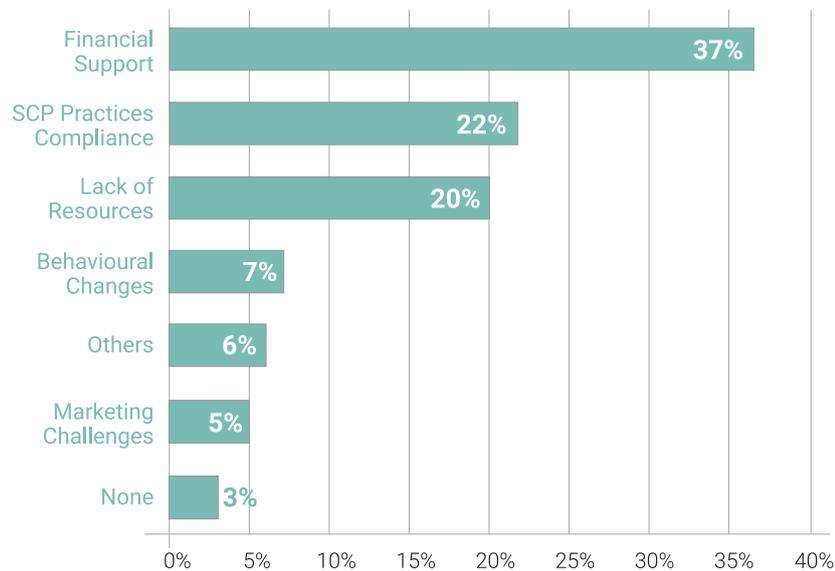


Figure 5.10: Challenges faced by MSMEs in sustainable agriculture

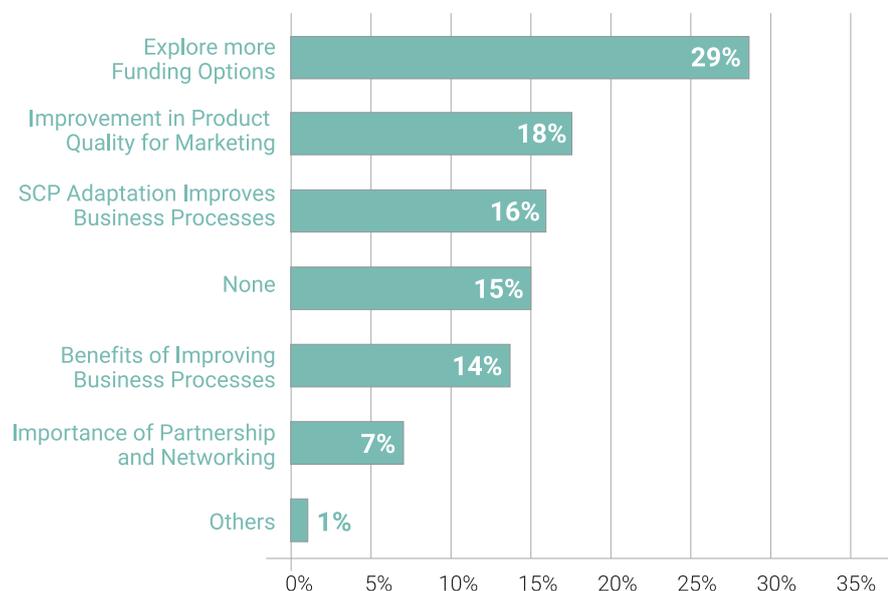


Figure 5.11: Lessons learnt from the implementation of sustainable agriculture projects

and capacity building and technical assistance for local suppliers to be able to provide after-sales services.

AGRICULTURE

Common underlying challenges within the projects implemented to support adopting sustainable agriculture practices revolved around financial support, resource constraints, market access, policy, environment and behavioural change, as shown in Figure 5.10 (SWITCH Africa Green, 2020a).

The various lessons learnt by the surveyed enterprises during the implementation of the projects are summarised in Figure 5.11.

The following recommendations were made based on the identified challenges, findings, and lessons learnt (SWITCH Africa Green, 2020b):

- ◆ Financing the transition to sustainable agriculture is significant and should be given priority. Funding solutions should include innovative green financing mechanisms and fiscal incentives. Public investment in infrastructure and protection of the environment should leverage resources from the private sector through public-private partnerships.
- ◆ Continued capacity building, knowledge sharing and awareness creation are required on relevant sustainable consumption and production principles, business and technical skills.

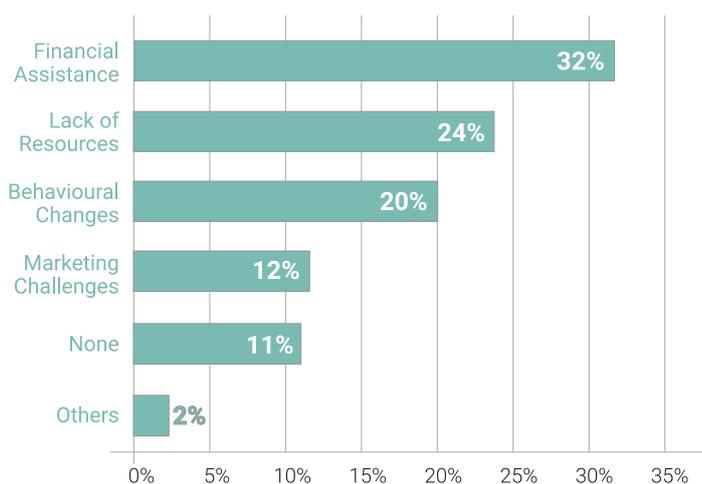


Figure 5.12: Challenges faced by MSMEs in sustainable manufacturing

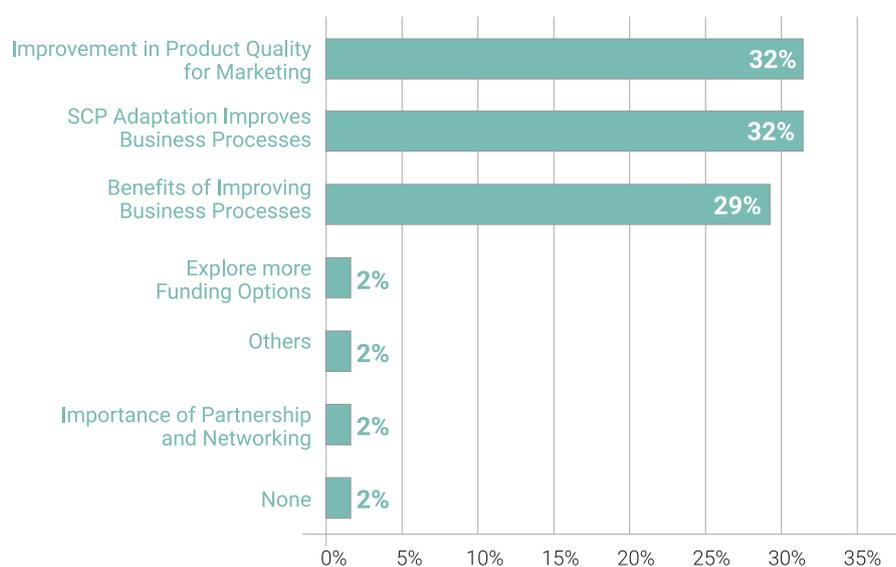


Figure 5.13: Lessons learnt from the implementation of sustainable manufacturing projects

- ◆ For the private sector to thrive in sustainable agriculture, there is a need to align the policy and regulatory environment to support sustainability in agriculture, including measures such as offering fiscal incentives, green procurement policies and tax incentives.
- ◆ Strengthen institutional capacity in the public sector for effective policy coordination and implementation.
- ◆ Innovative solutions need to be developed that allow the consideration of climate change impacts on sustainable agriculture, including permaculture, conservation, urban agriculture and the use of traditional knowledge and systems of coping.
- ◆ Other critical policy dimensions include rural infrastructure, agricultural research, extension services and innovation systems.

MANUFACTURING

In transitioning to green manufacturing, the key challenges to the uptake of sustainable consumption and production practices identified by the participating enterprises and other stakeholders revolve around financial assistance, lack of resources, behavioural and marketing challenges, and the need for an enabling policy landscape. These challenges are summarised in Figure 5.12.

The various lessons learnt by the surveyed enterprises during the implementation of the projects are summarised in Figure 5.13.

Based on the findings from the implementation of the projects, the SWITCH Africa Green Sustainable Manufacturing in Africa Report presented the following recommendations (SWITCH Africa Green, 2020b):

- ◆ Financing the transition to sustainable manufacturing should be given priority. It should include utilising innovative instruments that leverage local and international finance sources to support investment in green technologies and water and energy efficiency.
- ◆ Capacity building and knowledge sharing

are required to support the adoption of relevant sustainable consumption and production principles, including adopting and adapting relevant technologies, health and safety, resource efficiency and clean production techniques.

- ◆ Strengthen regional and national mechanisms to support sustainable consumption and production in the manufacturing sector, including the African Roundtable on Sustainable Consumption and Production and National Cleaner Production Centres.
- ◆ Align the policy and regulatory environment to support the greening of the manufacturing sector from both the supply and demand aspects using an integrated approach. Include key areas such as supporting investments in water and energy efficiency through fiscal incentives, promoting markets for green manufactured goods and technologies, supporting MSME compliance with product quality and environmental standards, implementing extended producer responsibility measures, and developing an enabling policy environment to exploit the opportunities presented through industrial symbiosis and circular economy.

INTEGRATED WASTE MANAGEMENT

While the SWITCH Africa Green integrated waste management projects facilitated the actualisation of multiple benefits such as income generation, job creation and pollution reduction, the beneficiary enterprises and relevant stakeholders also identified several challenges requiring attention to increase the uptake of sustainable consumption and production practices in the sector. Figure 5.14 shows the key challenges identified, including financial support needs, resource constraints, behavioural changes, marketing requirements, an enabling policy environment, and the compliance burden of sustainable consumption and production practices (SWITCH Africa Green, 2020c).

The various lessons learnt by the surveyed enterprises during the implementation of the projects are summarised in Figure 5.15.

The support from the SWITCH Africa Green initiative has set in motion the processes and necessary capabilities for long-term change in resource efficiency and waste management vis-à-vis decoupling and improved well-being. However, to maintain this momentum, the following recommendations based on the identified challenges, findings and lessons learnt were made:

- ◆ Capacity development and knowledge sharing should be expanded to cover appropriate technologies and practices in alternative waste treatment and resource recovery technologies. Capacity development should be extended to government officials focusing on governance and the policy environment to support the private sector in industrial symbiosis and circular economy areas.
- ◆ Effective partnerships and collaboration between government, civil society, private sector, academia, and development partners to exploit the potential benefits in the integrated waste management sector as well as the policy, legal and regulatory environment.
- ◆ Public attitude and waste management awareness regarding open dumping, littering, and waste segregation need improvement.

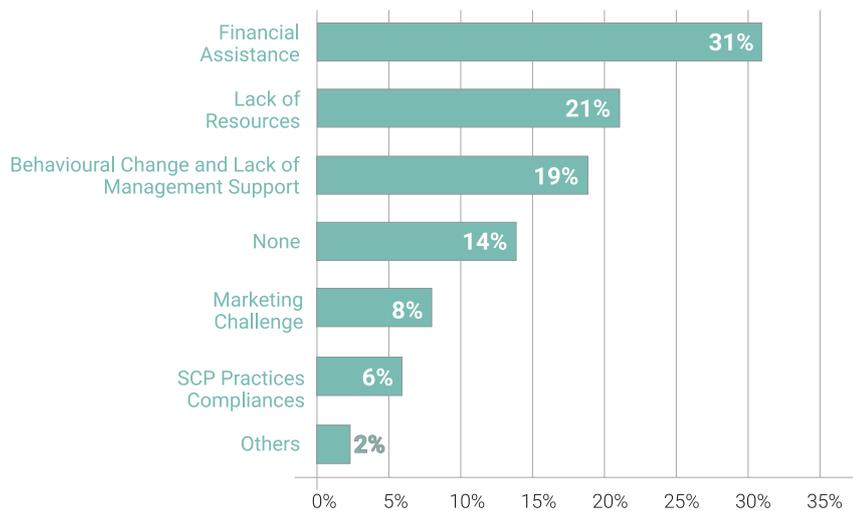


Figure 5.14: Challenges faced by MSMEs in integrated waste management

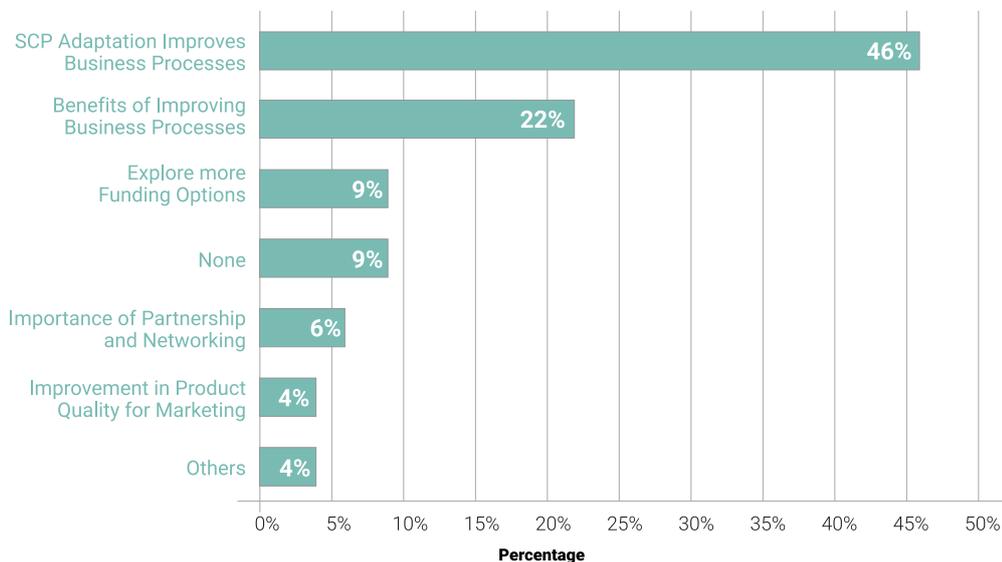


Figure 5.15: Lessons learnt from the implementation of integrated waste management



- ◆ Concerted efforts are needed to address competitiveness and market access challenges for green products, including the use of fiscal incentives and sustainable public procurement policies.
- ◆ Institutional capacity for policy implementation should be prioritised as part of the efforts to strengthen the policy and regulatory environment.
- ◆ Establish a regional platform to support the transition to a circular economy.
- ◆ Innovative green financing mechanisms are required to support MSMEs in the integrated waste management sector.
- ◆ Establish a regional platform to facilitate sharing best practice information and policy dialogue among stakeholders on transitioning to a circular economy.

During the Regional Consultative Workshop held in Cairo in May 2023, it was emphasised that integrated solid waste management needs critical attention regarding policies, regulations, strategies and standards for all economic sectors. There is an urgent need for the Ethiopian Government to create an appropriate integrated solid waste management strategy, and in order to address the lack of ownership, this strategy should be developed under the leadership of the Ethiopian Environmental Protection Authority.

TOURISM

Findings from implementing sustainable tourism projects suggest that its adoption and practice provide opportunities for generating income and employment while embracing

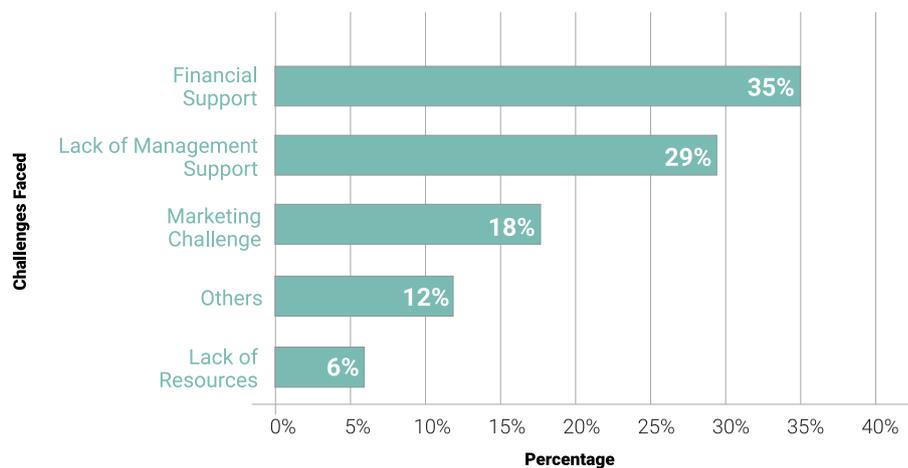


Figure 5.16: Challenges faced by MSMEs in sustainable tourism

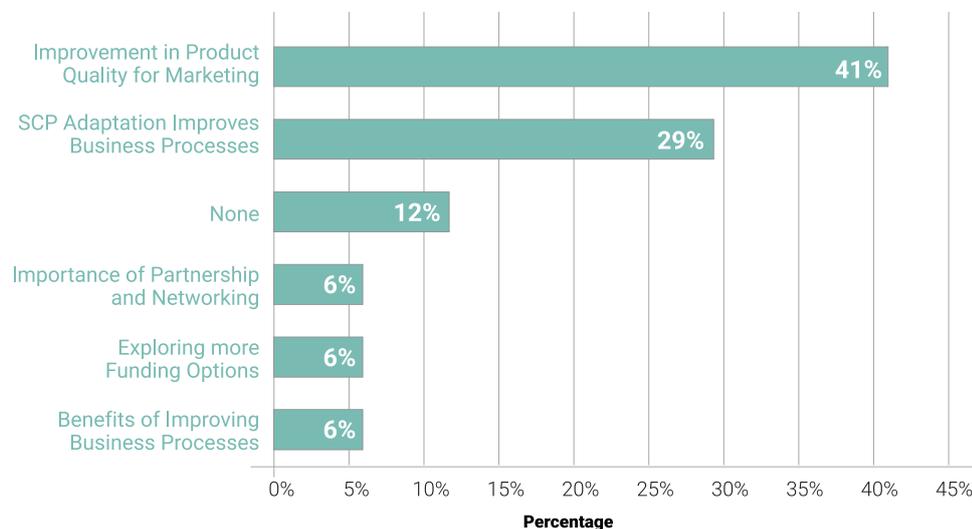


Figure 5.17: Lessons learnt from the implementation of sustainable tourism projects

practices that promote environmental sustainability, thereby fostering inclusive growth. The key challenges identified while implementing sustainable consumption and production measures in the sustainable tourism sector include the need for financial support, resource constraints, governance around community-based tourism initiatives, policy landscape, trade and marketing, and behavioural change (SWITCH Africa Green, 2020d). Figure 5.16 summarises these challenges.

The various lessons learnt by the surveyed enterprises during the implementation of the projects are summarised in Figure 5.17.

To transition to sustainable tourism, the following recommendations for long-term and sustainable change were made based on the identified challenges, findings and lessons learnt:

- ◆ Resources need to be mobilised to finance and invest in the transition to sustainable tourism, including leveraging the private sector and developing green financing mechanisms, whilst the government invests in relevant infrastructure and finances the protection and management of natural and cultural resources.
- ◆ Continuous capacity building and knowledge sharing for MSMEs should be enhanced in areas such as sustainable consumption and production practices, eco-innovations, workbooks and toolkits to support MSMEs, eco-tourism, standards, and certification, and community-based tourism.
- ◆ An integrated approach to policy is recommended as sustainable tourism is multi-sectoral with multiple stakeholders and requires effective policy coordination across different levels of government and sustainable consumption and production while supporting community participation. Other important dimensions include mainstreaming sustainable consumption and production in the

planning process, supporting women and youth participation, reducing seasonal variations, data collection on sustainable tourism to facilitate decision-making and monitoring, and addressing external factors that impact the competitiveness of the tourism industry.

- ◆ Partnerships and networking for strong branding and sustainable tourism development, including certification, standards, and joint marketing strategies.
- ◆ Develop effective development models for community-based tourism that address governance, benefits sharing, capacity building, and the development of tourism value chains.

5.3 SwitchMed

The SwitchMed initiative was launched in 2013 with the goal of achieving a circular economy in the southern Mediterranean by changing the way goods and services are produced and consumed. This would ensure that human development and satisfying human needs are decoupled from environmental degradation. To accelerate this shift to sustainable consumption and production, SwitchMed provides tools and services directly to the private sector, supports and enables the policy environment, and facilitates information exchange among key stakeholders. In this regard, the programme has three interlinked components through which stakeholders are supported and connected to scale-up eco- and social innovations (SwitchMed, 2023a; SWITCH to Green, 2023c):

- ◆ Policy - developing a regional sustainable consumption and production action plan for the Mediterranean region and eight national action plans for the participating countries.
- ◆ Demonstration - develop activities linking the policy component of the programme and the private sector.
- ◆ Networking - exchanging good practices, joint learning and scaling up.

SwitchMed works with stakeholders in order to catalyse the market of sustainable products and services in the Mediterranean through the following means:

- ◆ Capacity building for industry service providers targeting SMEs for resource efficiency improvements.
- ◆ Training start-ups and established entrepreneurs to build skills in design, business planning, marketing, and financing of sustainable products and services.
- ◆ Engaging policymakers to establish a regulatory and policy framework that enhances the market for sustainable products and services.
- ◆ Empowering citizens and civil society organisations as leaders of socially innovative solutions that can address environmental challenges.
- ◆ Develop an Action Network of stakeholders to connect with similar initiatives and networks, exchange information, and scale up current activities.

The initiative is funded by the EU and executed by UNIDO, UNEP Economy Division, and MedWaves, the UNEP/ Mediterranean Action Plan Regional Activity Centre for Sustainable Consumption and Production, in close coordination with the Directorate-General for Neighbourhood and Enlargement.

Benefitting eight countries in the Southern Mediterranean: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine and Tunisia, SwitchMed supports policymakers, eco-innovative SMEs, industries and startups that have identified job creation and the protection of natural resources as priority issues that contribute to the economic stability of these countries. Apart from ensuring sustainable consumption and production patterns (SDG 12), SwitchMed also contributes to the achievement of several SDGs in these countries, including:

- ◆ SDG 8 - Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- ◆ SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation.
- ◆ SDG 17 - Strengthen the means of implementation and revitalise the global partnership for sustainable development.

In alignment with the European Commission's New Circular Economy Action Plan, SwitchMed's design has been entrenched with measures for normalising sustainable products and empowering consumers, as well as focusing on sectors such as plastics, textiles and food that have high resource utilisation and a high potential for circularity.

The first phase of the initiative, which took place between 2013 and 2018, had a total funding of €24 million, and some of the results achieved include (SwitchMed, 2023b.):

- ◆ Training of over 1500 national stakeholders, 2300 entrepreneurs and 160 civil society organisations,
- ◆ Developing one Regional Action Plan and one Roadmap towards a circular economy,
- ◆ Developing eight Sustainable Consumption and Production National Action Plans,
- ◆ Implementing 20 demonstration pilot projects,
- ◆ Impacting over 30,000 direct jobs and contributing to the creation of over 1000 green jobs and 200 green companies,
- ◆ Incubating 48 green entrepreneurs and 14 civil society initiatives,
- ◆ €1.4 million raised and a potential investment of €2.15 million raised by the green entrepreneurs,
- ◆ €41.7 million in annual production cost savings for 125 industries,
- ◆ 197,525 tonnes of carbon dioxide avoided, and
- ◆ 1,830 resource-efficient and cleaner production measures identified in 125 industries.

How is SwitchMed integrating SCP into national policies?

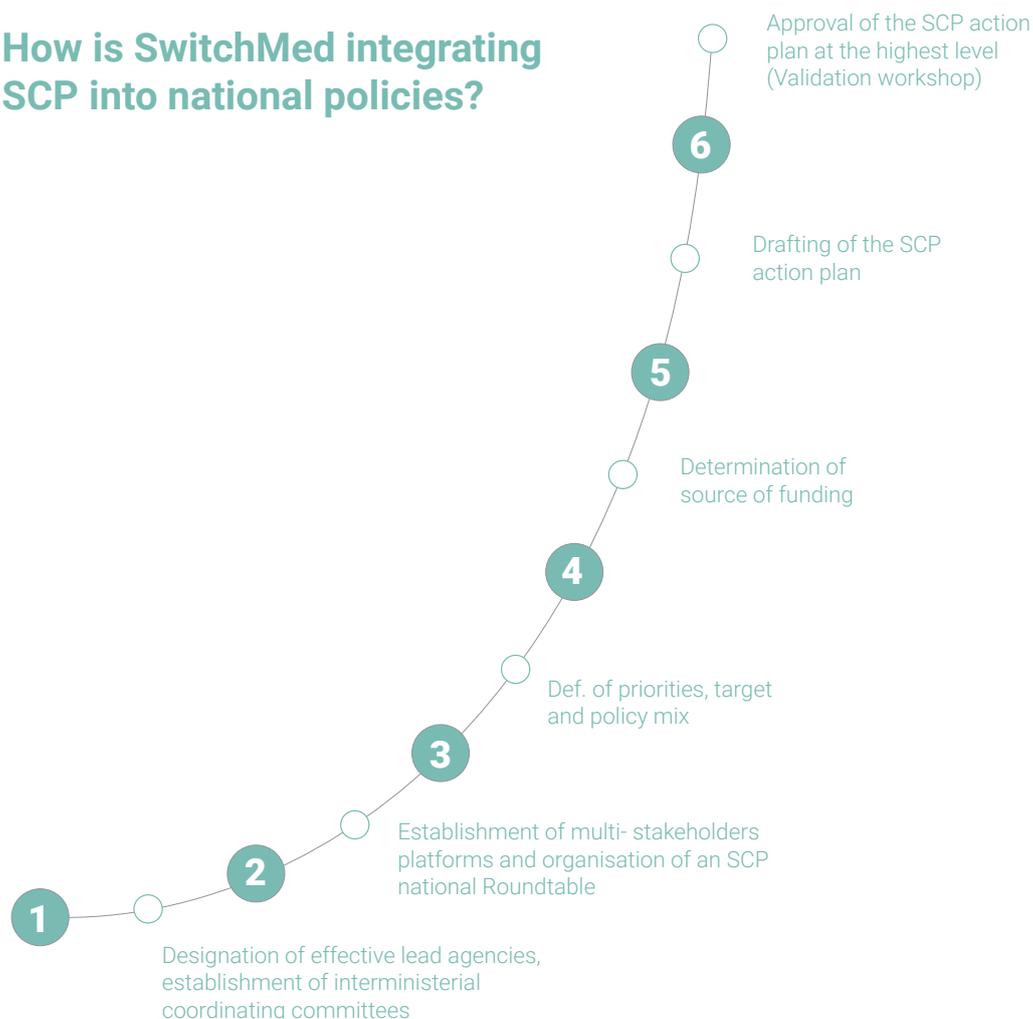


Figure 5.18: Roadmap to integrating sustainable consumption and production into national policies (SwitchMed, 2018e)

In implementing the policy component of the SwitchMed programme, establishing Sustainable Consumption and Production National Action Plans and identifying them was a crucial first step in a country's response to achieving the SDGs. This is key in kick-starting an ecosystem that enables mainstreaming sustainable consumption and production. The national plans developed by each participating country were tailored to the specific country's needs and circumstances, allowing synergies and integration with national development plans and strategies, while the implemented demonstration projects promoted the implementation of policies and circular economy measures in priority sectors selected by the participating countries. Figure 5.18 shows a general roadmap of how the Sustainable Consumption and Production National Action Plans were created in each country.

5.3.1 Overview of SwitchMed demonstration projects

The demonstration component of the SwitchMed programme is divided into three sub-components: sustainable production, green entrepreneurship and civil society empowerment, and sustainable consumption and production National Action Plans demonstration. The demonstration sub-component aimed to implement demonstration activities on the Sustainable Consumption and Production National Action Plans within the SwitchMed policy umbrella (UNIDO, 2019). A total of 20 demonstration projects were implemented across the eight participating countries. The following sections focus on the four SwitchMed countries located in North Africa: Algeria, Egypt, Morocco, and Tunisia.

ALGERIA

Algeria's National Action Plan on Sustainable Consumption and Production was developed as part of the SwitchMed programme and is a tool used to implement the country's National Plan for the Environment and Sustainable Development. The National Action Plan on Sustainable Consumption and Production has three priority areas:

- ◆ Integrating sustainable consumption and production patterns into national policies and plans.

- ◆ Promoting renewable energy development and energy efficiency to ensure the transition to cleaner energy.
- ◆ Developing a zero-waste economy by 2030.

Two pilot projects were implemented in Algeria during the first phase of SwitchMed as a demonstration of promoting the implementation of policies and actions on the ground in the country. The following is an example of one of the projects:

PROJECT TITLE:

Atelier Le Printemps (Textile Waste Recycling and Upcycling)

PROJECT OBJECTIVE:

Sourcing high-quality fabrics is a challenge in Algeria as the majority are imported and do not necessarily meet quality standards. Atelier le Printemps is a small-sized family business determined to convert their passion for sewing into successful green businesses. Scrap fabrics are reused to make bedding, clothes, bags, custom boxes, dolls, etc. (SwitchMed, 2018d). The project aimed to support Atelier le Printemps to upcycle discarded fabrics from factories, businesses and homes into garments and other accessories with fully customised fabric patterns, while being environmentally responsible. The project proponents produce their own natural dyes to reduce the impact of these chemicals on the environment. SwitchMed provided key training sessions to help strengthen their business model based on circular economy principles and they participated in training workshops on eco-design principles and silk-screening printing. This intervention helped the enterprise eliminate chemical wastes from dyes, value raw material adaptability, and adjust its products to market trends.

PROJECT BENEFITS:

- ◆ An increase of 67 per cent in textile waste recycled and upcycled between 2017 and April 2018.
- ◆ A 30 per cent increase in sales between June 2017 and February 2018.
- ◆ Creation of 16 new products using recycled waste and innovative sustainable design techniques whilst focusing on an increase in water and energy efficiency.
- ◆ Plastics and other unsustainable synthetic fabrics were eliminated from the production process with a greater emphasis on using natural cotton, gunny and linen, thereby improving the quality of the raw materials used.
- ◆ Creation of 2 green jobs for women staff.
- ◆ Training workshops on eco-design and circular economy for textile products to foster the knowledge and expertise of the staff.
- ◆ Establishment of an enabling network in the region of Bejaia to create awareness and capacity-building initiatives on circular economy concepts for textile products, including the organisation of nine workshops for local children.

EGYPT

The Sustainable Consumption and Production Action Plan for Egypt is a significant milestone that contributes towards a continuum of knowledge accumulation for the national integration of sustainability into Egypt's key economic sectors. The plan, which reflects the country's socioeconomic and environmental needs and ambitions, targets four priority sectors: agriculture, energy, water and municipal solid waste. The key strategic goals of these sectors are:

- ◆ Agriculture - drive economic activities and create jobs and other services for the peoples of Egypt by promoting sustainable rural agricultural communities as part of the 1 million-feddan project.
- ◆ Energy - promote both energy efficiency and utilising renewable energy to ensure the sustainability of the energy sector.

- ◆ Water - promote sustainable and efficient water utilisation from all sources based on the 2030 national wastewater strategy to extend wastewater treatment for agricultural uses.
- ◆ Municipal Solid Waste - develop an integrated solid waste management system (SwitchMed, 2023c).

At the end of 2018, two pilot projects were implemented in Egypt during the first phase of SwitchMed based on the priorities articulated in the country's Sustainable Consumption and Production National Action Plan. The following is an example of one of the projects implemented to adopt circular economy measures:

PROJECT TITLE:

Reducing Plastic Bag Consumption

PROJECT OBJECTIVE:

The consumption of plastic bags in Egypt is largely unrestrained and was at an average of 124 bags per person in 2015, equivalent to 12 billion bags annually. These bags, given away for free at shops and supermarkets, are not properly disposed of and litter the streets and waterways, including the Nile, Mediterranean, and the Red Sea (UNEP, 2023d). This pilot project aimed to raise awareness of the environmental harm caused by plastic bags and eventually cause a behavioural change by lobbying for a levy on single-use plastic bags charged by retailers at the point of sale. The pilot project activities included stakeholder identification and the production of a baseline study to identify alternative bags achieved through consultation sessions in collaboration with the Plastic Technology Centre of the Egyptian Ministry of Trade and Industry.

PROJECT BENEFITS:

- ◆ The reduction in the use of plastic bags contributes to environmental and ecosystem conservation by minimising littering and waste. It also contributes to resource conservation by promoting sustainable alternatives.
- ◆ Climate change mitigation from reducing greenhouse gas emissions associated with plastic bag production, transportation and disposal.
- ◆ Alternative bags were distributed to 72 branches of seven hypermarkets within Cairo, and biodegradable bags were distributed through a private-public partnership arrangement between key stakeholders.
- ◆ An awareness-raising campaign was prepared for dissemination through various media channels and launched on World Environment Day in June 2017.

MOROCCO

Morocco's National Action Plan for Sustainable Modes of Consumption and Production is framed around four priority sectors based on its relevance to the implementation of existing commitments from the Barcelona Convention, the environmental impacts generated by the sectoral activities, and contribution to the Mediterranean economies, ecological footprint, and social well-being. These sectors include food and agriculture, goods production, tourism, and housing and construction (SwitchMed, 2018b).

During the process of preparing the National Framework Plan for Sustainable Modes of Consumption and Production in Morocco, seven strategic orientations providing a reference framework and actions to promote sustainable consumption and production were defined (UNEP, 2020):

- ◆ Anticipating economic and behavioural changes that are connected to ecological transition.

- ◆ Encouraging national companies to actively participate in the process of sustainable production.
- ◆ Support for the development of green chains.
- ◆ Promoting a circular economy and one based on low carbon intensity.
- ◆ Implementing systems of ecological labelling and environmental certification.
- ◆ Promoting environmentally responsible consumption.
- ◆ Disseminating information and raising awareness.

Three pilot projects were implemented in Morocco during the first phase of the SwitchMed programme as a demonstration of promoting policy and action implementation on the ground. The following is an example of one of the projects that align with the eco-construction, sustainable buildings and sustainable agriculture sectoral plan of the Sustainable Modes of Consumption and Production:



Photo Credits: SWITCH Africa Green

PROJECT TITLE:**Biodôme du Maroc (Biogas Plant)****PROJECT OBJECTIVE:**

In Morocco, the financial burden on farmers to irrigate their land is high as they use fossil fuels to run generators that pump water for irrigation and other uses. This practice is not only expensive, it also has environmental impacts and presents difficulties in transporting fuel to rural areas. To address these challenges, Biodôme du Maroc offers methane and compost transformed from organic waste to the farmers to cover their soil fertiliser and energy needs. SwitchMed selected and supported four beneficiaries, including the founder of Biodôme du Maroc, in building a collective biogas plant to benefit an agricultural cooperative, Ouled Abdoun, in the region of Khouribga. The biogas plant, which belongs to the cooperative, is managed by the founder of Biodôme du Maroc and allows the cooperative members to develop a new circular economy model. The biogas produced from agricultural waste is used as an energy source and the compost is used internally and sold to external users.

PROJECT BENEFITS:

- ◆ National-level replication of the project as a new circular economy model focused on generating biogas and organic fertiliser from local agricultural waste.
- ◆ Additional income-source generation from the sale of compost produced in the biogas plant.
- ◆ Reducing and substituting pesticide use for locally produced organic fertiliser (compost).
- ◆ Reduced energy consumption by farmers of the cooperative taking up locally produced biogas.
- ◆ Improvement in skill sets of targeted unemployed youth related to the farmers, concerning sustainable agriculture and circular economy.
- ◆ Development of public-private synergies – a final national workshop held with all relevant stakeholders.



Photo Credits: SWITCH Africa Green

TUNISIA

The tourism and agri-food industries are considered the highest priority sectors in Tunisia. In this regard, the country developed and adopted a Sustainable Consumption and Production National Action Plan around these sectors over the next ten years (2016-2025).

The objectives of the Ten-Year Agri-food Action Plan are to:

- ◆ Streamline the use of natural resources and minimise the causes of damage (pesticides and waste),
- ◆ Promote and ensure sustainable agricultural practices and activities and local knowledge.

The objectives of the Ten-Year Tourism Action Plan are to:

- ◆ Promote sustainable resource management and encourage collective action,
- ◆ Develop sustainable waste management practices,
- ◆ Improve the quality of the available options

- ◆ and offer environmental certification,
- ◆ Encourage a cohesive social and societal approach,
- ◆ Promote the consumption of products that are local and organic, and
- ◆ Appraise the risk of flooding and coastal erosion (SwitchMed, 2018c).

As part of the first phase of the SwitchMed programme in Tunisia, four pilot projects were implemented to demonstrate mainstreaming sustainable consumption and production measures in priority sector processes and activities aligned with the Sustainable Consumption and Production National Action Plan. One of the projects, which is more aligned with the key priority areas at the regional level, i.e., the Mediterranean Regional Activity Centre for Sustainable Consumption and Production (SCP/RAC), was implemented in Tunisia. The project centred around minimising the detrimental effects of chemicals in the region is as follows:



Photo Credits: SWITCH Africa Green

PROJECT TITLE:

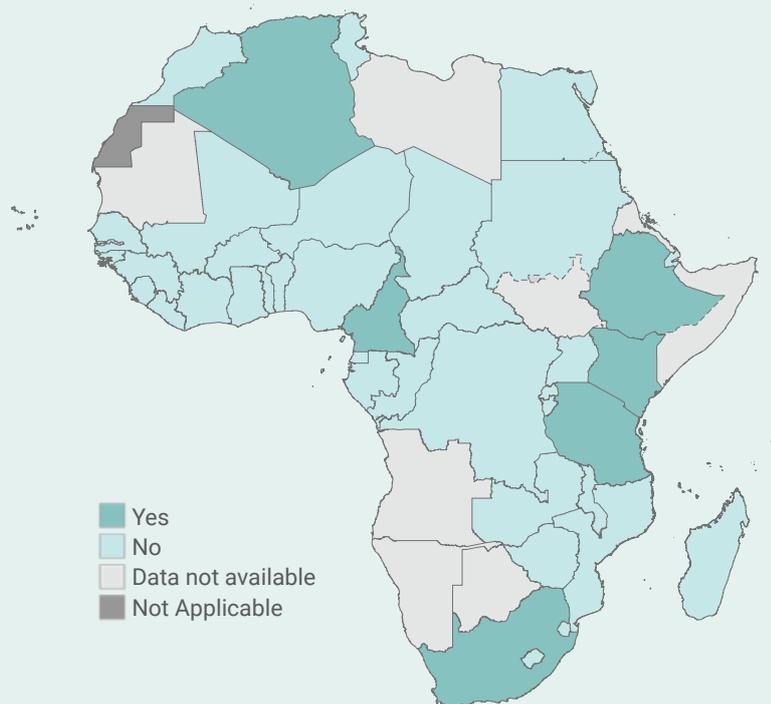
Replacing Lead in Industrial Paint

PROJECT OBJECTIVE:

The use of lead, a toxic heavy metal in industrial and decorative paints, poses a serious threat to long-term human and environmental health. Though its use has been restricted in many countries, it is still used in Tunisia and other Southern Mediterranean countries. Figure 5.28 shows the countries in Africa with lead paint laws as of September 2019. The pilot project aims to tackle the substitution of lead in industrial anti-corrosive paint in Tunisia to minimise the adverse effects of chemicals through awareness creation and the dissemination of technical guidelines.

PROJECT BENEFITS:

- ◆ A fair trade, bringing together important actors who will help in the phase-out of lead and the implementation of safe alternatives, was organised to discuss actions to eliminate lead paint in the Tunisian market.
- ◆ Development of a best practices technical guide tailored to the Tunisian market to encourage the substitution of lead-containing rustproof paints for non-toxic alternatives.
- ◆ Legislation banning the use of lead in paint in Tunisia underway.
- ◆ Creation of eco-labels favouring industries that have made the switch to substitute products.
- ◆ Organisation of an SME cluster to set up financing mechanisms to aid them in switching to lead substitutes in paint.
- ◆ Awareness campaigns on the adverse effects of lead in paint and available substitutes in the market to challenge and spur policymakers into actions supporting industries during the transition to non-toxic alternatives.
- ◆ Scientific research focusing on the development of more sustainable and economically viable alternatives.



Countries with Lead Paint Laws as of September 2019
Data: UNEP

5.3.2 Lessons learnt and recommendations from SwitchMed

The first phase of the SwitchMed programme offers valuable insights and lessons from the various initiatives implemented along its three major components - policy, demonstration and networking. In transitioning to sustainable consumption and production practices and to a green economy, the key obstacles that impact green businesses and the uptake of sustainable consumption and production practices identified by stakeholder assessments include establishing viable business cases and access to funding, enacting regulations that are geared towards circular strategies, insufficient knowledge and support services, a conservative financial sector, insufficient supply chain and cross-sector collaboration, a lack of demand for green and circular products and services, among others.

POLICY AND REGULATORY SUPPORT

The programme's first phase saw the development of the Regional and National Action Plans, which were enacted in alignment with regional and national priorities. This emphasised the significance of an effective top-to-bottom approach that mainstreams sustainable consumption and production and its interlinkages with environmental responsibility into the decision-making processes for different sectors of the green economy. The role of governments in creating an enabling environment through supportive tailored legislation, regulations, incentives and fiscal measures accelerates the transition to sustainable consumption and production practices.

ACCESS TO FINANCE

The need for innovative financial instruments to support sustainable businesses and initiatives was recognised as a significant challenge for implementing sustainable consumption and

production-related projects in the region. The collaboration between development finance institutions, other financial institutions, multilateral and bilateral institutions, and sustainable enterprises can attract and enhance access to finance.

CAPACITY BUILDING, NETWORKING, AND STAKEHOLDER ENGAGEMENT

A key lesson learnt from the programme's first phase is the role of effective stakeholder engagement and collaboration in successfully implementing related projects and initiatives. Collaborative approaches between various stakeholders, including governments, businesses, local communities and civil societies, helped build on existing measures, address multiple needs, promote ownership, and guarantee the sustainability of interventions. Capacity building was also crucial in achieving the planned outcomes of the programme's components, as the need to enhance stakeholders' knowledge, technical and business skills was apparent. The provision of mentorship, training, and technical support enabled the stakeholders, particularly the SMEs, to adopt more sustainable practices. Engaging this diverse range of stakeholders, connecting the relevant actors, and building support networks were necessary for a successful outcome.

SCALING UP SUCCESSFUL INITIATIVES

The programme's ability to measure and monitor the impact of entrepreneurship support programmes ensured that improvement areas were identified and the interventions were effective. With these measures, scaling up successful initiatives and replicating them in other cities and contexts becomes possible, informing future initiatives to promote the uptake and diffusion of sustainable consumption and production in the region. Some recommendations from the

observations and lessons learnt from the first phase of the programme are as follows (SWITCH to Green, 2020):

- ◆ Continuous advocacy for enabling policies and regulations that build upon the successes of the regional and national action plans. Examples of such policies could be establishing Extended Producer Responsibility schemes based on regional/national capacities to incentivise the integration of circularity into product design, imposing waste disposal taxes to incentivise reuse and recycling, establishing green, free zones providing incentives to green/circular SMEs and startups, amongst others.
- ◆ Stimulating consumer demand through the support of awareness creation campaigns on sustainable consumption and production practices among consumers, VAT exemption or reduction for second-hand goods and repair services, supporting verification and certification programmes for the international market, etc.
- ◆ Continuous capacity building and knowledge dissemination are needed. The transition to a circular economy needs to be sustained via supporting incubation and acceleration programs, creating national knowledge centres or networks specialised in the circular economy, encouraging the integration of related modules in educational institutions, supporting targeted information, training, skills and networking opportunities for girls and women, etc.
- ◆ To address the financing gap to implement best practices, there is a need to explore innovative financial mechanisms and partnerships between financial institutions and SMEs.
- ◆ Attracting impact investments, establishing green funds, and facilitating access to grants and loans are imperative for the region's transition to sustainable consumption and production. Building financial management and investment readiness capacity improves the chances of securing finance.
- ◆ Stakeholder engagement and collaboration should be strengthened and prioritised. Collaboration with policymakers can facilitate and contribute to policy change.



Photo Credits: SWITCH Africa Green

5.4 Conclusion

Partnering with the EU's SWITCH to Green initiatives in Africa offers various benefits for businesses. The SWITCH Africa Green for sub-Saharan African countries and SwitchMed for North African countries programmes spotlight and emphasise Africa's numerous market and growth opportunities for business and investments in the sustainable consumption and production ambit of the SDGs. Sustainable consumption and production span several sectors related to sustainable development, as shown by the activities under the SWITCH programme, and businesses looking to expand their operations into new regions and tap into new consumer segments can look to Africa.

Besides providing financial support and incentives to encourage investments in green initiatives, the programme's encouragement and advocacy for the enactment of enabling policies and frameworks that support and create a conducive environment for sustainable investment, increase business confidence and reduce related risks and uncertainties in the African business environment. These policies and reforms facilitate business operations and promote sustainable practices.

The networking and partnership opportunities facilitated by the SWITCH to Green programme allow valuable connections and collaborations to be established between

key stakeholders such as businesses, investors, government, local communities, and civil society organisations. This provides a platform for dialogue and knowledge sharing, connecting businesses with local partners, suppliers and potential clients, accelerating their entrance into African markets.

The SWITCH to Green programme also offers entrepreneurs technical assistance and capacity-building programmes, which helps them navigate the local context and market dynamics relevant to operating in Africa. This improves business readiness to invest and succeed in the continent's markets. Operating in this market offers the opportunity to showcase the sustainability credentials of a business that can then attract eco-conscious investors, partners and consumers. The programme helps businesses build a positive brand image as a differentiating factor in the market.

By addressing key investment barriers and supporting sustainable business opportunities, the SWITCH Africa Green and SwitchMed programmes encourage businesses to participate in Africa's green economy transition and contribute to sustainable development.





CHAPTER

06

Financing for Nature and Private Sector Investments



6.1 Introduction

The intersection of financing for nature and private sector investments presents a compelling and transformative opportunity in today's global landscape. As the world grapples with pressing environmental challenges, there is increasing recognition of the critical role that private sector investment can play in addressing biodiversity loss, land degradation, climate change, and other nature-related sustainability concerns.

By mobilising private capital towards nature-positive initiatives, we can unlock innovative and scalable solutions to preserve and restore ecosystems, promote sustainable resource management, and advance nature-based businesses. This chapter discusses nature-related risks, opportunities and impacts specifically for financial institutions in section 6.1, financing options for nature-based solutions in section 6.2, and investment potential of the African carbon market in section 6.3

6.2 Nature and financial institutions in Africa: Opportunities and Risks

The long-term sustainability of businesses and society depends on the health and security of nature and its ecosystems. An estimated \$44 trillion of economic value generation, representing more than half of global economic output, is moderately or highly reliant on the planet's ecosystems (WEF, 2020). However, most organisations take for granted that nature will continue to provide economic value, and the impact of this unmindful dependency has become increasingly significant over the years. The risks that human activity and economic growth pose on biodiversity and natural systems are becoming more likely and impactful (UNEP FI, 2023). Human interactions with nature result in both physical and transition risks. While the impacts on nature expose business activities to transition risks and opportunities, the dependency on nature exposes businesses to physical risks and opportunities.

In this regard, there is a growing and urgent consciousness for organisations to begin assessing their business operations and investments to shift capital flows away from nature-negative outcomes and towards nature-positive ones. The WWF defines nature positivity as halting and reversing the loss of nature, measured from 2020 levels, by increasing the health, abundance and resilience of species, populations and ecosystems so that by 2030 nature is visibly and measurably on the path to recovery (WWF, 2023b). Nature-positive transactions can potentially create an annual business value of \$10 trillion and 395 million jobs by 2030 (WEF, 2020).

6.2.1 Nature-related risks and opportunities

Physical risks and opportunities can be chronic or acute and occur due to the loss of natural capital, which is the primary input for production, and the loss of the natural protection that nature provides. The loss of natural capital materialises over time due to long-term shifts in ecosystem structures with the implication of exposure to chronic risks. Acute risk exposure arises from material damage to physical assets, infrastructure and supply chains caused by natural disasters. A company's exposure to these acute and chronic physical risks is proportional to its dependency on nature (McKinsey and Company 2022).

Exposure to transition risks and opportunities arises mainly from introducing policies and regulations, innovation and consumer shifts that enable a transition to a nature-positive economy. For example, policy measures include taxes on land or pollution-heavy goods, expansion of protected areas and the mandatory disclosure of a company's impact on nature. Developing innovative technologies or business models that reduce a company's reliance or impact on nature creates opportunities for disruptors. As the awareness of the loss of nature and the resultant effects on healthy and prosperous environments and economies increases, consumer preferences for nature-positive goods and services will also increase. While these shifts provide significant opportunities and a competitive edge for businesses with nature-supportive operations, companies that fall short could see impacts on reputation, market share, production costs, profitability and ultimately, the viability of the business as a going concern.

6.2.2 Implications for financial institutions and systems

Financial institutions are exposed to financial risks and opportunities via a cascade effect from the financial risks and opportunities the businesses they lend to face from their own impacts and dependencies on nature. Figure 6.1 shows how impacts from counterparties translate to financial risks and opportunities for financial institutions.

The Network for Greening the Financial System (NGFS) has recognised the connection between nature-related risk and financial stability and calls for integrating these risks into the micro and macro-prudential oversight frameworks by financial supervisors and regulators. Financial institutions can respond to this exposure through the effective management of nature-related risks and opportunities in the following ways:

- ◆ Carry out portfolio management improvements to de-risk portfolios in financial investments, corporate lending, or insurance underwriting to prevent overvaluation from the failure to consider counterparties' exposure to nature-related risks adequately. Building up the necessary risk assessment capabilities and incorporating these into investment, lending, and underwriting processes can mitigate financial institutions' risks in this regard.
- ◆ Forward-looking preparation for new policies and regulations can minimise disruptions and related compliance costs. Following the trajectory of climate action, nature-related risk assessment, disclosures, and stress testing could become mandatory. Preparation for these shifts would prevent operational disruptions in the future.
- ◆ Ensure reputational risk management by acting to mitigate risks from increasing stakeholder pressure to align operations with specific nature targets. Financial institutions must act on these expectations to avoid unfavourable financing terms and market share loss. Early action avoids reputational risks and builds a responsible brand profile.
- ◆ Adapting commercial strategy to align with nature-positive impacts to take advantage of new commercial opportunities from the demand for nature-neutral and positive products and services. Developing innovative nature-aligned products can lead to business growth and the stability of financial systems.
- ◆ Deploying a joint framework for climate and nature-related risk assessment and management, given the nexus between climate change and nature loss, allows for leveraging synergies that enable accuracy and consistency.



A girl in Zimbabwe. Photo Credits: UNEP

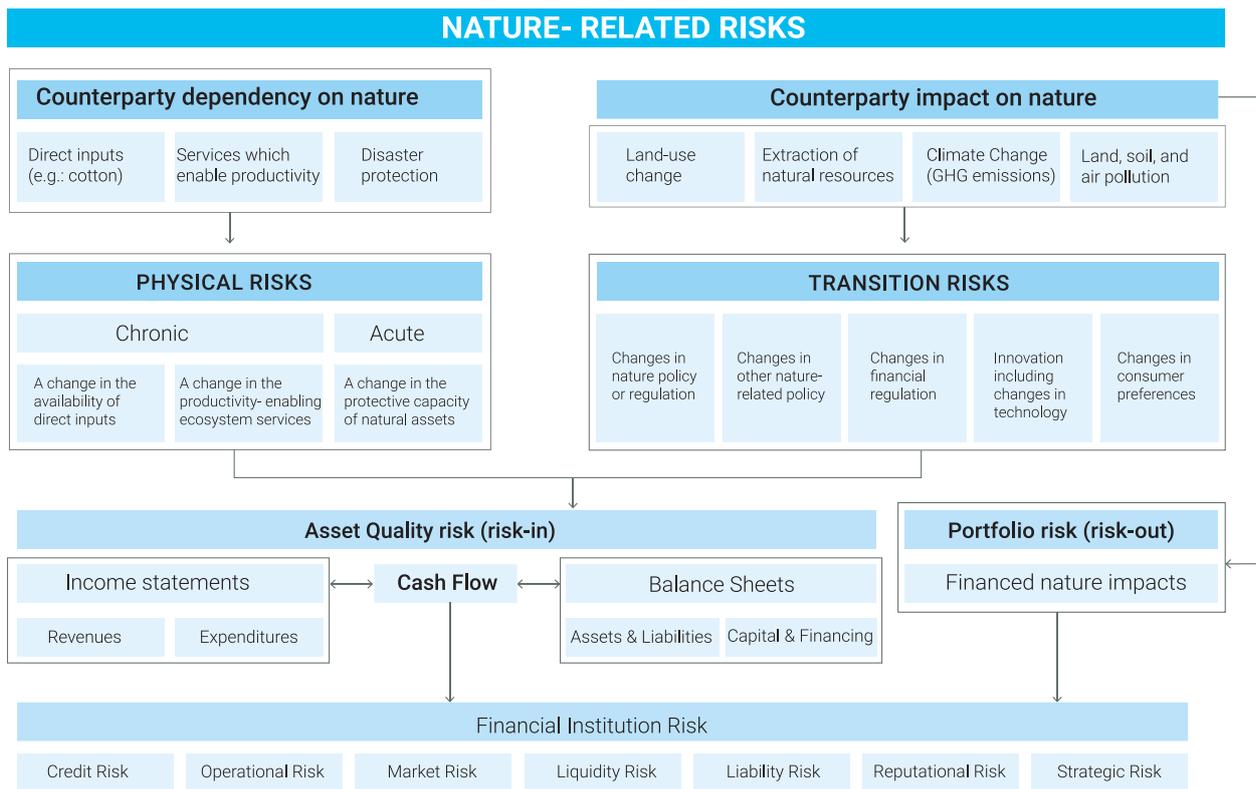


Figure 6.1: Transmission mechanism for financial risks and opportunities (McKinsey and Company 2022)

6.2.3 Global action on nature

Global action and cooperation by policymakers and regulators to facilitate a carbon net-zero and nature-positive transition are shown by commitments made by government leaders at the UN’s COP26 climate-change conference to protect nature through extensive reforms in food systems, agriculture and marine industries in 2021. The 2022 UN COP15 Convention on Biological Diversity adopted the Kuming-Montreal Global Biodiversity Framework (GBF), which contains critical measures and global targets to address the dangerous loss of biodiversity and the restoration of natural ecosystems by 2030. The Global Biodiversity Framework is anticipated to be the watershed for global action on nature, as the Paris Agreement was for climate.

Private sector action is also increasing, with commitments and pledges to set targets on impacts to nature and disclosing progress accordingly. For instance, 84 financial institutions managing \$13.7 trillion in assets

have made this commitment under the Finance for Biodiversity Pledge (McKinsey and Company 2022). Early movers in the financial industry are developing positive investment strategies. Financial regulators are advancing the integration of nature-related risks into the ambits of financial regulation, as evidenced by actions of the NGFS.

Financial and corporate institutions are urged to consider natural capital within their operations and portfolios and incorporate the related dependencies, impacts, risks and opportunities into their enterprise risk management, strategic planning, and asset allocation frameworks. A critical step in this direction involves bringing to light dependencies on nature in corporate and investment decision-making. This will provide a better understanding of identifying risks and analyses, developing strategies to mitigate and manage these risks, and identifying opportunities that drive growth and innovation. To this end, the Task Force on Nature-related

Financial Disclosures (TNFD) developed its beta framework, laying the foundation for the expectations around managing and disclosing nature-related exposure and impacts by businesses worldwide.

TASK FORCE ON NATURE-RELATED FINANCIAL DISCLOSURES

The Task Force on Nature-related Financial Disclosure (TNFD, 2023.), representing financial institutions, corporates and market service providers with over \$20trn in assets, built on the structure and foundation of the Task Force on Climate-related Financial Disclosure (TCFD), provides a guidance framework to support financial institutions and companies on how to comprehensively and consistently approach, assess, address, and report on nature-related financial dependencies, risks and opportunities. Expected to be the principal globally coordinating framework for this purpose, the TNFD will be fully launched by the end of 2023 and integrated into global mandatory reporting regulations such as the International Financial Reporting Standards (IFRS) new International Sustainability Standards Board (ISSB).

The TNFD has drafted recommendations for disclosure built on four similar pillars as the TCFD, as shown in Figure 6.2, governance, strategy, risk and impact management, and metrics and targets, designed to:

- ◆ Support strategy and risk management at the board and management levels with the aim of improving capital allocation and asset valuation decision-making,
- ◆ Promote investment, credit and insurance underwriting decisions that are more informed, and
- ◆ Provide insights into nature dependencies and impacts that strengthen the understanding of nature-related risk and opportunity concentrations.

The TNFD developed a Locate, Evaluate, Assess and Prepare approach for Financial Institutions (LEAP-FI), which focuses on the scope of assessment for financial institutions as voluntary guidance to help in assessing risks and opportunities involving financed activities such as equity and debt investing, insuring and trading. It represents four stages that encourage organisations to:

1. Locate interface with nature,
2. Evaluate dependencies and impacts,
3. Assess materiality, and
4. Prepare response and report on nature-related risks and opportunities.

Figure 6.3 shows a snapshot of the LEAP-FI guiding framework. The LEAP builds on and incorporates high-quality tools and data sources in its framework to help collect and assess data and is updated as needed. There are also publicly accessible and paid data tools available for companies to utilise.



Photo Credits: SWITCH Africa Green

TCFD-Aligned Disclosure Recommendations

Governance	Strategy	Risk & Impact Management	Metrics & Targets
<p>Disclose the organisation's governance around nature-related dependencies, impacts, risks and opportunities.</p>	<p>Disclose the actual and potential impacts of nature-related dependencies, impacts, risks and opportunities on the organisation's businesses, strategy and financial planning where such information is material.</p>	<p>Disclose how the organisation identifies, assesses and manages nature-related dependencies, impacts, risks and opportunities.</p>	<p>Disclose the metrics and targets used to assess and manage relevant nature-related dependencies, impacts, risks and opportunities where such information is material.</p>
<p>Recommended Disclosures:</p> <p>A. Describe the board's oversight of nature-related dependencies, impacts, risks and opportunities.</p> <p>B. Describe management's role in assessing and managing nature-related dependencies, impacts, risks and opportunities.</p>	<p>Recommended Disclosures:</p> <p>A. Describe the nature-related dependencies, impacts, risks and opportunities the organisation has identified over the short, medium, and long term.</p> <p>B. Describe the effect nature-related risks and opportunities have had and may have on the organisation's businesses, strategy, and financial planning.</p> <p>C. Describe the resilience of the organisation's strategy to nature-related risks and opportunities, taking into consideration different scenarios.</p> <p>D. Disclose the locations where there are assets and/or activities in the organisation's direct operations, and upstream and/or downstream and/or financed, where relevant, that are in: high integrity ecosystems; and/or areas of rapid decline in ecosystem integrity; and/or areas of high biodiversity importance; and/or areas of water stress; and/or areas where the organisation is likely to have significant potential dependencies and/or impacts.</p>	<p>Recommended Disclosures:</p> <p>A. (1) Describe the organisation's processes for identifying and assessing nature-related dependencies, impacts, risks and opportunities in its direct operations.</p> <p>A. (ii) Describe the organisation's approach to identifying nature-related dependencies, impacts, risks and opportunities in its upstream and downstream value chain(s) and financed activities and assets for assessment.</p> <p>B. Describe the organisation's processes for managing nature-related dependencies, impacts, risks and opportunities and actions taken in light of these processes.</p> <p>C. Describe how processes for identifying, assessing and managing nature-related risks are integrated into the organisation's overall risk management.</p> <p>D. Describe how affected stakeholders are engaged by the organisation in its assessment of, and response to, nature-related dependencies, impacts, risks and opportunities.</p>	<p>Recommended Disclosures:</p> <p>A. Disclose the metrics used by the organisation to assess and manage material nature-related risks and opportunities in line with its strategy and risk management process.</p> <p>B. Disclose the metrics used by the organisation to assess and manage dependencies and impacts on nature.</p> <p>C. Describe the targets and goals used by the organisation to manage nature-related dependencies, impacts, risks and opportunities and its performance against these.</p>

Figure 6.2: *The TNFD's draft recommended disclosures (TNFD, 2023)*



Figure 6.3: The LEAP-FI framework (McKinsey and Company 2022)

6.2.4 The implications for financial institutions in Africa

Nature loss is precarious in Africa, with degradation rates increasing and exceeding global trends. For instance, compared to an 11 per cent global figure, 30 per cent of tree cover has been lost in several African countries between 2001 and 2020; 25 per cent of African countries currently experience water stress, with acute water shortages and crises becoming more probable. The stability of the continent's economy and financial systems is in jeopardy, as 23 per cent of the continent's GDP is highly dependent on nature (McKinsey and Company 2022). There is an urgent need to prevent ecosystem damage tipping points as these could result in severe impacts on African livelihoods, akin to climate change impacts. A study between Financial Sector Deepening

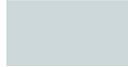
(FSD) Africa and McKinsey's Vivid Economics applied a quantitative risk assessment and stress-testing framework via the TNFD's LEAP approach for financial institutions to African private financial institutions portfolios and a national financial system. The goal was to demonstrate what was feasible in Africa and the materiality of its nature-related risks and opportunities. The study was conducted across five African countries, Egypt, South Africa, Kenya and Mauritius, with a regional spread to factor in geographical variations and lending portfolios in these countries. The assessment considered eight risk channels spanned physical and transition risks in the agriculture, extractives, and secondary sectors, with financial risk examples as shown in Figure 6.4.

	Risk Channel	Industries covered	Description	Direct Financial Risks
Physical risk	Pollination	 	Loss of animal pollinators due to changes in land use	Reduced productivity of crops relying on animal pollinators. Investment cost to intensify per hectare productivity
	Water availability	 	Reduced availability of fresh, high-quality water as a result of increased water stress	Investment cost to adopt irrigation or productivity impacts due to curtailment of water supply
	Soil quality	 	Reduced soil productivity as a result of increased soil salinity	Reduced yields for some crops in localised areas
Transition risk	Air pollution	 	GHG or non-GHG pollution (e.g., NOx, PMP 2.5)	Introduction of a cost per unit of emission representing policy or investment costs
	Water pollution	 	Freshwater pollution due to nitrogen and phosphorus runoff (linked to artificial fertilizer)	Investment cost to adopt mandated sustainable technologies - e.g., more advanced irrigation systems
	Deforestation	  	Forest cover lost due to land-use change	Introduction of a cost per hectare of deforestation investment cost to intensify per hectare productivity
	Protected areas	 	Expansion of areas under protection which permit only specific types of activities to be undertaken	Investment cost to adopt mandated sustainable technologies
	Demand shifts	 	Changes in global or regional commodity demand (e.g., reduction of meat consumption)	Decrease or increase in revenue for businesses

Source: Vivid Economics.

 Agriculture  Extractives  Secondary Sectors

Figure 6.4: Risk channels and descriptions (McKinsey and Company 2022)

Scenario	Description	Transition Risk	Physical Risk	Natural Outcome
Baseline	No accounting of physical or transition risk. All results are measured relative to baseline.			N/A
Current Policies	Continuation of accelerating biodiversity loss, widescale depletion of natural capital and fall in the availability and quality of ecosystem services.			Continuation of current nature policies and commitments with no expected increase in ambition for both nature and climate.
Climate only	Ambitious action is taken on climate with limited focus on, or coordination with, nature action. Actions can benefit nature or drive nature loss.			Any nature co-benefits from climate action are largely ineffective at halting the overall decline in nature. Accelerating nature loss continues, but at a slightly reduced pace.
Climate + Protection	Climate action is coupled with substantial expansion and protection of nature but with no further action.			Effective area-based conservation improves nature integrity in key hotspots by 2030, but significant decline continues in other areas of the world.
Climate + Nature Future	Ambitious and coordinated nature action works towards co-benefits for both climate and nature goals. However, transformative change is achieved late.			Trends of nature loss continue to accelerate to 2030 and then decelerate, leading to eventual reversal (i.e., positive nature trend) by 2050.
Climate + Nature Now	Ambitious, holistic, and early nature action is well coordinated with climate, maximising co-benefits and minimising disruption.			Rapid transformation to halt and reverse nature loss by 2030 with significant biodiversity gains achieved by 2050.

Low exposure      High exposure

Figure 6.5: *The nature scenarios adopted in the study (McKinsey and Company 2022)*

The study revealed the nature-related risks and opportunities that African financial institutions are exposed to under different scenarios considering variations in ambition and coordination between nature and climate action, as shown in Figure 6.5. The study also highlighted the challenges garnered from a UNEP financial institution-led TNFD study for the application and adoption of the TNFD's LEAP framework by African financial institutions and provided recommendations to minimise these challenges and promote the practice in Africa.

IDENTIFIED RISKS AND OPPORTUNITIES

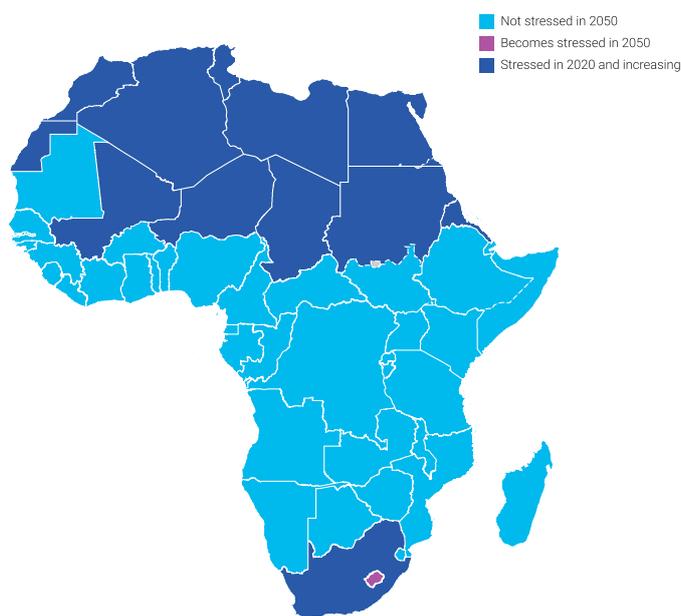
The agriculture, extractives and tourism sectors are central to the African economy, with variations of importance across the continent. For instance, combined, they accounted for about 30 per cent of Africa's GDP in 2019, about 40 per cent in Kenya and Ghana but only 16

per cent in South Africa; agriculture accounts for 60 per cent of GDP in Sierra Leone but less than 3 per cent in South Africa. However, these sectors are particularly vulnerable to nature-related risks and opportunities, significantly affecting the continent's economies. Highlights of some of the risks and opportunities identified in the study are presented.

RISKS

Businesses will face disruptions in the next decade due to the deterioration of nature in Africa. Water stress is expected to have the most significant economic impact, followed closely by habitat degradation and loss. Agriculture has strong water dependency, and habitat degradation could destabilise the tourism industry from impacts on forest loss and agriculture expansion in parts of East and Southern Africa.

Water demand as share of water availability



Source: Vivid Economics, water stress projections from RCP 8.5 in (Gassert et al., 2015)
 Note: A country is defined as 'stressed' if the ratio of water demand to water availability is above 50%. This ratio is above the threshold for 'high' water stress defined by the World Resources Institute.

Production change in unit production costs in 2050 under current policies relative to baseline

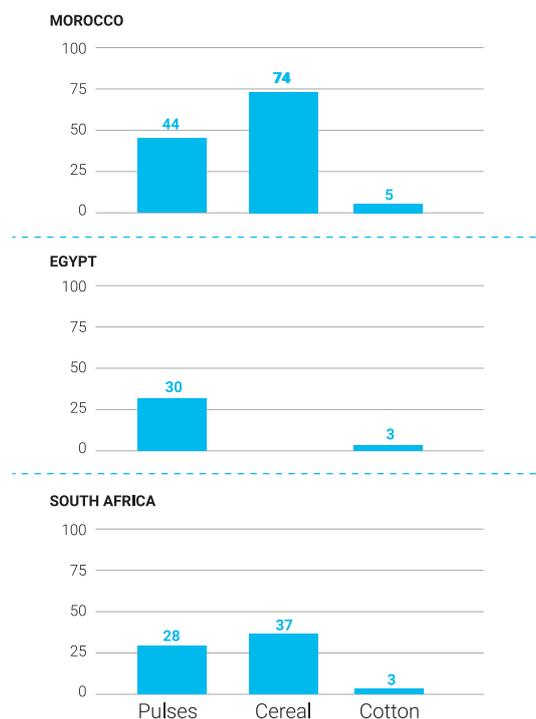


Figure 6.6: Water stress and impacts on crop production costs by 2050 (McKinsey and Company 2022)

Water stress, already impacting part of Africa, is expected to worsen over the next decade resulting in disruptions. The frequency and intensity of acute water shortage events, such as South Africa's 2018 water crisis, are expected to increase. Northern Africa has the greatest exposure to water stress and unchecked land use change could lead to sharp increases in water stress in Central Africa.

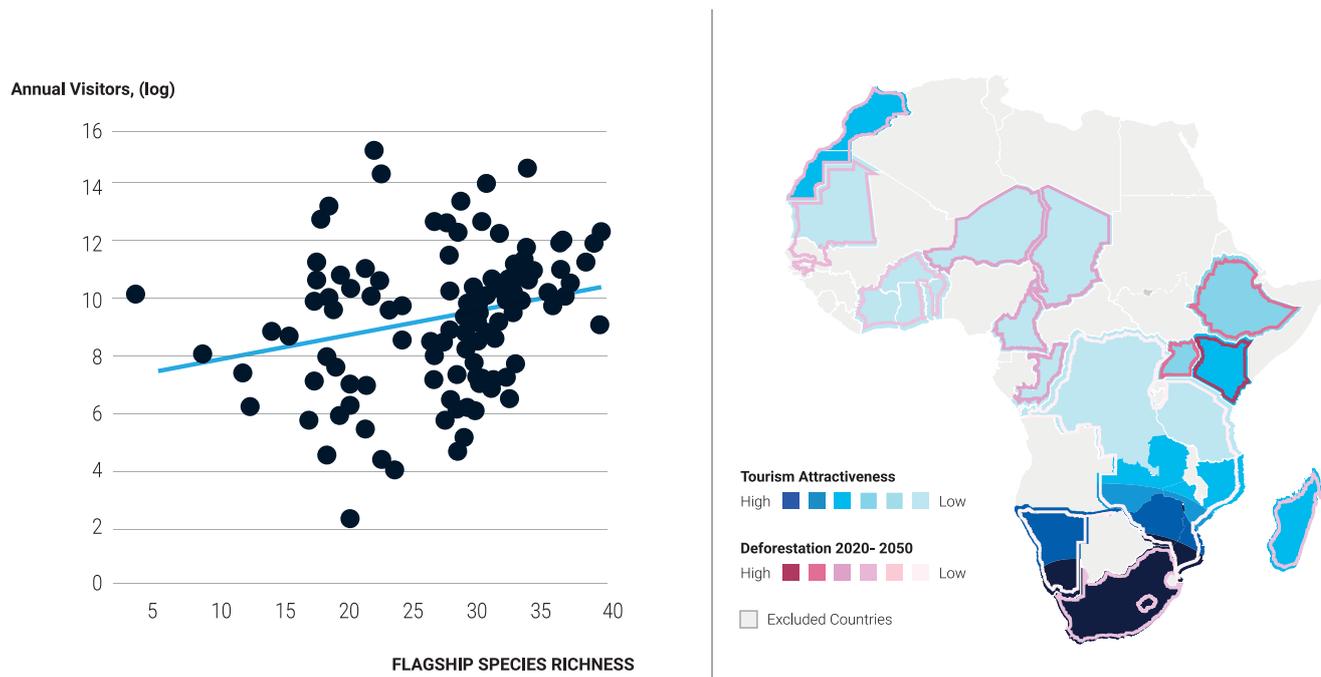
The cost of unit agricultural production could increase between 20 to 40 per cent for some crops if water-stressed countries enact regulations to address shortages, such as increasing irrigation or curbing production. These costs in Africa could be more than five times the global average, reaching 9 per cent by 2050. Figure 6.6 shows the state of water stress and the percentage of crop unit production costs by 2050.

The abundance of flagship species in Africa attracts tourists worldwide, boosting the ecotourism sector. Protected habitats across 14 African countries generate about \$142

million in access fees annually, apart from associated multiplier revenues for the local communities from hospitality, transport and accommodation. As indicated in Figure 6.7, this industry is particularly vulnerable to nature disruptions in southern and eastern African countries, which have the highest potential for tourism revenue. Figure 6.7 also shows the relationship between the abundance of flagship species and the number of annual tourists. Current deforestation and agricultural land-use trends could impact the habitats of flagship species, resulting in significant financial risk for the tourism sector.

In curtailing land-use change, the introduction of new regulations and measures, as well as the intensification of agriculture production over the next decade, might see an increase in production costs by 4 to 13 per cent in 2030 in the most land-constrained scenarios.

Deforestation from opening new mines or expanding existing locations is the extractive sector's most significant terrestrial impact



Note: Left hand side logarithmic scale using the natural logarithm; N = 125, p<0.01. Flagship species are species that can successfully be used to attract funding for conservation or commercial ends. They include the 'Big Five': lions, leopards, rhinos, elephants, and buffalo. Countries without national parks are excluded.
 Source: Analysis with data from (Institute for Economics and Peace, 2021), (Nelson, 2008), (McGowan, J., Beaumont, L.J. Smith, R.J. et al., 2020), (IBAT, 2021), and (Roser, 2017).

Figure 6.7: Relationship between tourist attraction and loss in flagship species (McKinsey and Company 2022)

on nature. Gold and copper are primarily responsible, accounting for 55 per cent of sub-Saharan Africa’s export revenues in 2020. Gold, copper and iron are mainly responsible for mining-related deforestation globally, representing 20 per cent, 10 per cent and 7 per cent of mines in selected forest locations in 2020, as shown in Figure 6.8. Local or international regulations requiring mining companies to restore land and avoid operations

in some protected areas could increase production costs with impacts that can make specific extractive activities unprofitable.

Consumer prices for agricultural commodities could increase as production costs rise due to the demand inelasticity of these commodities, allowing for cost pass-through rates of up to 90 per cent from producers to consumers. Under a ‘climate only’ scenario

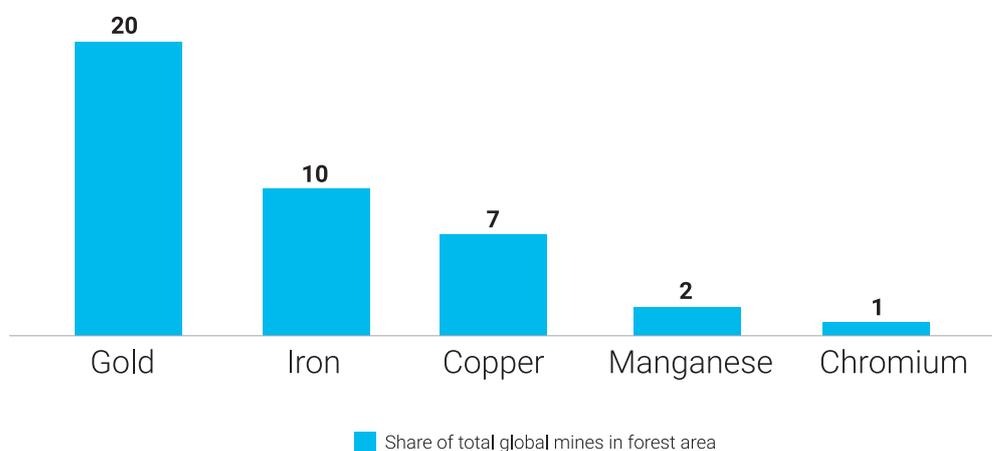


Figure 6.8: Share of minerals in forest areas in 2020 (McKinsey and Company 2022)

where ambitious action is taken on climate with limited coordination with nature, the overall production costs for some crops in areas where pressure on land use is high could increase by 6 per cent in 2030, with a starting baseline profit of 16 per cent.

Producers in the mining sector are more exposed to shocks from rising costs, taking more significant hits in profit margins due to the concentrated market structure, making it harder to pass on costs.

As looming environmental protection regulations, policy requirements and shifting stakeholder expectations gradually evolve and advance towards increased institutional disclosure of nature-related dependencies, risks and opportunities, organisations that do not align their investment strategy and management face non-compliance and legal and reputational risks.

OPPORTUNITIES

Regardless of the imposition of natural and climate constraints on economic activities in Africa, the prospects for agricultural growth over time, vis-à-vis total profits in agriculture, are substantial due to rising food demand driven by population growth and a rise in per-capita income.

Ambitious climate and nature actions limit land availability for agriculture and impact food waste reduction. Continuing current trends in the consumption of plant-based protein and reducing food waste may relieve pressure on land resources in Africa. In addition, a shift in the consumption of plant-based and alternative proteins could bring investment opportunities for agribusiness. For instance, demand for sugarcane cultivated in Africa and used as feedstock for fermentation could be 15 to 36 per cent higher in all scenarios.

In scenarios where disruptions from nature-based constraints are in place, there would be incentives for increased vertical integration

in supply and value chains as the need for transparency around nature impacts rises. Financial institutions that invest in companies with lower impacts on nature may outperform sector averages and reduce portfolio-level risk, as disruptions in business-as-usual practices could lead to rapid growth across sectors. For instance, the intensification of agriculture and meeting new consumer demand for plant-based and alternative proteins produce efficiencies in the long term while also stimulating demand for agricultural inputs such as irrigation equipment, machinery, fertilisers and pesticides; extractives operating in non-forested areas could become more competitive than peers as the cost of doing business in forested areas increase and become economically and socially unviable in the long-term.

CHALLENGES FOR AFRICAN FINANCIAL INSTITUTIONS

The adoption and implementation of the TNFD beta framework by African financial institutions pose several challenges due to a variety of factors:

Capacity: The limited internal capacity of human personnel and financial institutions' current operating systems and technology frameworks to store, evaluate, and monitor nature-related information from client portfolios. While these institutions are developing their climate risk capabilities, effectively integrating actions on nature to minimise internal resources still needs to be clarified while considering a sparse appetite for building additional capacity. Difficulty in recruiting personnel with the necessary skills and experience for nature-related oversight is also a challenge due to the limited size of the talent pool.

Availability and access to counterparty data: Financial institutions need to access valuable location-specific data from their numerous clients, which are not usually collected from counterparties. This would enable them to make more informed nature-related decisions.

Information paucity exists on geolocated revenue, value chain relationships, location of physical assets and corporate sustainability practices. Due to the transparency and traceability of supply chain activities and impacts, there are also barriers making it difficult to understand tail risks related to highly localised tipping points. These challenges make only coarse sector-level assessments possible. There is also a reluctance for financial institutions to add to the burden of data collection for clients.

Assessing sectors with indirect exposures:

Poor understanding of nature dependency and impacts for portfolios with indirect and complex exposure to nature-related risks and opportunities, such as financial services, tourism-related industries and personal lending. Data for these clients are typically unavailable.

Lack of standardised metrics and reporting systems:

Unlike climate-related disclosures where carbon is the standard metric, there is currently no standard nature-related metric, making nature-related disclosure seem complex. In addition, multiple nature-related disclosure initiatives and reporting frameworks make adopting this agenda seem cumbersome and complicated, requiring limited resources to be allocated to multiple but similar endeavours.

Regulatory signalling: There is an absence of signalling by regulators as to timelines for implementing the recommendations of the NGFS on nature-related risks. This lack of clarity as to when the recommendations would become mandatory does not incentivise financial institutions to secure the internal investments required to develop nature-related oversight capacity.

6.2.5 Managing the challenges

The following actions are recommended in order to meet these challenges:

- ◆ Improved resource allocation and internal capacity building targeted to enhance a robust assessment of nature-based risks and opportunities by developing related tools, technology and training programmes. An integrated approach to climate and nature-risk governance, assessment frameworks, risk management process, reporting and strategy development would allay the strain on the limited capacity of clients and staff. If frameworks and processes for nature are designed as extensions of those for climate, adopting the TNFD would be facilitated in Africa.
- ◆ Creating internal teams representing the organisation's operations enables financial institutions to gain a complete view of their operations and better assess their nature-related impacts. Guidance from standard-setting and framework-issuing organisations would help build the capacity of teams.
- ◆ There should be further engagement with clients to facilitate understanding of nature-related dependencies, impacts, risks, opportunities, and the benefits of high-quality data and information disclosure, avoiding information asymmetry. Developing methods to define and collect these data would accelerate the adoption of nature-related risk assessments.
- ◆ Introducing regulations and regulatory guidance on incorporating nature-related scenario analysis or integrating nature-related risks into stress tests, as well as practical examples of how these have been translated into related financial institution corporate strategies, will be helpful for financial institutions in Africa.

- ◆ Collaborating with stakeholders such as governments, industry associations, academia and international organisations to enhance internal capacities for environmental impact assessments and disclosures and creating and implementing standardised data and metrics for assessing nature-related risks and cascades.
- ◆ Demonstrating responsibility for the impact on nature and exposure to the related risks and opportunities by leveraging existing standards and frameworks such as the TNFD, Natural Capital Protocol (NCP) framework, and Science Based Targets Network (SBTN), among others. Join initiatives and working groups such as the Partnership for Biodiversity Accounting Financials (PFAB), the Finance for Biodiversity Pledge and the African Natural Capital Alliance (ANCA).
- ◆ Assess investment and lending portfolios to update risk identification and related processes to account for material changes that may occur when ambitious action is taken on nature.
- ◆ Financial regulators, including financial supervisors and central banks, can support banks, asset owners and asset managers in their preparation by detailing their potential pathways for policy action and integration plans for nature into regulations; financial supervisors can adopt proposals on recent studies to integrate nature into micro-prudential regulations, thereby expanding the scope of supervision tools to include nature-related risks.
- ◆ Framework-issuing and standard-setting institutions should engage with regional and local peers to help translate and cascade global frameworks into jurisdiction-specific standards that reflect the realities and practicalities of the local capital base.
- ◆ Engage with the TNFD and other initiatives to improve the suitability of applying the frameworks for financial institutions in Africa, thereby contributing to shaping the evolving global architecture of nature.



Photo Credits: SWITCH Africa Green

6.2.6 Conclusion

Financial institutions are exposed to nature-related risks and opportunities through their investments. In this regard, 84 financial institutions managing \$13.7 trillion in assets have committed to set targets on their impacts on nature and disclose progress under the Finance for Biodiversity Pledge. Africa's economic and financial stability is intricately linked to the state of its natural resources. It is imperative to address and mitigate the impacts of nature loss, which poses a significant challenge as degradation rates surpass global trends and continue to escalate. In several African countries, the extent of tree cover loss has reached alarming levels, with a staggering 30 per cent reduction between 2001 and 2020, compared to the global average of 11 per cent, while approximately 25 per cent of African nations are currently grappling with water stress, increasing the likelihood of acute water shortages and crises.

Frameworks such as the Taskforce on Nature-related Financial Disclosures present a valuable framework for African financial institutions to assess, disclose, and manage nature-related risks and opportunities. By recognising the interdependence between nature and the economy, financial institutions can contribute to sustainable development while safeguarding the natural resources and ecosystems they rely on. Through concerted efforts and collaboration between the relevant stakeholders, Africa's financial sector can play a pivotal role in preserving nature, addressing climate change, and fostering a resilient and inclusive economy for the benefit of present and future generations.

6.3 Sustainable financing for nature-based solutions

Nature-based Solutions (NbS) refer to actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively while simultaneously providing human well-being and biodiversity benefits (Cohen-Shacham et al., 2016). NbS is an umbrella concept encompassing many ecosystem-related approaches addressing societal challenges. NbS interventions are designed

to address some societal challenges, including climate change, disaster risk reduction, food and water security, human health, biodiversity loss, and social and economic development. Figure 6.9 demonstrates the definition of NbS concerning their ecosystem-based approaches to tackling significant societal challenges. Meanwhile, Table 6.1 provides an overview of these approaches' categories and relevant examples.



Figure 6.9: Defining nature-based solutions (IUCN, 2020)

Table 6.1: *Nature-based solutions categories and examples (Cohen-Shacham et al., 2016)*

Category of NbS approach	Examples
Ecosystem Restoration	Ecological restoration Ecological engineering Forest landscape restoration
Issue-Specific, Ecosystem Related	Ecosystem-based adaptation Ecosystem-based mitigation Climate adaptation services Ecosystem-based disaster risk reduction
Infrastructure Related	Natural infrastructure Green infrastructure
Ecosystem-Based Management	Integrated coastal zone management Integrated water resources management
Ecosystem Protection	Integrated water resources management

6.3.1 Types and Sources of financing available

The funding sources and mechanisms for NbS interventions vary, and it is essential to seek funding in alignment with each intervention's specific context, scale and timescale. There is a requirement for additional funding from existing and new funding sources, with significant funding opportunities emerging from the private sector. However, public finance will likely remain an essential source for NbS, as relying solely on market-based mechanisms is unlikely to generate the necessary funding (Brears, 2022). Figure 6.10 shows the primary types of finance sources.

INTERNATIONAL PUBLIC SOURCES

- ◆ **Multilateral donors:** Includes donors such as the European Union (EU), the Climate Investment Funds (CIF) under the Nature, People, and Climate Investment Programme, the Green Climate Fund (GCF), the Global Environmental Facility (GEF), the Adaptation Fund (AF), the International Fund for Agricultural Development (IFAD) among others (Swann et al., 2021).
- ◆ **Multilateral development banks (MDBs):** Include development banks such as the World Bank (WB), Asian Development

Bank (ADB), African Development Bank (AfDB), Islamic Development Bank (IsDB), Development Bank of Latin America (CAF), and the Inter-American Development Bank (IDB). MDBs provide funding through short- or long-term loans and grants for nature-based intervention projects in developing countries (Swann et al., 2021; Brears, 2022). In a joint nature statement at the UN COP26, MDBs committed to 'looking for opportunities to step up nature financing and efforts to mobilise or leverage private finance for investments in nature, including nature-based solutions for climate change mitigation and adaptation with co-benefits for nature and people' (UN Climate Change Conference UK, 2021).

- ◆ **Bilateral technical and financial cooperation:** These include government-to-government and official development assistance (ODA) aid and support that promotes and specifically targets developing countries' economic development and welfare. Funding from ODA totalled \$185.9 billion in 2021 (OECD, 2023a). Funding flows were in the form of bilateral aid between developed and

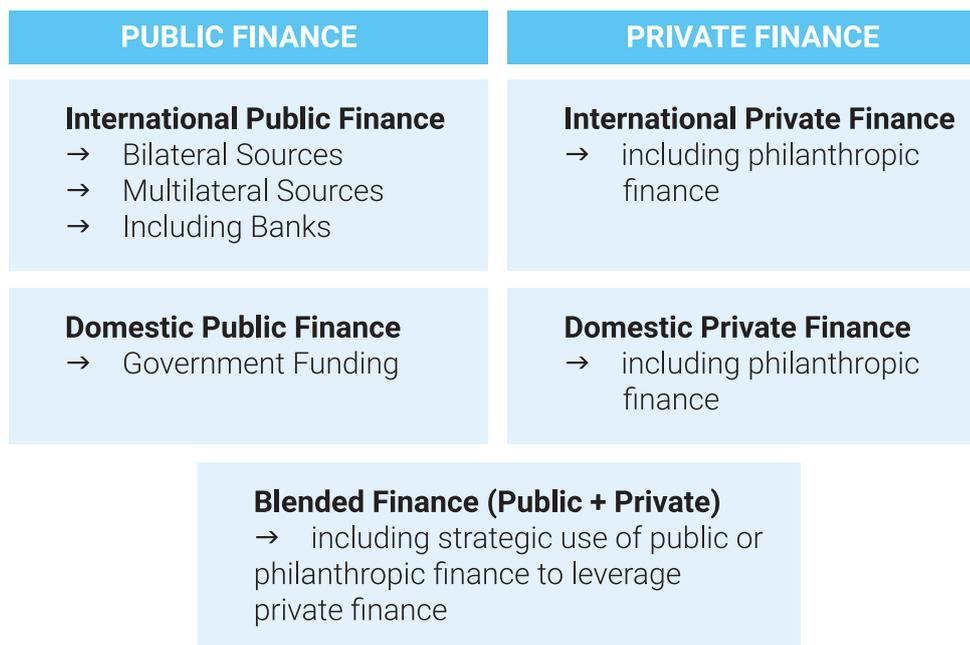


Figure 6.10: Primary types of finance (Atteridge et al., 2022; Brears, 2022; Ludwig, 2021)

developing countries, for example, through the Department for Environment, Food & Rural Affairs (Defra), United States Agency for International Development (USAID), Swedish International Development Cooperation Agency (SIDA), North American Aerospace Defense Command (NORAD), Canadian International Development Agency (CIDA), among others. ODA funds are primarily grant instruments from direct government-to-government support or civil society organisations. Bilateral cooperation also includes specialised development banks or subsidiaries that can finance nature-based solutions and leverage funding from the private sector. Examples of such specialised banks include the German KfW (Kreditanstalt für Wiederaufbau) and the French AFD (French Development Agency). They also often provide technical assistance to accompany their finance (Brears, 2022).

- ◆ **Debt-for-nature swaps:** This is a mechanism whereby a donor pays off a component of a country’s debt, and the government then invests in conservation interventions with the savings made from the reduced debt repayments. More than

30 countries have participated in debt-for-nature swaps since the first edition in 1987, generating around \$1.2 billion for conservation, which may include NbS initiatives (King, 2021).

DOMESTIC PUBLIC SOURCES

- ◆ National budgets and development banks
- ◆ National funds (Ludwig, 2021; Brears, 2022)

PRIVATE FINANCE SOURCES

- ◆ Private financing sources encompass a range of entities, such as commercial banks, private impact investors and private equity firms, all seeking investment opportunities in nature conservation projects. These entities aim to contribute to the preservation of nature while also generating financial returns and social benefits. Funding instruments include innovative green bonds, grants, equity and loans (Chen, 2022). An example of innovative funding is the Nature+ Accelerator Fund (Nature+), a private sector-focused nature conservation fund providing measurable conservation and social benefits while delivering financial returns for investors. It is a collaboration between public and private institutions

and platforms to attract private finance to conservation, including nature-based solutions (UN DESA, 2022).

- ◆ Philanthropy
- ◆ Domestic and international private sources
- ◆ Private sector businesses wishing to offset their negative impacts by providing funds for nature conservation projects that address climate change and other societal challenges (Brears, 2022). This funding source also includes Corporate Social Responsibility projects.
- ◆ Impact investors are seeking investment opportunities arising from the conservation, restoration, and sustainable use of nature. Many non-governmental organisations (NGOs) have created impact investment specialist groups to encourage investments by private sector groups, for example, WWF Impact, TNC NatureVest and the Landscape Finance Lab.
- ◆ Institutional investors, such as sovereign wealth and pension funds, seek ways to maximise investments, albeit with a lower risk appetite than commercial investors (Brears, 2022). For instance, sovereign wealth funds have a lower risk appetite and long-term and large-scale horizons suitable for nature-based solutions (Brears, 2022). An example is the Norwegian Sovereign Wealth Fund which adopts principles of sustainable and ethical investment in investments made in more than 9,000 companies across 70 countries.
- ◆ Market-based mechanisms, such as carbon credits and offsets, enable the implementation of payment for ecosystem services. In this mechanism, governments or other groups pay local communities for ecosystem services provided, and the funds are used to maintain the ecosystem and its provision of that service (Frapp, 2014).

BLENDED FINANCE SOURCES

- ◆ Fund-level blended finance combines concessional funding, usually from public or philanthropic funds, with full return private capital in a fund for investments in companies' regular equity or bonds (UNGC, 2023). An example is the Africa Agriculture and Trade Investment Fund (AATIF) (OECD, 2023).
- ◆ Company-level blended finance strategically deploys catalytic capital from public or philanthropic sources to directly support a company's financial needs. In such arrangements, public or philanthropic investors offer guarantees, insurance, or concessional loans at below-market terms to enhance the company's creditworthiness. For example, the International Finance Corporation (IFC) offers equity investments, loans denominated in local currency, and credit guarantees to foster the growth of environmentally and socially sustainable companies operating in emerging markets (UNGC, 2023).
- ◆ Project-level blended finance where public or philanthropic investors play a crucial role by providing funding or financial support for significant private sector infrastructure projects that align with the SDGs. Guarantees and insurance are the most common forms of project-level blended finance, effectively leveraging scarce public funds and incentivising private sector participation. These instruments help attract commercial financing by mitigating risks such as commercial defaults or political uncertainties. Additionally, guarantees from export credit agencies can stimulate the export of national technologies and solutions, particularly in challenging markets where the private sector alone may be hesitant to invest. For example, the World Bank, through its Multilateral Investment Guarantee Agency (MIGA), has established a dedicated practice to facilitate cross-

border investments in developing countries. This practice aims to support investors and lenders by offering guarantees in the form of political risk insurance and credit enhancement (UNGC, 2023).

- ◆ Outcome-based blended finance involves public or philanthropic entities' investments in fixed-income instruments tied to predefined sustainability or environmental, social, and governance (ESG) objectives. These objectives are measured using predefined sustainability Key Performance Indicators (KPIs and targets). An example is Engie's Sustainability-Linked Loan, where financial instruments are linked to the

company's sustainability performance. Outcome-based blended finance aligns with development impact bonds (DIBs) principles, which involve private investors providing funding for development programs. Investors earn a return, paid by a third-party donor if the program achieves its predetermined objectives, which are independently verified. These approaches ensure that investments have a measurable impact on sustainable development goals (UNGC, 2023).

Figure 6.11 provides a non-exhaustive overview of the financing available for NbS by type of funding, along with notable examples of each type.

Type of Funding	Financing Instrument	Description	Notable Examples
Grant Based	Domestic government budget allocations	Direct budgetary provisions for nature protection by domestic governments	
	Philanthropic grants	Charitable grants provided by NGOs or wealthy individuals	
	ODA, incl. climate finance	Government aid programs and climate finance targeted at nature protection	
	Results-based ODA	Form of ODA where results are defined in advance and subject to an independent verification process and funding is only released upon the achievement of these results	GCF provided \$100M to Indonesia REDD+ program
	Project Finance for Permanence (PFP)	Project financing approach in which sources of financing are contingent on other critical elements of the project being in place, only released simultaneously at closing of deal	\$140M PFP deal to protect 167,000 km ² of Peruvian Amazon in 2019
	Crowd-funding	Raising typically small individual amounts of money, either donations or investments, from a large number of people via online platforms	Numerous crowdfunding campaigns to protect endangered species
	Debt for nature swap	Instrument that reduces or restructures a developing country's debt in exchange for commitments to protect nature, often facilitated by NGOs	Seychelles debt for nature swap in 2015 resulted in \$1.4M of debt relief and \$5M in donor grants

Investment-based	Blended finance funds	Combining capital from investors with different risk/return profiles in a single fund to increase investment in sustainable development	Investment of the Urapi Sustainable Land Use Fund into the Sierra Nevada Project, Colombia in 2020
	Bonds and loans	Debt instrument for projects that yield environmental benefits as well as cashflows to repay capital and interest. Can include sovereign, project and corporate bonds	Seychelles government raised \$15M through blue bonds in 2018
	Public Private Partnership (PPP)	Contract between a government and a private party given some level of conservation management responsibility, in which remuneration is typically linked to performance	PPP partnership in 2017 in Mozambique, concession to African Parks to manage Bazaruto Archipelago National Park
Ecosystem value-based	Levy on sustainable use	Collection of levy from those who affect the environment by the means of nature use	Great Barrier Reef Credit Scheme established in 2020
	Payment for ecosystem services (PES)	System that enables financial compensation for undertaking actions that ensures or increases the provision of ecosystem services to beneficiaries	
	Insurance premium discount	Arrangement to monetize the value that natural ecosystems provide in terms of reducing the risk of insured losses (e.g.. coastal property storm damage)	AXA XL assessment of flood-risk reduction by restoration & protection of mangroves across the Caribbean
Compensation Based	Eco-taxes	Ecological taxes levied on activities that are considered harmful to the natural environment	
	Extractive fees, royalties, permits	Fees, royalties and permits targeted directly at users both commercial and private users of nature	
	Regulatory offset schemes	Financing protection & restoration of ecosystems via mandatory or voluntary compensation of non-point pollution or nearby ecosystem damage	BIOFUND biodiversity offset scheme in Mozambique

Sources: WWF and ASL, *Securing Sustainable Financing for Conservation areas*; Biofund; *The Commonwealth, Case Study: Innovative Financing - Debt for Conservation Swap*. Seychelles' Conservation and Climate Adaptation Trust and the Blue Bonds Plan, Seychelles (on-going): Press search

Figure 6.11: Overview of nature financing instruments (ACMI, 2022)

6.3.2 Current financing status

Financial support for nature-based solutions (NbS) has predominantly originated from public funding sources, totalling \$154 billion annually. Notably, investments from G20 countries reach approximately \$120 billion annually, constituting 92 per cent of global investments in NbS. However, these expenditures primarily focus on domestic initiatives, resulting in a significant funding gap for NbS interventions in developing countries that heavily rely on international development finance. Only \$2 billion out of the \$154 billion annual finance flow to NbS is via official development assistance to developing countries where external assistance would probably remain critical for implementing NbS, especially for least developing countries (LDCs) and small island developing states (SIDS) (Atteridge et al., 2022). While investments from the public sector stand at \$128 billion, private sector investment in NbS amounts to only \$26 billion per year, representing about 17 per cent of total NbS investment (UNEP, 2022b). Figure

6.12 shows public and private funding flow distribution to marine and terrestrial NbS.

Between 2021 and 2022, total public and private finance flows to NbS increased by 2.6 per cent from \$150 billion to \$154 billion. Although public financial flows increased by \$1.6 billion due to domestic investments in fishing, agriculture and forestry sectors, there was a \$0.3 billion decrease in flow from official development assistance year on year. Increased investments in carbon markets impact investments, and philanthropy is responsible for the increase in private financial flows (UNEP, 2022b). Financial flows to marine NbS and protected area management, including marine and terrestrial areas, are estimated to be \$14 billion and \$23 billion annually. Investments in marine interventions account for about 9 per cent of total NbS finance. Figure 6.13 shows the annual flows from public and private sources to marine and terrestrial NbS, and Figure 6.14 shows the global financial flow for managing protected areas by region.

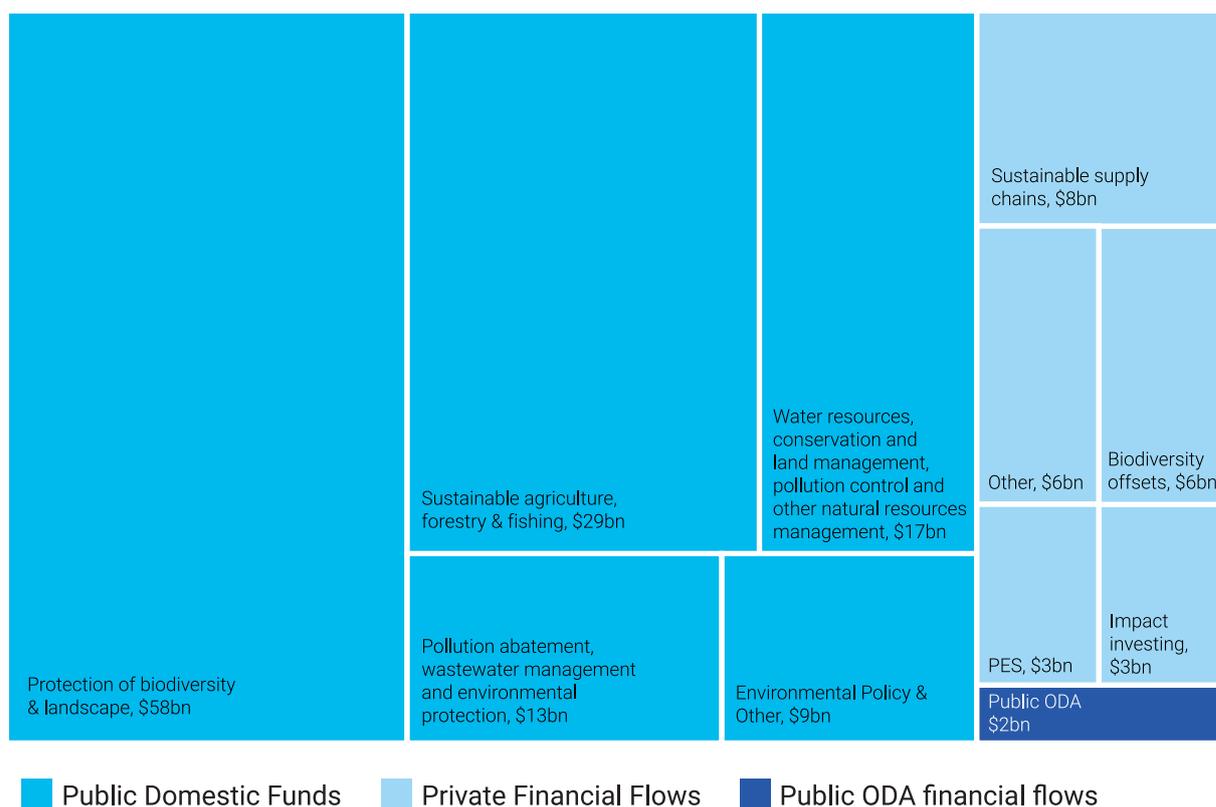


Figure 6.12: Public and private investments in nature-based solutions, 2022 \$ (UNEP, 2022b)

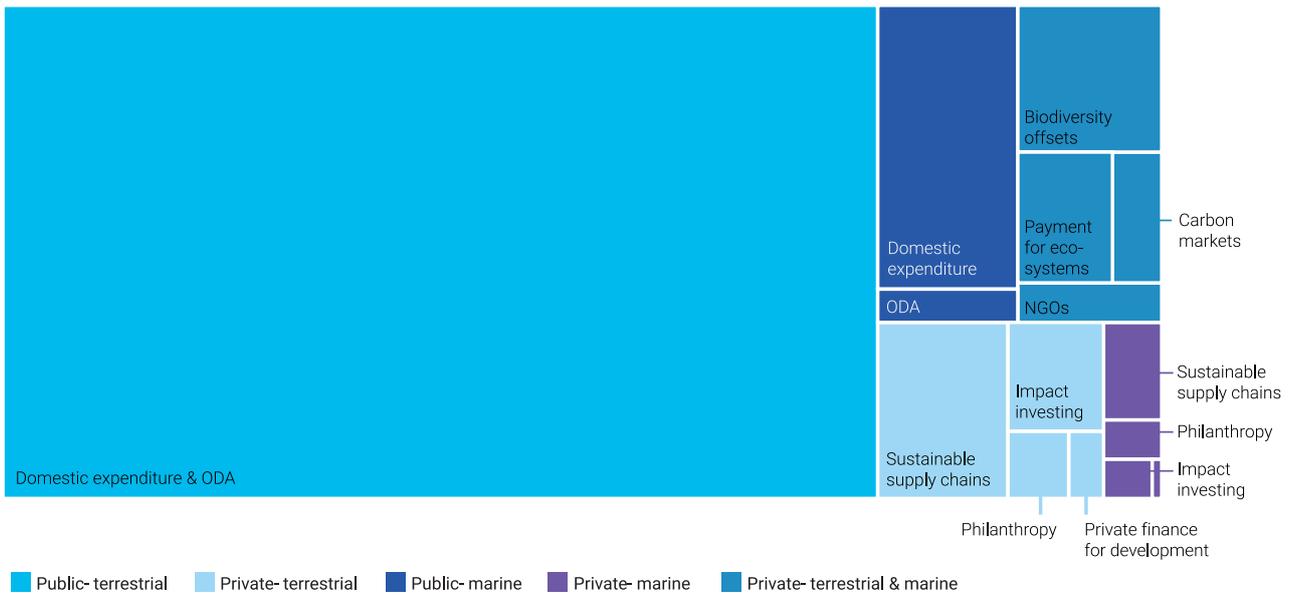
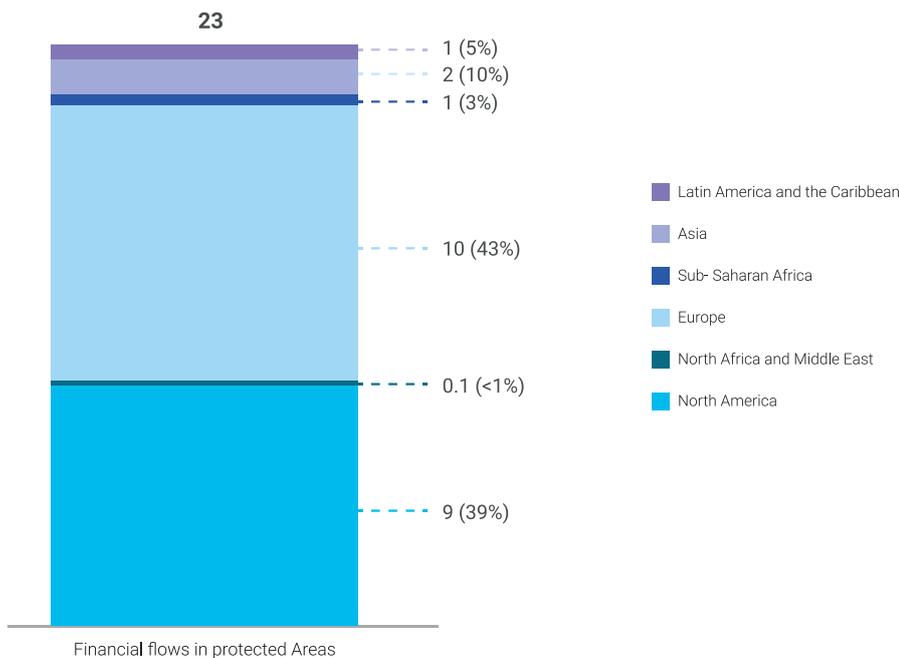


Figure 6.13: Annual flows to marine and terrestrial nature-based solutions (UNEP, 2022b)

NATURE-NEGATIVE FINANCIAL FLOWS

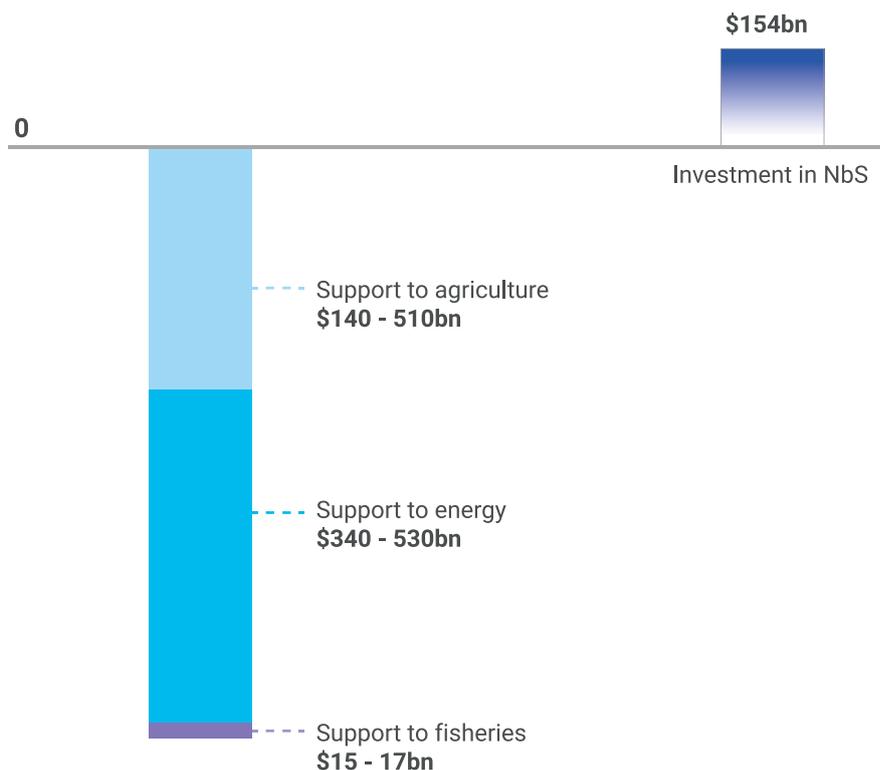
The damage to nature caused by government fiscal support in the form of subsidies, price incentives and fiscal transfers for some economic sectors such as agriculture, fisheries and fossil fuels is increasingly becoming recognised and scrutinised as actions undermining the efforts at increasing finance flows to NbS. It is estimated that

public financial flows for these activities are about three to seven times greater than investments in NbS, ranging from \$500 billion to \$1.1 trillion annually. Figure 6.15 shows a breakdown of public investments with nature-negative impacts by beneficiary sectors. Despite limited available data to accurately assess the impact of private financial flows on nature, an analysis of



Source: *Waldron et al. (2020)*
 Note: 1. Current spending in protected areas in Oceania is not included due to limited data reported in the region. 2. Current spending in marine protected areas in North America is not included due to the complex division of enforcement responsibilities across multiple agencies in the USA, which makes it difficult to distinguish expenditure on marine protected areas. 3. Domestic expenditure in protected areas cannot be disaggregated into public and private sources.

Figure 6.14: Annual global spending on protected area management (UNEP, 2022b)



Source: FAO, United Nations Development Programme (UNDP) and UNEP (2021); International Energy Agency (IEA)(2021); OECD (2020b); OECD (2022); Environmental Markets Lab (2018); Skerritt and Sumaila (2021).

Figure 6.15: Public financial flows with nature-negative impacts, 2022 \$ (UNEP, 2022b)

portfolios belonging to the 50 largest banks worldwide indicates their connection to an average of \$52 billion in funding that carries inherent risks to biodiversity. This funding amounts to a cumulative investment of at least \$2.6 trillion, potentially resulting in net-negative impacts on nature (UNEP, 2022b).

INVESTMENT GAPS IN NATURE-BASED SOLUTIONS

To fulfil global obligations in halting biodiversity loss, restricting climate change to below 1.5°C and attaining land degradation neutrality, the annual financial resources directed towards nature-based solutions must more than double, reaching \$384 billion between 2023 and 2025. Closing the financing gap requires an additional annual investment of \$230 billion up to 2025, with investment needs reaching \$674 billion by 2050 (UNEP, 2022b). Figure 6.16 shows the projected trajectory of financing needs from current levels up to 2050.

Cost-effective NbS interventions to achieve the desired outcomes of biodiversity preservation,

climate mitigation by limiting global warming to 1.5°C, land degradation neutrality and protecting 30 per cent of the planet by 2030 are categorised into protection, restoration and sustainable land management activities. Meeting the goal of the Paris Agreement to restrict global warming to 1.5°C rather than 2°C necessitates a cumulative investment of \$11 trillion by 2050 in NbS. Within this investment, approximately 67 per cent is allocated to reforestation and agroforestry, 12 per cent to protected areas, 14 per cent to restoration and 5 per cent to other agriculture-related NbS. Figure 6.17 provides an overview of the cumulative investment requirements from 2022 to 2050 in scenarios for both 1.5°C and 2°C global warming limits (UNEP, 2022b).

Closing the financing gap for NbS provides numerous benefits. A 1.5°C scenario can result in annual greenhouse gas abatement of 5 GtCO₂e by 2025 and 15 GtCO₂e by 2050, achieved through the restoration, protection and sustainable management of terrestrial and marine ecosystems.

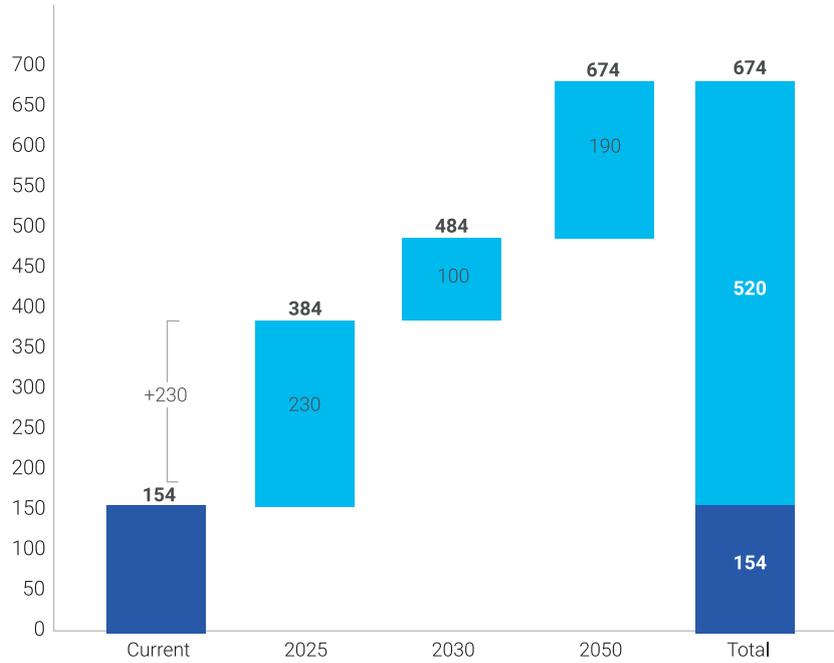


Figure 6.16: Nature-based solutions investment needs per year to achieve international commitments, \$ billion, 2022 (UNEP, 2022b)

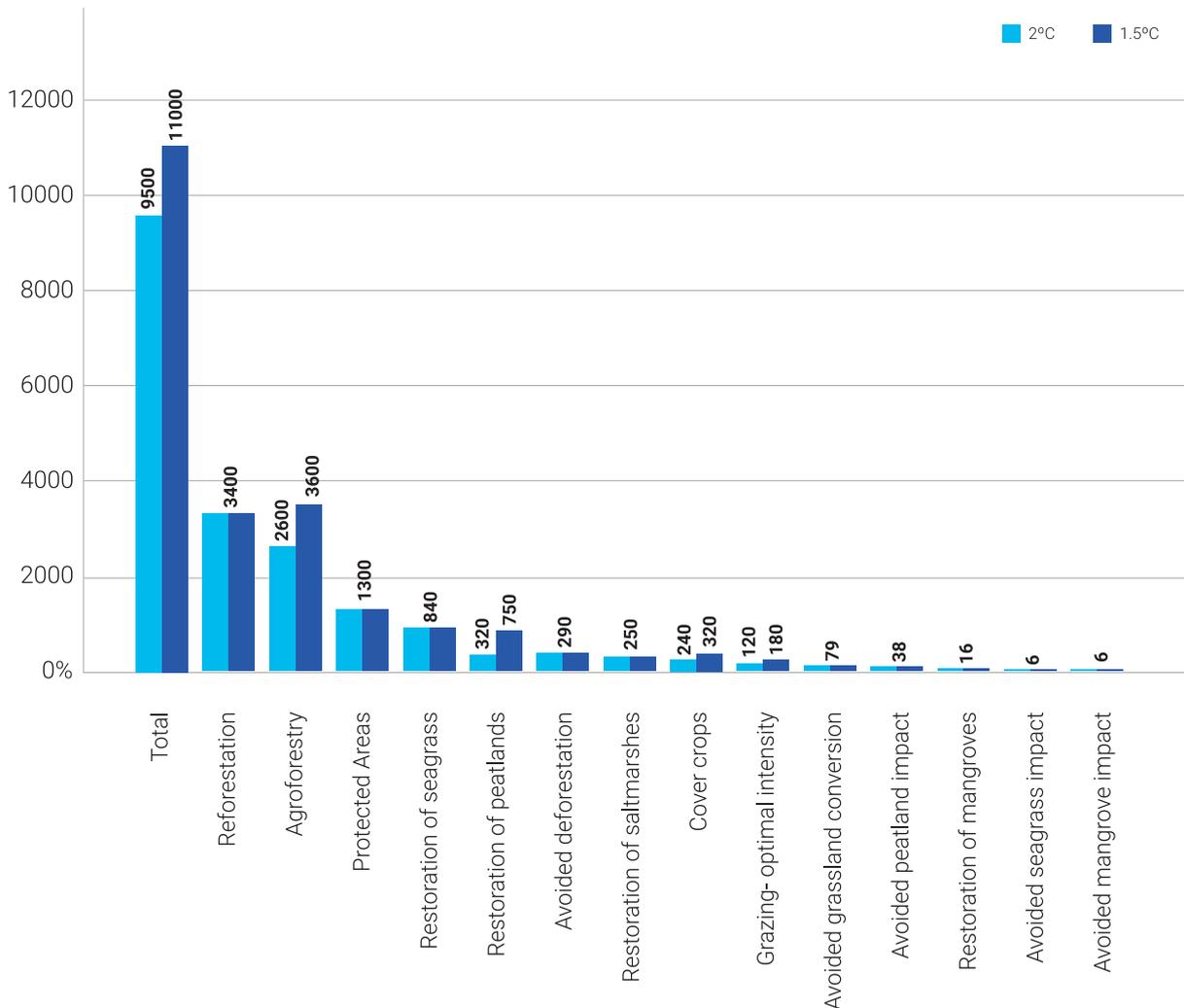


Figure 6.17: 2022 to 2050 cumulative Investment needs in 1.5°C and 2°C scenarios, \$ billion (UNEP, 2022b)

Furthermore, closing the gap stabilises ecological function, returning Biodiversity Intactness to 2020 levels by 2030 and increasing it beyond current levels by 2050, signifying a crucial step in halting and gradually reversing biodiversity loss (UNEP, 2022b).

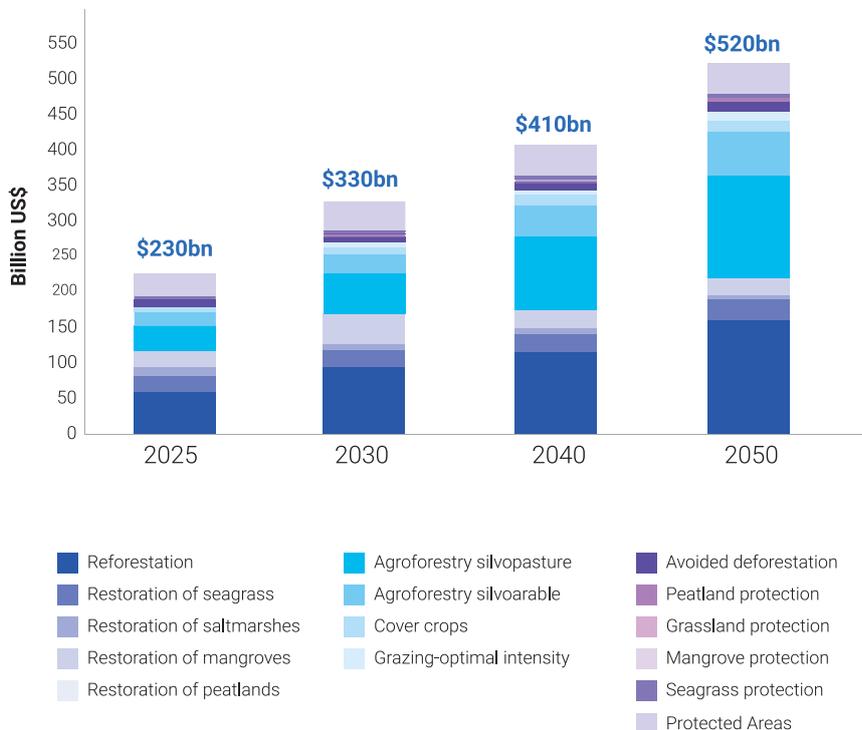
Another significant benefit is the global restoration of nearly 1 billion hectares, necessary to achieve land degradation

neutrality by 2030. This restoration will contribute to preserving and improving ecological health (UNEP, 2022b). For a breakdown of the additional investment flows required up to 2050, including the different intervention groups and related activities, refer to the graphical representation in Figure 6.18. Closing the financing gap is vital for realising these benefits and advancing sustainable development.

Current investment, future needs and benefits of closing the nature finance gap

\$154 billion
INVESTED IN NATURE- BASED SOLUTIONS ANNUALLY

Where do additional investments need to be directed under a 1.5°C Scenario



IF WE
DOUBLE
THAT NUMBER BY
2025,
WE CAN

- ➡ Reduce GHG emissions by up to 5 GtCO₂/year by 2025
- ➡ Halt Biociversion loss
- ➡ Restore almost 1 billion hectares of degraded land by 2030

LIMITING CLIMATE CHANGE TO
BELOW 1.5°C
IS ACHIEVABLE ONLY IF:

- ➡ Action is immediate
- ➡ With cumulative investment of \$ 11 trillion by 2050

Figure 6.18: Additional investment needs to close the NbS financing gap by 2050 in \$ (UNEP, 2022c)

6.3.3 Financial flow in Africa

Africa's share of global resources is substantial, considering the continent has 25 per cent of the world's natural biodiversity, 30 per cent of the world's mineral resources and 65 per cent of the world's uncultivated arable land. It also has the world's most productive forests and carbon retention sources. However, the value of these resources has been negligible as related returns have persistently been below potential (AfDB, 2023). Africa's natural capital, estimated as \$6.2 trillion in 2018, includes renewables, primarily land, cropland, pasture, forest and protected areas, and does not include ecosystem services in the form of land-based sequestered carbon stocks, wind, solar, biodiversity and the related ecosystem services they provide. This limitation in the continent's natural capital value accuracy is due to measurement and valuation challenges (AfDB, 2023).

Over the past quarter century, Africa has seen a decline in the value of natural capital per capita, underscoring the importance of the continent leveraging its natural capital in financing its green transition. The crucial role of NbS in mitigating climate change impacts and building resilience on the continent must be considered due to its particular exposure and vulnerability to climate change impacts. In this regard, national governments in sub-Saharan Africa have committed to scaling up NbS by including NbS for adaptation in their NDCs to the Paris Agreement (Seddon et al., 2020).

NbS projects implemented in Africa have addressed urgent infrastructural and social challenges, such as coastal and urban flooding and water security, including generating co-benefits, such as opportunities for carbon sequestration, biodiversity improvements and job creation (Oliver and Marsters 2022).

There are numerous opportunities for NbS to address Africa's infrastructure gap and water and adaptation challenges. However, despite these opportunities and demand for

NbS, finance flows toward these types of interventions need improvement as the portion of funds towards NbS for adaptation in overall climate finance has been relatively small with limitations to scale. The AfDB estimates that the climate financing gap in Africa ranges between \$99.9 billion and \$127.2 billion per year from 2020 to 2030. This estimation assumes that the current trends in climate finance inflows in Africa persist, with contributions from private sources falling short of the continent's requirements (AfDB, 2022). For example, Africa has a substantial financial need of approximately \$250 billion yearly to fulfil its NDCs by 2030. However, between 2019 and 2020, the total flow of climate finance received amounted to \$29.5 billion, with only \$4.2 billion coming from private sources. This proportion represents the smallest share among the major regions worldwide. Based on the assumption that private climate finance fills the entire gap in climate finance requirements, the private finance shortfall is projected to average around \$213.4 billion annually until 2030 (AfDB, 2023).

To further illustrate Africa's financing gap, finance flows into the continent for environmentally sound technologies (ESTs) with the potential for significantly improved environmental performance relative to other technologies have been dismal. For instance, in 2020, out of a global exported technology value of \$1.17 trillion, only \$6.07 billion of funding for these technologies went to Africa, as shown in Figure 6.19. Prioritising and boosting finance flows for EST is essential to scale both climate and nature-based investments on the continent as it covers total systems that include know-how, procedures, goods and services, and equipment, as well as organisational and managerial procedures for promoting environmental sustainability.

Financial flows to Africa specifically for NbS interventions have also been grossly inadequate to meet international targets such as the Global Biodiversity Framework's

BOX 17:**Example of NbS for climate in Ghana using an innovative results-based financing instrument*****Ghana Begins Receiving Payments for Reducing Carbon Emissions in Forest Landscapes (WB, 2023c)***

Accra, January 24, 2023—Ghana has become the second country in Africa after Mozambique to receive payments from a World Bank trust fund for reducing deforestation and forest degradation emissions, commonly known as REDD+. The World Bank's Forest Carbon Partnership Facility (FCPF) paid Ghana \$4,862,280 for reducing 972,456 tons of carbon emissions for the first monitoring period under the program (June to December 2019).

This payment is the first of four under the country's Emission Reductions Payment Agreement (ERPA) with the World Bank to demonstrate potential for leveraging results-based payments for carbon credits; subject to showing results from actions taken to reduce deforestation, Ghana is eligible to receive up to \$50 million for 10 million tons of CO₂ emissions reduced by the end of 2024

These actions are within a six-million-hectare stretch of the West African Guinean Forest, where biodiversity and forests are under pressure from cocoa farming, unsustainable harvesting and small-scale mining. Ghana is one of 15 countries that have signed ERPAs with the World Bank.

Ghana is the world's second-largest cocoa producer. Cocoa drives the economy, but it is also one of the leading causes of deforestation and forest degradation in the southeast and western regions of the country. Stakeholders are working to help some 140,000 Ghanaian farmers increase cocoa production using climate-smart agroforestry approaches rather than slash-and-burn land-clearing techniques that decimate forests. More sustainable cocoa farming helps avoid the expansion of cocoa farms into forest lands and secures more predictable income streams for communities.

Ghana's Cocoa Board is participating in the REDD+ process, as are some of the world's most important cocoa and chocolate companies, including World Cocoa Foundation members like Mondelez International, Olam, Touton, and others. Their combined actions are helping bring change to the cocoa sector and helping Ghana meet its national emissions reduction commitments under the Paris Agreement.

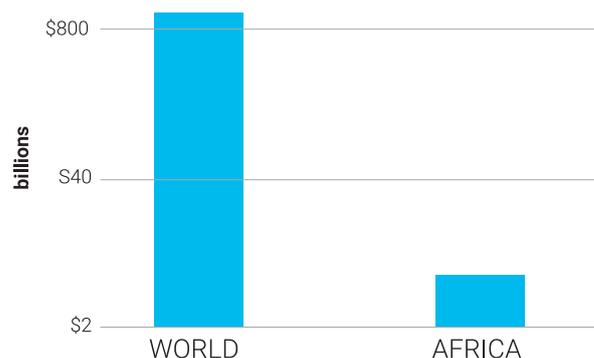


Figure 6.19: *Environmentally sound technologies exports in 2020 (UN statistics, 2023)*

commitment to increase protected areas to 30 per cent of the planet by 2030 (30 × 30). For instance, only 3 per cent of the current \$23 billion global annual spending on protected area management has been allocated to sub-Saharan Africa and less than 1 per cent to North Africa and the Middle East combined (UNEP, 2022b). Figure 6.20 shows that current annual spending in marine protected areas needs to increase from \$39 million to \$200 - \$270 million in sub-Saharan Africa and

from \$8 million to \$750 - \$1000 million in North Africa and the Middle East combined, to meet the 30 × 30 global biodiversity target.

For terrestrial protected areas, current funding needs to double in sub-Saharan Africa from \$760 million to \$1.4 - \$1.7 billion and increase almost fivefold in North Africa and the Middle East combined, from \$74 million to \$220 - \$430 million, to achieve the 30 × 30 target, as shown in Figure 6.21.



Photo Credits: SWITCH Africa Green

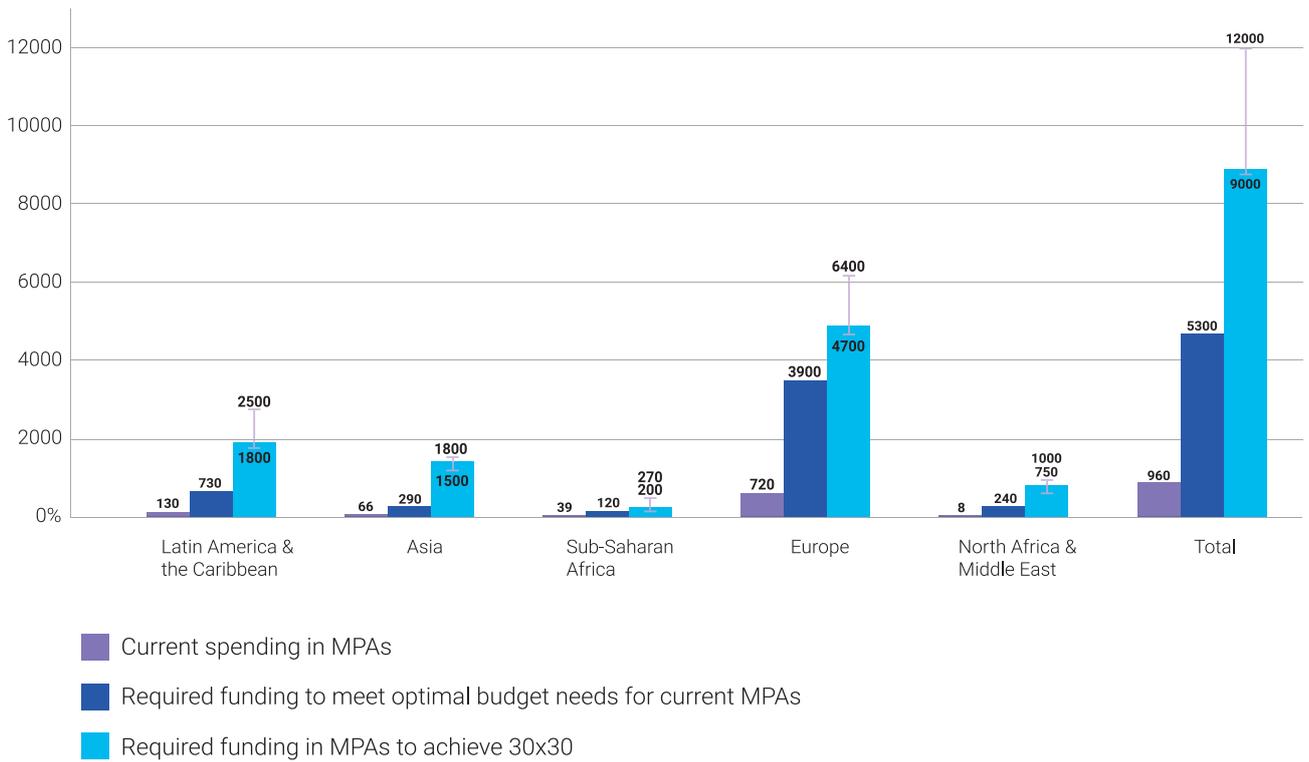


Figure 6.20: Current funding gaps for marine protected areas by region, million, 2022 \$ (UNEP, 2022b)

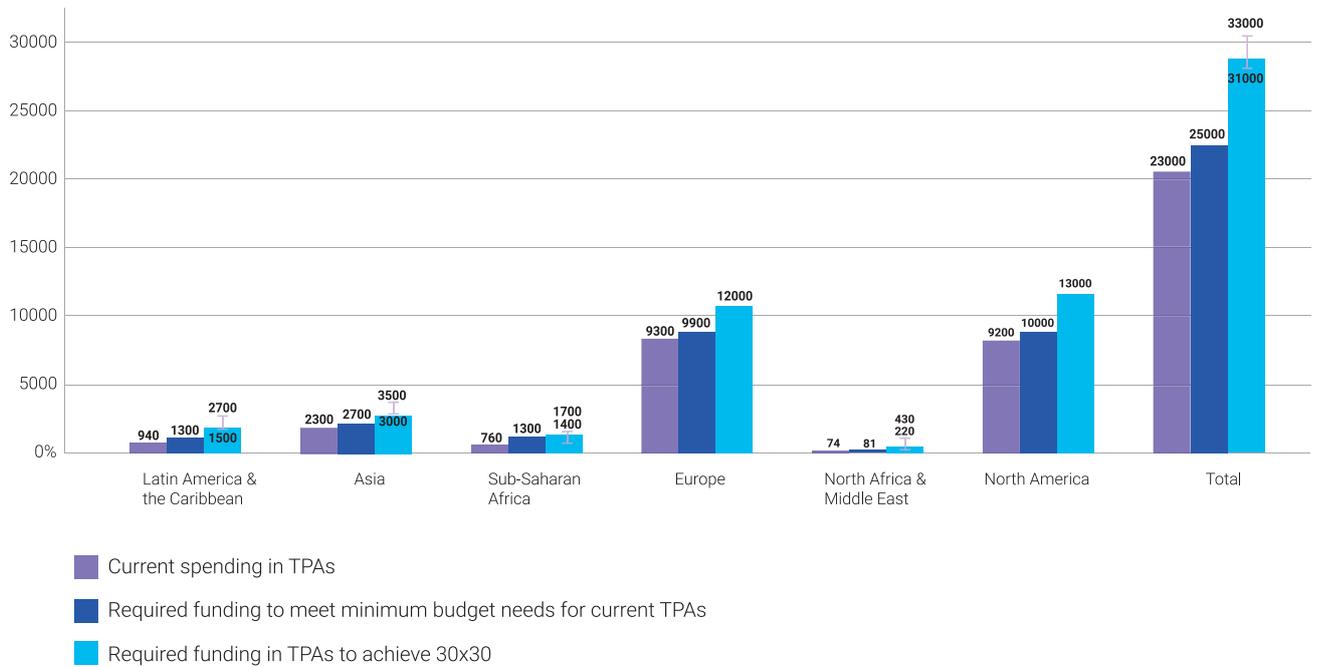


Figure 6.21: Current funding gaps for terrestrial protected areas by region, million, 2022 \$ (UNEP, 2022b)

6.3.4 Opportunities and barriers to financing

Although NbS have the potential to contribute significantly to global goals related to climate, biodiversity and land degradation, the investment market in this area is still in its early stages and primarily reliant on public funding. However, the capacity of public funds to scale up these interventions is limited. While addressing the barriers to investments in NbS is crucial, it is equally important to seize the opportunities presented by these solutions.

The implementation of NbS requires the deployment of sizeable human capital with varied skill sets. It should thus also be considered an opportunity to invest in people and livelihoods. A joint report by the International Labour Organization (ILO) and UNEP shows the potential for creating jobs and businesses through investments in NbS (ILO, UNEP, IUCN, 2022). Furthermore, the potential for NbS to contribute to disaster risk reduction by enhancing the health of ecosystems and increasing resilience has become an attractive proposition for reinsurance companies. As a result, these companies are increasingly directing their investments toward this field (Swiss Re Group, 2023).

Developing countries face a variety of barriers to accessing public finance for NbS. These barriers include complex application processes mandated by multilateral donors such as the Global Environment Facility, Green Climate Fund, or Adaptation Fund. Additionally, there needs to be more available information and data necessary to apply for funding and a need for initial funds to conduct baseline feasibility assessments. Inadequate capacity for implementing various aspects of NbS interventions, such as addressing social safeguards, further hinders access to public finance for these countries (UNFCCC, 2022b; UNFCCC, 2021; Atteridge et al., 2022; Brears, 2022).

Addressing the following barriers is crucial for facilitating access to private-sector financing for NbS (UNFCCC, 2022; UNFCCC, 2021; Atteridge et al., 2022; UNEP, 2022b):

- ◆ The share of private sector finance to NbS, as compared to climate, reflects the novelty of the natural capital investments and suggests that the NbS and business case for investments are generally not entirely understood by private institutions in development finance, commercial banking, investment banking and institutional investing. Figure 6.22 reinforces this point and compares finance flows to climate and NbS.
- ◆ Valuing ecosystem goods and services in financial terms and the capacity and funding to acquire and assess the required data and information poses a challenge.
- ◆ The long-term horizon for generating investment returns, given that NbS have a longer timeframe than many other investments, including hard infrastructure.
- ◆ The absence of government incentives and an established taxonomy.
- ◆ The presence of private sector institutional barriers to investment and operations.

ADDRESSING THE BARRIERS

Actions to overcome the barriers to public and private sector financing of nature involve short-, medium- and long-term initiatives and strategies by key stakeholder actors (UNFCCC, 2022b; UNFCCC, 2021; Brears, 2022; Atteridge et al., 2022; NbS, 2022).

Climate finance relative to finance for NbS

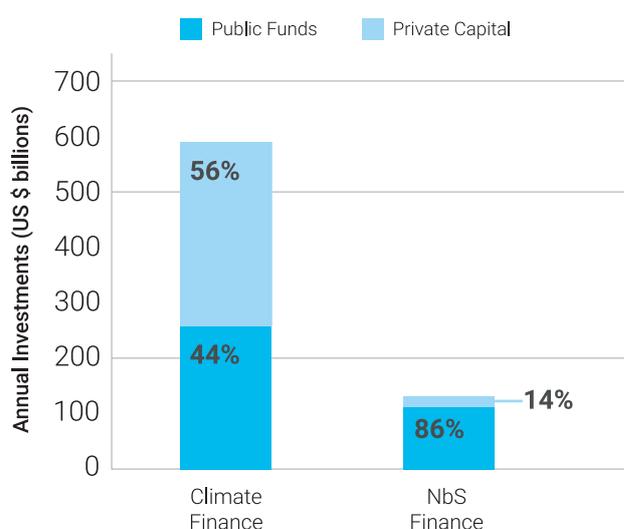


Figure 6.22: Comparing annual investments in climate finance and NbS (UNEP, 2022c)

Actions for governments and implementing agencies at the national level:

- ◆ Create a supportive environment for NbS by developing coherent policies that integrate them into overall development strategies and sector-specific policies in climate, agriculture, infrastructure and other relevant sectors.
- ◆ Incorporate NbS into foreign policy and development assistance initiatives.
- ◆ Establish incentives to encourage private sector investment in NbS.
- ◆ Develop a compelling business case for investing in NbS by researching potential opportunities, cost-benefit analysis and risk assessment and ensuring effective communication of the findings.
- ◆ Promote active engagement with the private sector to gain better insights into investment opportunities and understand the sector's specific needs.
- ◆ Ensure the inclusion and participation of indigenous peoples and local communities

(IPLCs) from the inception of project identification and development while respecting their rights and knowledge in all aspects of the intervention.

- ◆ Facilitate access to information, provide capacity building and offer technical support to IPLCs during proposal development and the funding application process as per their requirements.
- ◆ Enhance South–South cooperation to foster the exchange of best practices and lessons learned.
- ◆ Establish a pipeline of NbS initiatives that are investment-ready for funding opportunities.
- ◆ Ensure the equitable distribution of funds across global, national, and local levels.

Actions for governments, regional bodies, implementing agencies and donors at the international level: (UNFCCC, 2022b; UNFCCC, 2021):

- ◆ Facilitate more significant international exchanges between developed and developing nations and South-South interactions while acknowledging the context-specific and site-specific nature of NbS.
- ◆ Harmonise bilateral support with recipient countries' development, environmental and climate priorities.
- ◆ Allocate financial resources to blended finance initiatives, mitigate risks and encourage participation for private investors, such as multilateral banks and international agencies.
- ◆ Streamline the application and accreditation processes to reduce the complexity and approval and disbursement procedures to expedite funding from bilateral and multilateral support agencies and

- international funders such as the GCF and GEF.
- ◆ Promote a better understanding of available financing options and facilitate the integration of such financing, including blended finance, with other forms of funding.
- ◆ Ensure the equitable distribution of funds across global, national and local levels.



Photo Credits: SWITCH Africa Green

6.3.5 Conclusion

Africa's decline in its natural capital per capita highlights the importance of leveraging its natural capital to fund the green transition. Given its vulnerability to the related risks, financing nature-based solutions on the continent is critical for climate change mitigation and adaptation. While significant financing gaps need to be filled, various opportunities exist for mobilising funding and investment in nature-based solutions. These include innovative financing mechanisms such as green bonds, impact investing, blended finance, and leveraging existing international funding sources and partnerships, especially from the private sector. However, several barriers hinder the effective financing of

nature-based solutions. These include limited understanding and awareness of nature-based solutions and financial value, lack of policy and regulatory incentives, and institutional barriers to private sector participation. Overcoming these barriers requires a multi-stakeholder approach, with collaboration between governments, financial institutions, development organisations, and local communities. It is essential to prioritise nature-based solutions in national development plans, establish conducive policy frameworks, build capacity on innovative financing options, and raise awareness about the economic, social, and environmental benefits of investing in nature.

6.4 African carbon market

The global effort to combat climate change and transition to a low-carbon economy has gained significant momentum in recent years. Africa has emerged as a key player in this transformative journey with its vast natural resources, diverse ecosystems, and growing economies with immense potential for carbon market development and greenhouse gas reduction. This section provides an introductory overview of carbon markets, exploring their

purpose, mechanisms, and potential for sustainable development in the African context. By examining the unique opportunities and challenges African countries face and the regional and international collaborations driving voluntary carbon market initiatives, this chapter sets the stage for a comprehensive exploration of the impact that investments in Africa's voluntary market can play in Africa and a globally sustainable future.



Women collecting water in Ethiopia. Photo Credits: UNEP

6.4.1 Carbon markets overview

The Paris Agreement's emission reduction targets have made it imperative for countries and organisations to prioritise directly decarbonising their activities and operations. In addition to these efforts, carbon markets are emerging as significant contributors to achieving net zero ambitions. Carbon markets are trading systems in which carbon credits are bought and sold. They are an effective tool that provides economic incentives for public and private stakeholders to limit the increase in greenhouse gas emissions (UNDP, 2022). Carbon markets are currently classified into two main categories: compliance carbon markets (CCM) and voluntary carbon markets (VCM). In CCMs, carbon allowances are traded and regulated under mandatory national, regional or international regimes. These markets are crucial for supporting emission reduction endeavours in an increasing number of countries.

On the other hand, VCMs operate voluntarily, where companies and individuals trade carbon credits to meet carbon reduction emission targets and ambitions. VCMs play

a significant role in stimulating investment in carbon compensation projects and neutralising emissions (GIC, EDB, McKinsey and Company 2021). The compliance markets are bigger and more mature than the voluntary markets and had a market value estimated at over \$100 billion and an annual trade turnover of over \$250 billion in 2020. In comparison, the voluntary markets were valued at only \$300 million as of 2020 (GIC, EDB, McKinsey and Company 2021). Thirty CCMs were operating worldwide in 2021, reaching a combined value of over \$850 billion and covering nearly a fifth of global greenhouse gas emissions (BloombergNEF, 2022). Figure 6.23 shows the international jurisdictions operating CCMs. South Africa is the only country in Africa that has a compliance market.

Voluntary carbon markets have the potential to contribute to broader development objectives by generating employment opportunities, expanding access to energy, enhancing livelihoods and safeguarding biodiversity. Carbon credit funds, whether privately or

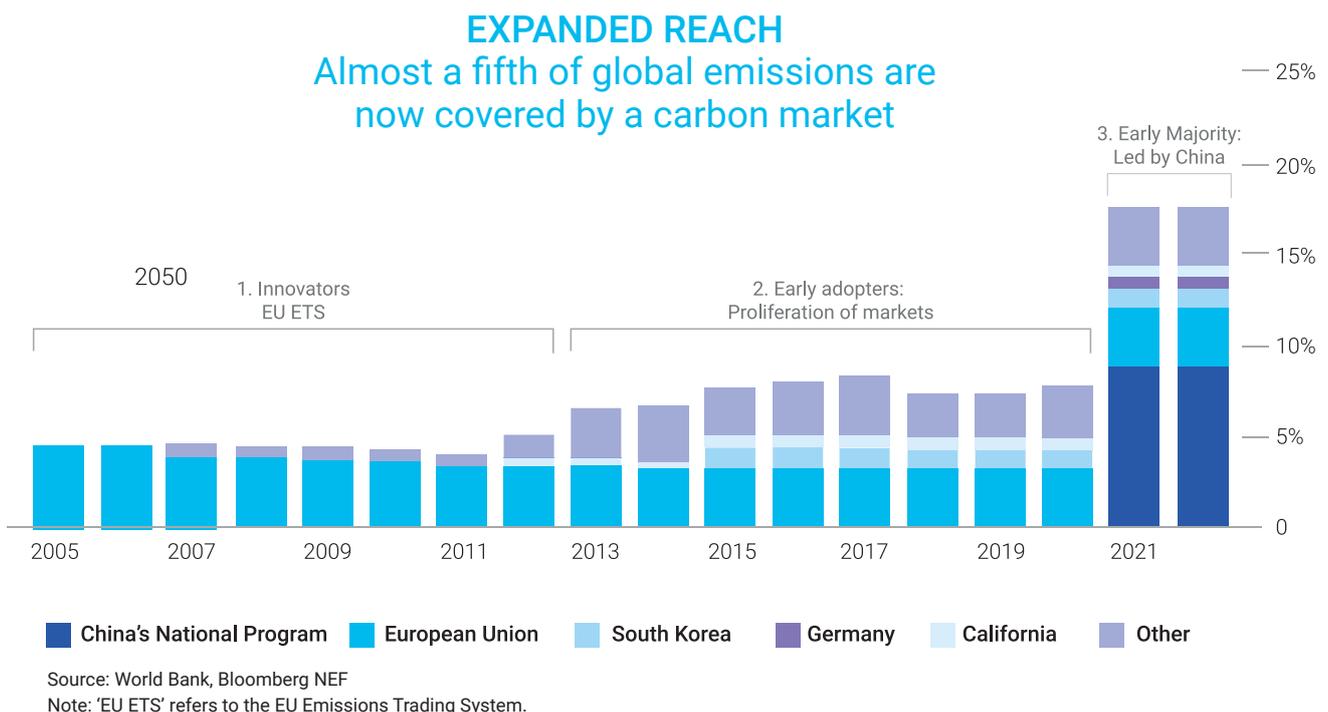


Figure 6.23: Compliance carbon market jurisdictions (BloombergNEF, 2022)

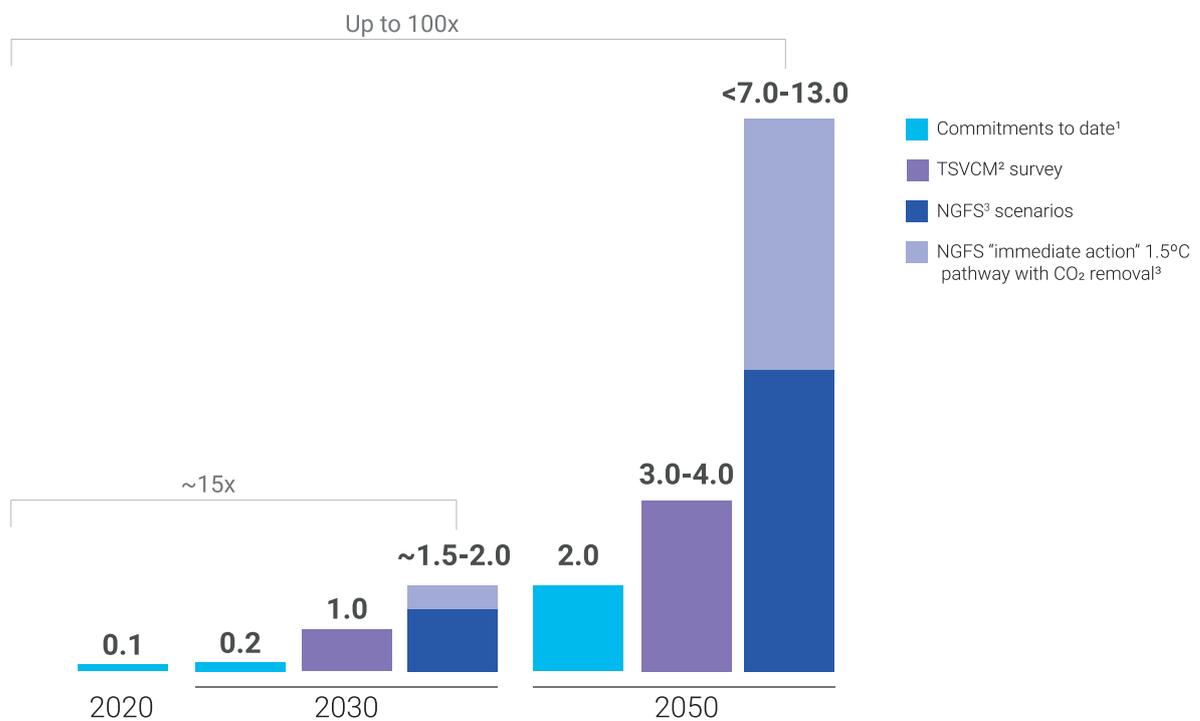
government-owned, form the foundation of the voluntary carbon market. These funds provide financial support for advancing carbon offset projects and acquiring carbon credits, which are subsequently sold to end customers. Four significant trends are currently shaping voluntary carbon markets on a global scale (ACMI, 2022):

Demand growth: Global companies are increasingly incorporating carbon credits that represent the avoidance or removal of CO₂ equivalent (CO₂e) emissions, especially residual emissions, as part of their journey to achieving net zero emissions. According to the Task Force on Scaling Voluntary Carbon Markets (TSVCM), demand for VCMs is projected to grow by 15 times by 2030 and up to 100 times by 2050 under different scenarios. By 2030, the market value for carbon credits could exceed \$50 billion. (TSVCM, 2021; Blaufelder, et al., 2021). Figure 6.24 shows the projected global demand for voluntary carbon credits under different scenarios.

Expansion and shift of project types: New project types are emerging within VCMs, leading to a shift in buyer preferences for specific project types. In addition, newer technology-based removal projects are emerging alongside traditional nature-based methods, creating a complementary approach within the market.

Price growth: The pricing of carbon credits varies significantly depending on the project type, with nature-based projects currently commanding higher prices than other traditional project types. Prices are expected to rise, with nature-based credits projected to achieve three times their current worth by 2025. Additionally, as high-integrity removal credits, such as engineered carbon dioxide removal credits, are prioritised by buyers, the prices of these credit types are expected to increase significantly.

Enhanced government activity: An increasing number of countries are actively exploring possibilities to participate in VCMs, even if



¹These amounts reflect demand established by climate commitments of more than 700 large companies. They are lower bounds because they do not account for likely growth in commitments and do not represent all companies worldwide.
²TSVCM = Taskforce on Scaling Voluntary Carbon Markets. These amounts reflect demand based on a survey of subject-matter experts in the TSVCM.
³NGFS = Network for Greening the Financial System. These amounts reflect demand based on carbon-dioxide removal and sequestration requirements under the NGFS's 1.5°C and 2.0°C scenarios. Both amounts reflect an assumption that all carbon-dioxide removal and sequestration results from carbon credits purchased on the voluntary market (whereas some removal and sequestration will result from carbon credits purchased in compliance markets and some will result from efforts other than carbon-offsetting projects).
Source: NGFS; TSVCM; McKinsey analysis

Figure 6.24: Voluntary carbon credit demand scenarios, gigatonne per year (Blaufelder, et al., 2021)

they had minimal or no prior involvement. This engagement includes issuing jurisdictional credits or engaging in bilateral country-to-country credit sales.

A simultaneous focus is developing a robust and trustworthy market to generate and trade these carbon credits.

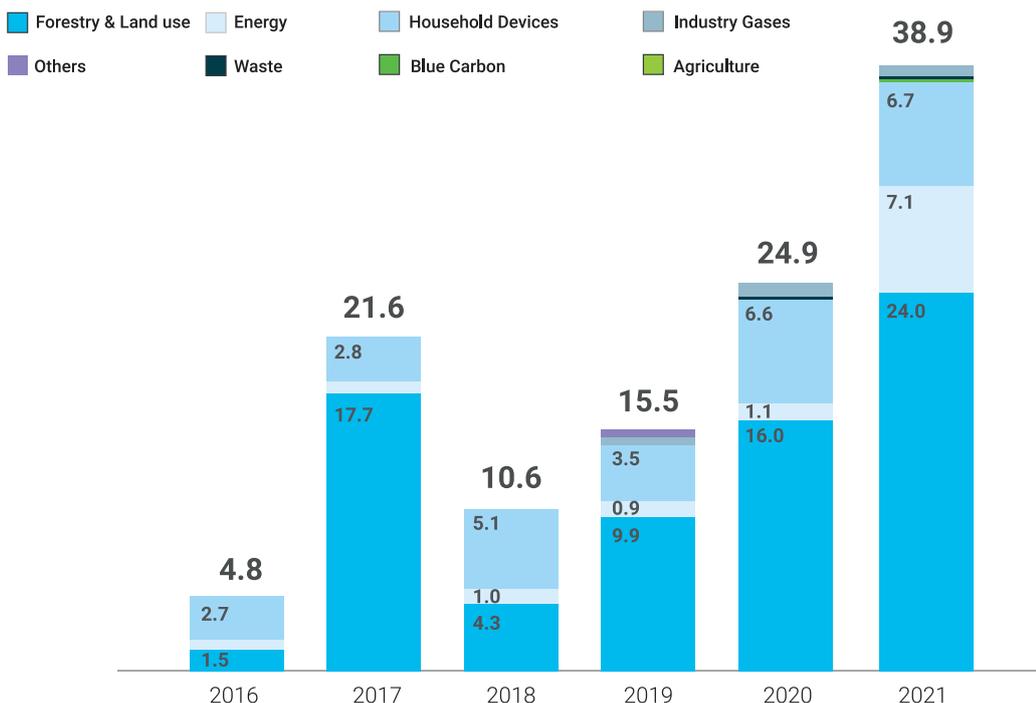


Measuring Carbon, Tanzania. Photo Credits: UNEP

6.4.2 State of the carbon markets in Africa

Africa has the potential to benefit significantly from carbon markets, as they present an excellent opportunity to unlock significant funds for the climate finance requirements of African economies. This opportunity can simultaneously promote energy accessibility, job creation, biodiversity preservation and the advancement of climate action. African VCMs are growing, with retirement credits having seen an average yearly growth of 36 per cent from 2016 to 2021, compared to 31 per cent for global markets. However, concerted and deliberate efforts will be needed to sustain this level of growth over the coming decades (Climate Champions, 2022; ACMI, 2022).

Africa is currently utilising a tiny fraction of its carbon credit potential representing only about 2 per cent of its maximum annual potential in nature-based solutions, clean cookstoves, renewable energy projects, waste management, agriculture and blue carbon, among others.



Source: Vivid Economics carbon credit database including data from Verra, Gold Standard, and Plan Vivo registries

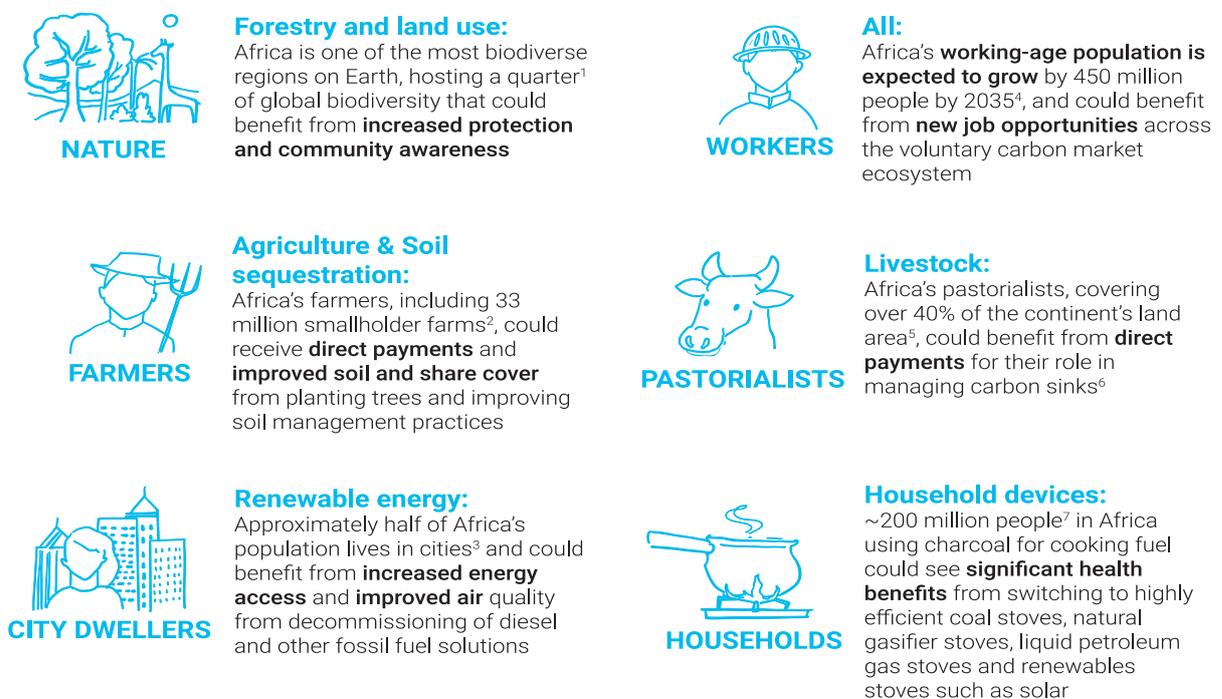
Figure 6.25: Total credit issued in Africa by project type from 2016-2021, MtCO₂e (ACMI, 2022)

Africa has an immense untapped potential estimated to be about 2,400 metric tons of CO₂ equivalent (MtCO₂e) per annum, and by utilising new and emerging methodologies, Africa can achieve a maximum technical potential of approximately an additional 400 MtCO₂e yearly. This would be worth about \$7 billion per year by 2030 (ACMI, 2022). Even harnessing a small portion of this immense potential could redirect substantial climate financing into Africa, providing support for employment, livelihoods, enhanced energy access, biodiversity preservation and improved health outcomes. Also, only five countries account for about 65 per cent of carbon credits issued over the last five years (ACMI, 2022). Figure 6.25 shows the total credit issued in Africa by project type between 2016 and 2021.

opportunities for stakeholders, including businesses, support projects that align with Africa’s development priorities, assisting the continent in achieving its goals and objectives. For example, companies engaged in renewable energy initiatives can evaluate the eligibility of these projects for carbon finance. Furthermore, such companies can generate additional revenue streams by obtaining carbon credit certification for these projects and selling them to end buyers. Financial institutions interested in investing in green projects may also explore the option of providing carbon finance to project sponsors. Additionally, companies can fulfil their net-zero commitments by purchasing carbon credits of superior quality. Figure 6.26 shows the developmental benefits that VCMs can provide to Africa.

Voluntary carbon markets facilitate the transfer of financial resources across borders, allowing for funding from the Global North to the Global South. These markets, which open up significant

Several obstacles inhibit the growth of the continent’s voluntary carbon market, including fragmented projects and carbon-emitting assets, a scarcity of large-scale developers



1. UN Report “The state of Biodiversity in Africa”
 2. IFAD, Invest more in smallholder agriculture
 3. World Bank (2022)
 4. World Bank publication “Creating Jobs for Africa’s Growing Population”
 5. African Union 2010 estimates
 6. However, because of the insecure land rights, pastoralists risk having their rights violated by private sector and government carbon credit developers
 7. Rose, Julian; Bensch, Gunther; Munyehirwe, Anicet; Peter Jörg. “The forgotten coal: Charcoal demand in Sub-Saharan Africa”

Figure 6.26: Benefits of the voluntary carbon markets to Africa (ACMI, 2022)

BOX 18:

Excerpt from how Kenyan coastal villagers are cashing in on carbon credits (Africa Renewal, 2023)

Kiswahili speakers in East Africa have invented a new word, "hewa kaa," to describe carbon credit. Hewa kaa is a commodity that villagers in Kenya's coastal region are selling to international corporations as a monetary incentive for them to reduce their carbon emissions. When asked what business these villagers are in, they say, "We are selling air."

The villagers are part of Mikoko Pamoja – Swahili for "mangroves together" – a development initiative in the Gazi and Makongeni areas of the south coast of Kenya. This pioneering project promotes the conservation and sustainable use of mangrove resources to achieve three goals: mitigate climate change, conserve biodiversity, and enhance community livelihood.

Mikoko Pamoja conserves 117 hectares of state-owned mangroves, representing almost 16 per cent of the ecosystem in the Gazi Bay. During the 20 years from 2013 to 2033, the project seeks to protect 107 hectares of natural mangrove forests and conserve 10 hectares of red mangrove plantations established in denuded areas in the early 1990s.

As a result of these efforts, Mikoko Pamoja became the first-ever blue carbon initiative in the world that sold carbon credits from mangrove conservation activities for community development, according to the Equator Initiative. With most credit trading projects based on terrestrial ecosystems, going "blue" includes conserving and restoring ocean-based carbon sinks, such as mangrove forests.

Plan Vivo, an organisation that helps communities plant trees and generate carbon credits, validated Mikoko Pamoja to sell at least 3,000 metric tons of CO₂ equivalent per year from 2013 to 2033. This arrangement is expected to generate annual revenue of about \$130,000.

Forward-thinking businesses buy the credits, NGOs, universities, and individuals looking to manage their carbon footprints, while supporting people and nature. Before its launch, access to clean water and education materials in Gazi Bay village was a privilege for the few. The project has seen more than 30 per cent of carbon credit profits in education, clean water supply, mangrove reforestation, and equal employment opportunities for the majority of people in Gazi.

Mikoko Pamoja has funded pumps, providing clean drinking water for several hundred children in primary schools in Gazi and Makongeni and nearly 5,400 people in the broader community. The project also has helped purchase textbooks, sports uniforms and other learning materials for 700 children.

As a flagship project, Mikoko Pamoja's model is being replicated in Vanga Blue Forest, 60 km south of Gazi Bay, close to the border with Tanzania. The expansion in Vanga will effectively triple the area of mangroves protected and the number of carbon credits sold, further increasing revenues. Good science, community buy-in, communal entrepreneurship and government support have been identified as building blocks of the project that could be replicated by other mangrove areas in Africa and Latin America.

with the capacity to gather sufficient capital and expertise, and an uncertain regulatory landscape. In addition, concerns regarding the credibility of certain carbon credits and the equitable value distribution impede intermediation and demand (ACMI, 2022). Figure 6.27 summarises the key challenges identified along the supply, intermediation and demand value chains that must be addressed to scale African VCMs.

6.4.3 Overcoming the challenges

To address the challenges in the growth of carbon markets on the continent, a consortium of stakeholders, including a 13-person steering committee of African leaders, CEOs and carbon credit experts, launched the Africa Carbon Markets Initiative (ACMI) at the UN COP27 in November 2022. The ACMI, which was sponsored by Sustainable Energy for All, the Global Energy Alliance for People and Planet, and the UN Economic Commission for Africa, seeks to support carbon credit growth and job creation in Africa. By promoting the demand

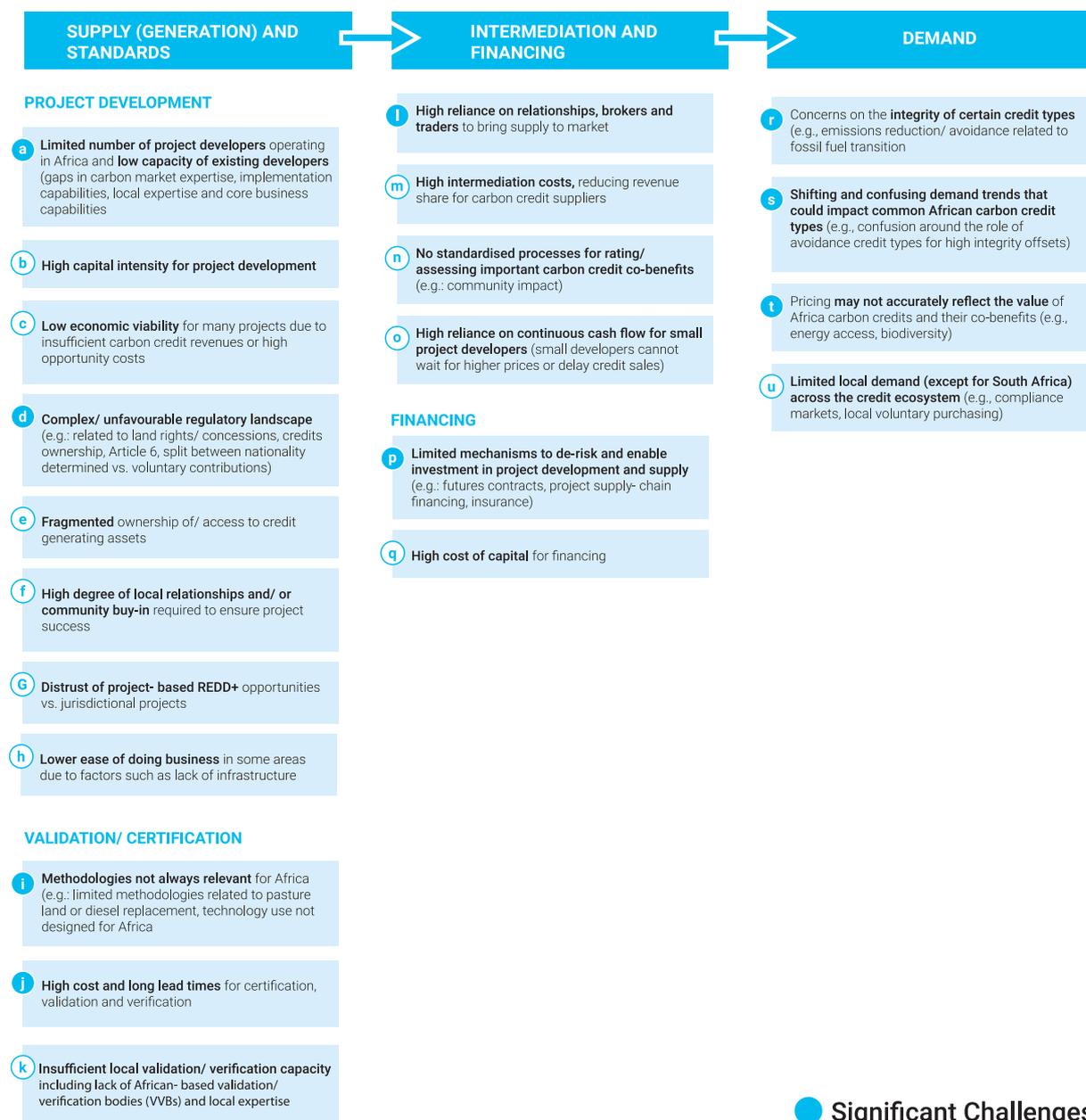


Figure 6.27: Key challenges to scaling voluntary carbon markets in Africa (ACMI, 2022)

for existing and pipeline high-integrity carbon credits and creating a market for innovative projects and products, ACMI aims to grow Africa’s voluntary carbon markets by scaling the supply and demand for African carbon credits. This ambition includes four core objectives:

- ◆ Increasing the retirement of African carbon credits by approximately 19 times, from around 16 MtCO₂e retired in 2020 to approximately 300 MtCO₂e per year by 2030 and up to 1.5-2.5 GtCO₂e by 2050.
- ◆ Unlocking \$6 billion in revenue by 2030 and over \$100 billion by 2050 annually by raising the quality and integrity of African credits.
- ◆ Supporting the creation of 30 million jobs by 2030 and over 100 million by 2050 from the development, execution, certification and monitoring of carbon projects.

- ◆ Ensuring the equitable and transparent distribution of carbon credit revenue with local communities.
- ◆ To achieve its objectives, the ACMI has a roadmap that includes 13 action programmes across the VCM value chain of supply and standards, intermediation and financing, and demand. Figure 6.28 itemises and summarises the ACMI proposed action programmes.

On the global stage, the TSVCM has proposed six areas for global actions to build an effective market which, in addition to the proposed action programmes by the ACMI, can enable and support the scaling up of the voluntary carbon markets in Africa. These areas include (TSVCM, 2021):

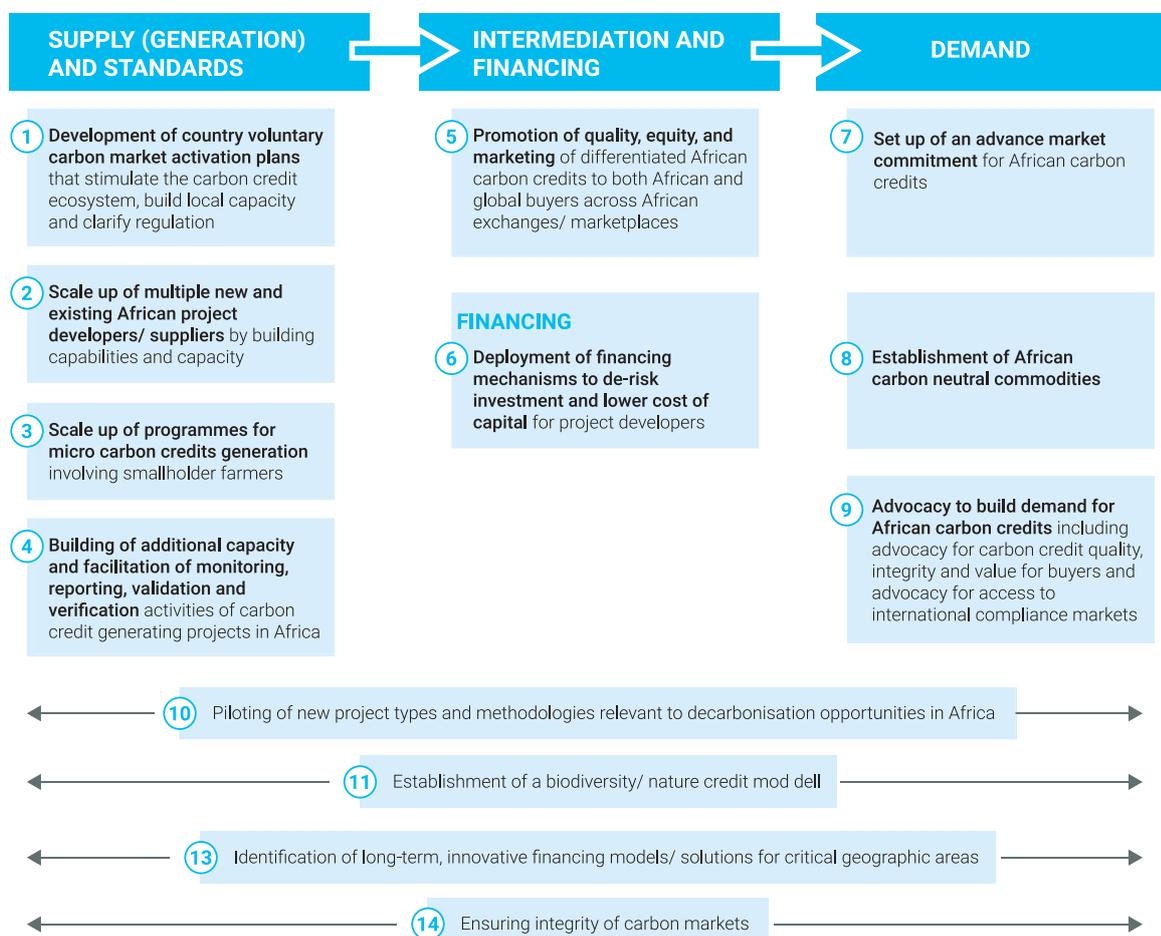


Figure 6.28: Proposed action programmes to address challenges in Africa’s VCM (ACMI, 2022)

Establishing core and common principles for defining and verifying carbon credits: These would efficiently match buyers and suppliers by eliminating the heterogeneity of carbon credits and pricing based on attributes from the underlying projects. Standardising credit attributes, such as quality and additionality, in a common taxonomy would enable sellers to market their credits and buyers to find credits that suit their needs.

Formulating agreements with standardised terms: Exchanges can introduce reference contracts for carbon trading which incorporate the core carbon principles with additional attributes defined according to a standardised classification and priced separately. Core contracts enable companies to efficiently purchase significant quantities of carbon credits and offer the advantage of establishing a transparent daily market price. Prices for credits traded using reference contracts can serve as benchmarks for negotiating over-the-counter trades, with additional attributes priced individually.

Setting up the requisite infrastructure for trading and post-trade operations: A robust and resilient infrastructure is crucial for the efficient operation of the voluntary carbon market. Such infrastructure should facilitate listing and trading reference contracts at a large scale, as well as contracts encompassing a defined set of additional attributes. This infrastructure would also support developing structured finance products for project developers, providing them valuable opportunities. Setting up post-trade infrastructure such as clearinghouses, meta-registries, and advanced data infrastructure is also necessary.

Building agreement and consensus on the appropriate use of carbon credits: Defining principles for the utilisation of carbon credits would ensure that carbon offsetting does not hinder other emission reduction efforts and

effectively leads to more carbon reductions compared to the absence of such measures. Under these principles, a company would initially assess its requirement for carbon credits by disclosing its greenhouse gas emissions from all operations, along with its targets and plans for progressively reducing emissions. To offset emissions from sources that can eventually be eliminated, the company may choose to acquire and retire carbon credits, attributing the reductions to its efforts and removing the credits from the market to prevent duplicate claims. Additionally, carbon credits could be employed to neutralise residual emissions that cannot be eliminated in the future, referred to as residual emissions.

Implementing measures to ensure market integrity is protected: To overcome obstacles that hinder the growth of the VCM due to the heterogeneous nature of credits and the limited transparency in pricing, it is necessary to establish a digital process for registering projects and verifying and issuing credits. This digital platform would streamline and enhance the efficiency of these crucial processes, eliminate fraud, and enable greater transparency and standardisation within the VCM.

Effectively transmitting clear signals of demand: Facilitating effective methods for buyers of carbon credits to express their future demand can significantly encourage project developers to enhance the supply of carbon credits. Promoting demand signals can be achieved through consistent and widely accepted guidelines that outline acceptable uses of carbon credits for offsetting emissions. Increased industry-wide collaboration may also be beneficial, with consortiums of companies aligning their emission reduction goals or establishing shared objectives. Furthermore, enhancing standards and infrastructure for developing and selling consumer-oriented carbon credits can promote demand signals.

6.4.4 Conclusion

Voluntary carbon markets offer a range of benefits that extend beyond climate action and can contribute to broader development objectives. In Africa, these markets have the potential to create employment opportunities, increase access to energy, improve livelihoods, and protect biodiversity. They present a valuable avenue to mobilise substantial climate finance for African economies. However, despite the immense potential, Africa is currently utilising only a fraction of its carbon credit capacity concentrated in only five countries that account for about 65 per cent of carbon credits issued over the last five years, and with a significant untapped potential estimated at approximately

2,400 metric tons of CO₂ equivalent (MtCO₂e) per annum. By embracing new and emerging methodologies, Africa could achieve an additional 400 MtCO₂e yearly, valued at around \$7 billion per year by 2030. Initiatives such as the African Carbon Market Initiative (ACMI) and the Taskforce on Scaling Voluntary Carbon Markets (TSVCM) recommend regional and global actions to scale the supply and demand for high-integrity carbon credits. With continued efforts and collaboration among stakeholders, the African voluntary carbon market has the potential to unlock substantial investment, foster sustainable development, and contribute to global climate goals.



Photo Credits: SWITCH Africa Green



CHAPTER

07

Leveraging the African Continental Free Trade Area (AfCFTA) for Green Businesses in Africa



Photo Credits: SWITCH Africa Green

7.1 Introduction

Africa is one of the most vulnerable continents to climate change, climate variability, and biodiversity loss, and it faces significant challenges due to various forms of environmental pollution and ecosystem degradation.

Party to 16 Regional and 37 Global Environmental Treaties and Protocols, the region has committed to multilateral cooperation and national-level action on various environmental issues, including biological diversity, chemicals and waste, climate and atmosphere, environmental governance, land and agriculture, and marine and freshwater (InforMEA, 2023). Over 90 per cent of African countries have ratified the Paris Agreement, and 70 per cent have committed to clean energy and agriculture in their Nationally Determined Contributions (NDCs) (van der Ven and Signé 2021). These agreements and commitments provide a solid mandate to join global efforts to reduce greenhouse gas (GHG) emissions,

reinforce adaptive capacity, tackle pollution, and protect terrestrial and marine biodiversity.

At the same time, African governments are committed to industrialising their economies to meet the needs of growing populations and create jobs and wealth (Bouchene et al., 2021a). In finding a new path that respects planetary limits while also delivering on economic imperatives, Africa can turn the fact that its manufacturing sector is still relatively small, contributing just 3 per cent to global manufacturing GHG emissions and 2 per cent to global manufacturing value-add (MVA), to its advantage. Because half of the continent's potential 2050 GHG-emitting industries have not yet been built, Africa can leapfrog more developed nations and build a low-carbon manufacturing sector from the ground up. Similarly, the services sector in Africa is faced with enormous business opportunities while creating enabling conditions for other sectors to expand, for example, the telecommunications

sector and its role in driving digitisation in the continent. Regional trade and integration can provide a strong stimulus for this potential. The creation of the African Continental Free Trade Area (AfCFTA) through the Agreement Establishing the AfCFTA, which entered into force on 30 May 2019, presents essential opportunities for boosting intra-African trade and promoting environmentally, socially and economically sustainable development (AfCFTA Secretariat, 2023). Figure 7.1 shows some key features of the AfCFTA, and Box 19 lists the Agreement's objectives.

These new businesses could embrace opportunities in two main areas: new products that displace existing carbon-

intensive products, which are fast gaining market share worldwide, and the development of new industries and new processes that support or enable the energy transition (Bouchene et al., 2021a). These opportunities offer African entrepreneurs and financiers exciting prospects. Those who act quickly to take advantage of these could benefit from Africa's unique resource advantage, including its range of natural resources, solid renewable energy capabilities, and a significant amount of uncultivated or under-cultivated land.

In the following section, some of the emerging sectors for green businesses and the consequent boosting of trade are discussed.



Figure 7.1: AfCFTA Quick facts (AfCFTA Secretariat, 2023)

7.2 High demand and growth potential sectors for green businesses

7.2.1 Renewable energy and the Power sector

Sustainable, renewable energy is fundamental to Africa's future, playing a critical enabling role in its socio-economic development and industrialisation. Regionally based renewable energy enterprises can help Africa advance using its natural resources locally while also boosting intra-African trade in clean energy technologies, services and electricity, benefiting from the African Continental Free Trade Area and the recent launch of the African Single Electricity Market (IRENA and AfDB, 2022). Around 150 off-grid clean-energy companies are at the start-up or growth stage in sub-Saharan Africa's power sector. Over the past

decade, these companies have provided 370 million Africans and businesses with access to energy, and often they represent the lowest-cost electrification solution, according to the World Bank. These clean-energy generation, distribution, and financing companies will continue to play a significant role in the future, and their share is likely to rise from 30 per cent of new energy connections in 2022 to over 50 per cent by 2050 (Hill et al., 2022). Securing such benefits hinges on leveraging and enhancing local industrial capacities, implementing adequate education and training programmes, and adopting far-sighted

BOX 19:

The General Objectives of the AfCFTA

- ◆ *Create a single market for goods and services, facilitated by movement of people in order to deepen the economic integration of the African continent and in accordance with the Pan-African Vision of “An integrated, prosperous and peaceful Africa” enshrined in Agenda 2063*
- ◆ *Create a liberalised market for goods and services through successive rounds of negotiations*
- ◆ *Contribute to the movement of capital and natural persons, and facilitate investments building on initiatives and developments in State Parties and RECs*
- ◆ *Lay foundation to establish Continental Customs Union at later stage*
- ◆ *Promote and attain sustainable and inclusive socio-economic development, gender equality, and structural transformation of State Parties*
- ◆ *Enhance the competitiveness of State Party economies within the continent and global market*
- ◆ *Promote industrial development through diversification and regional value chain development, agricultural development, and food security*
- ◆ *Resolve challenges of multiple and overlapping memberships and expedite regional and continental integration processes.*

industrial and labour market policies (IRENA and AfDB, 2022).

Investment in renewable energy in Africa is lagging. Of the \$ 2.8 trillion invested in renewable energy globally between 2000 and 2020, only 2 per cent went to Africa, despite the continent's enormous potential to generate power from renewable sources and its urgent need to bring modern energy services to the hundreds of millions of people still lacking them. However, progress has been made in public-private sector partnerships and investments in clean and renewable energy streams intended to strengthen the access and

affordability of energy while also assisting the African countries in meeting their emission goals in line with their respective nationally determined contributions (NDCs).

As discussed in Chapter 4, some concrete examples of business opportunities that are emerging in the renewable power generation sector include the manufacturing of parts for wind turbines (primarily turbine towers), manufacturing of solar panels, assembling of off-grid solar systems (e.g., solar home systems, water pumps) for local markets and assembling of microgrids for local markets.



Photo Credits: SWITCH Africa Green

7.2.2 Food and agro-processing

Intra-African agricultural trade is expected to increase by 574 per cent by 2030 if tariffs are eliminated under the AfCFTA (WEF, 2023a). The continent could become a net exporter of agricultural commodities, replacing \$110 billion worth of imports and doubling its market value share for select processed commodities (AfDB, 2018b).

With its vast agricultural potential, Africa's agribusiness sector is predicted to reach \$1 trillion by 2030 (AfDB, 2018b). Agro-processing has explicitly unique strengths for investors and African countries alike. It is significant for generating new companies, diversifying rural economies and youth entrepreneurs to drive economic growth and creating employment opportunities (Tony Elumelu Foundation, 2023). Scaling agro-processing also has significant inclusivity effects, given that women comprise 70 per cent of agricultural employment and most of the domestic workforce is female.

7.2.3 Transport and logistics

Owing to its many infrastructural and systemic challenges, the continent suffers from low regional and global integration in trade and the movement of goods (Lakshmi, 2023). The logistics sector is vital to realise the economic benefits of regional trade integration. Notably, the digitalisation of logistics and adherence to sustainable practices will drive how the African markets will grow. The AfCFTA is projected to increase intra-African trade demand by 28 per cent, with demand for almost 2 million trucks, 100,000 rail wagons, 250 aircraft and more than 100 vessels by 2030 (WEF, 2023a).

In this ecosystem, a new wave of e-logistics start-ups in African nations is changing the game when it comes to plugging the gaps existing in the traditional African logistics ecosystem across road, sea, and air freight modes through digitalisation. For example, Nigerian tech-enabled logistics company Kobo360 has developed an app that matches truck owners and drivers with customers or companies whose cargo needs moving and helps drivers limit "empty runs". Similarly, Google has invested in Nairobi-based Lori Systems, an e-logistics company that digitises



Photo Credits: SWITCH Africa Green

haulage and provides shippers with solutions to manage cargo and transporters efficiently. This new investment is the third from Google's Africa Investment Fund worth \$50 million that was announced in October 2021 and targeted the continent's early and growth-stage startups.

As this sector expands, opportunities for encouraging sustainable, low-emission transport and mobility systems must be considered. Low carbon mobility can reduce pollution while also creating jobs, making streets safer, strengthening infrastructure and stimulating local economies. Various countries in the region provide incentives for importing used electric and hybrid vehicles, encouraging a switch to cleaner fleets. Rigorous importation regulations on used vehicles and associated technology will be critical in ensuring cleaner and more efficient vehicle technologies are brought into the markets, including in the context of the Africa Continental Trade Area. When combined with appropriate fuel quality, used vehicles that meet emission standards will be essential in decreasing emissions impacts and significantly improving road safety.

7.2.4 Green manufacturing

A heightened emphasis on streamlining the manufacturing sectors should be a priority for African governments, the business sector, and other development partners. The imperative lies in adopting cleaner, greener, and more inclusive manufacturing technologies and practices harmonised with enabling policies and legislation. To achieve this, there is a need to expand opportunities for collaboration with strategic partners, including funding partners and investors. Additionally, drawing from the valuable insights gained through past and ongoing multi-partner initiatives like the SWITCH Africa Green Programme would significantly bolster the momentum of green manufacturing efforts in the region.

TEXTILES

The textile and fashion industry holds immense potential for economic transformation. With the increasing consumer demand for sustainably produced goods and services, buyers want to source from countries closer to Europe and the US, have the raw materials, and operate an integrated yarn-to-apparel setup to decrease supply chain costs and pollution (Whitfield, 2022). African countries can capitalise on this opportunity, building production capacities in spinning, weaving, knitting and finishing fabrics to deliver on 'green' production as well as digitalisation, small batch sizes, vertical integration and preferably a multi-factory international footprint.

The AfDB's Fashionomics Initiative aligns the continent's textile potential with sustainability. With its Fashionomics Africa Digital Marketplace, the Bank will analyse the impact of the textile sector in Africa on climate change and the environment to



Photo Credits: SWITCH Africa Green

deploy climate-friendly solutions. The Bank and its partners are collaborating through the Fashionomics Africa Masterclasses to train entrepreneurs on ethical sourcing and sustainable production practices. The aim is to help create business models to keep garments in use, use renewable materials and recycle old clothes into new products.

Another opportunity at the intersection of trade and textiles is the growing imports of used textiles worldwide into Africa. Globally, between 2000 and 2019, the export volume of used textiles rose from 550,000 tonnes to 1.7 million tonnes, while the value decreased from €0.76/kg to €0.57/kg (EEA, 2023). Close to half of these were imported by African countries (46 per cent), and sometimes close to 30-40 per cent of the imported used textiles made their way directly to landfills and informal waste streams (Changing Market Foundation, 2023). Africa's growing textile production and imports, combined with a lack of recycling solutions, create high demand and an immense opportunity for African businesses to fill a gap in turning Africa into a pivotal player in the circular transition through enhanced recycling capacity.

7.2.5 Ecotourism

The tourism sector is essential to the region's economies, livelihoods and value chains, especially in the small island states. Africa represents a small share of international tourism (5 per cent) despite its significant potential regarding natural and cultural resources. However, United Nations World Tourism Organisation (UNWTO) expects about 134 million international tourists to visit Africa by 2030 (Sustainable Tourism Africa, 2016). Even though ecotourism can stimulate growth in the business sector while facilitating businesses and communities to generate positive environmental and social impacts, it can, unfortunately, be as damaging to the environment if not managed appropriately. The SWITCH Africa Green programme has highlighted the need to decouple tourism growth from environmental degradation. Among countries that have been able to integrate green transformation strategies that include environmental sustainability certification schemes achieved through public-private partnerships (PPP) are Comoros, Uganda, Kenya, Tanzania, and South Africa.



Photo Credits: UNEP

7.2.6 Sustainable infrastructure and construction

Sustainable infrastructure and construction is a key sector for green business opportunities as it encourages the connection between environmental sustainability and the growth of the business sector. Infrastructure will only deliver on the goals of the 2030 Agenda for Sustainable Development, Paris Climate Agreement and Africa’s Agenda 2063 if sustainability and strengthening the resilience of societies to environmental shocks and risks are included at its core.

7.2.7 Strengthened circularity and waste management

Targeted interventions on circularity and sustainable consumption and production are crucial areas of opportunity that are central to actions for delivering on every multilateral agreement, from the SDGs to the Paris Agreement to the post-2020 global biodiversity framework. Figure 7.2 depicts the features of the circularity approach to production and consumption.

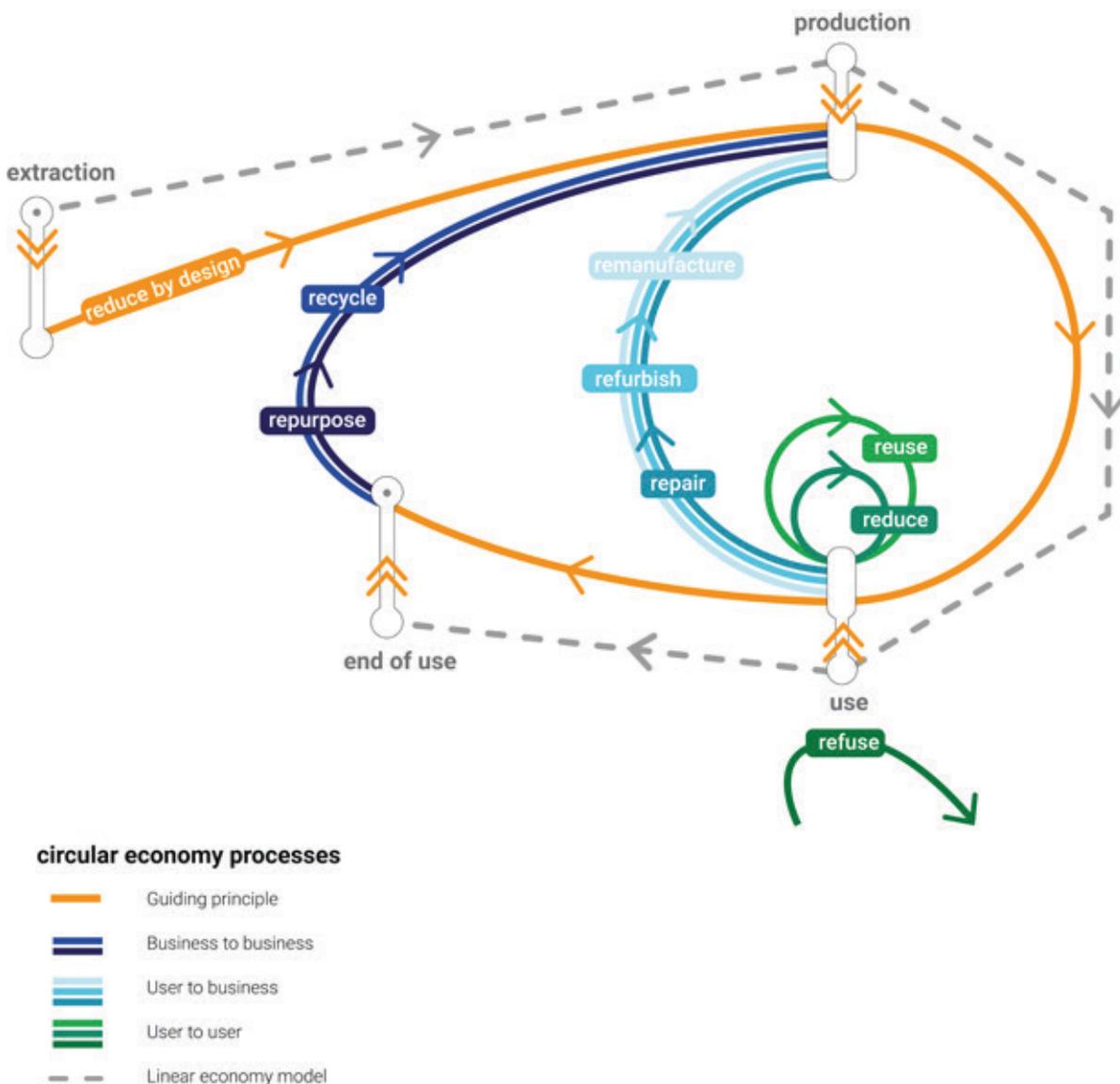


Figure 7.2: The UNEP circularity approach (UNEP, 2023e)

7.3 Challenges for green businesses in Africa

While the sectors highlighted in the previous section are only examples of the considerable potential for expanding green businesses in Africa, transitioning to an economy where green businesses can thrive will be challenging. Africa already faces difficulties attracting investments— for instance, AfDB estimates a \$70 billion per annum financing gap for African infrastructure. This financing challenge will be exacerbated by the capital needs of green manufacturing and by the fact that some high-emitting industrial assets could become stranded, causing further profitability and capital availability challenges. In addition, the continent will need to tackle capability and talent gaps and address the issue that newly created jobs will often be in different regions or countries than jobs that are phased out. Identifying approaches that allow for a “just transition” will be paramount (Bouchene et al., 2021a). The following are some of the challenges faced by green businesses in Africa:

- ◆ **Lack of supportive regulatory frameworks:** In many African countries, more precise and consistent regulations and policies specifically tailored to support green businesses must be enacted. The absence of robust frameworks can create uncertainty and make it difficult for green businesses to navigate the regulatory landscape.
- ◆ **Weak enforcement of regulations:** Even when regulations supporting green businesses exist, enforcement can be weak, leading to non-compliance and unfair competition. Inconsistent enforcement can undermine the viability and growth of green businesses and create an uneven playing field. Inconsistent policy environments can create uncertainty and discourage long-term investments.
- ◆ **Limited supportive institutions and incubators:** The availability of dedicated institutions, incubators and accelerators focused on supporting green businesses may be limited in some areas of Africa. These institutions are crucial in providing mentorship, access to networks, and business development support.
- ◆ **Limited access to finance:** Green businesses often require significant upfront investment, but they may need help accessing affordable financing options. Traditional lenders may be unfamiliar with or hesitant to finance green projects, considering them risky or unfamiliar. Limited access to capital can impede the development and expansion of green businesses.
- ◆ **Skills and capacity gaps:** The lack of skilled personnel with expertise in green technologies and practices can be a barrier to the growth of green businesses. Training programs and educational opportunities focused on renewable energy, sustainable agriculture, waste management, and other green sectors are crucial to developing a skilled workforce and filling these capacity gaps.
- ◆ **Limited market demand and awareness:** Green businesses often face limited market demand due to low consumer awareness or perceptions of higher costs. Educating consumers about the benefits of green products and services, building awareness, and promoting sustainable consumption patterns is essential to expand the market for green businesses.
- ◆ **Limited access to technology and innovation:** Green businesses rely on access to cutting-edge technologies and innovation. However, limited access to affordable and

appropriate green technologies can be challenging, particularly for SMEs with limited resources.

Addressing these challenges requires concerted efforts from governments and financial institutions to create an enabling environment that supports the growth of green businesses in Africa. The AfCFTA is one such significant effort, billed as the biggest free trade accord in the world in terms of population; if fully implemented, it promises broader and deeper economic integration and would attract investment, boost trade, provide better jobs, reduce poverty, and increase shared prosperity in Africa (Africa News, 2023). Figure 7.3 shows the benefits

that the successful implementation of AfCFTA would have on African businesses. However, the implementation of AfCFTA has fallen short of achieving its goals due to challenges in creating enabling conditions. Some of the bottlenecks include:

- ◆ Lack of coordinated country-to-country standards across region.
- ◆ Lack of commitment to implement the agreement and enact policies for green business.
- ◆ Differences in governance systems and integration of trade policies.

The African Continental Free Trade Area (AfCFTA)

The successful Implementation of the AfCFTA has the following benefits for African businesses

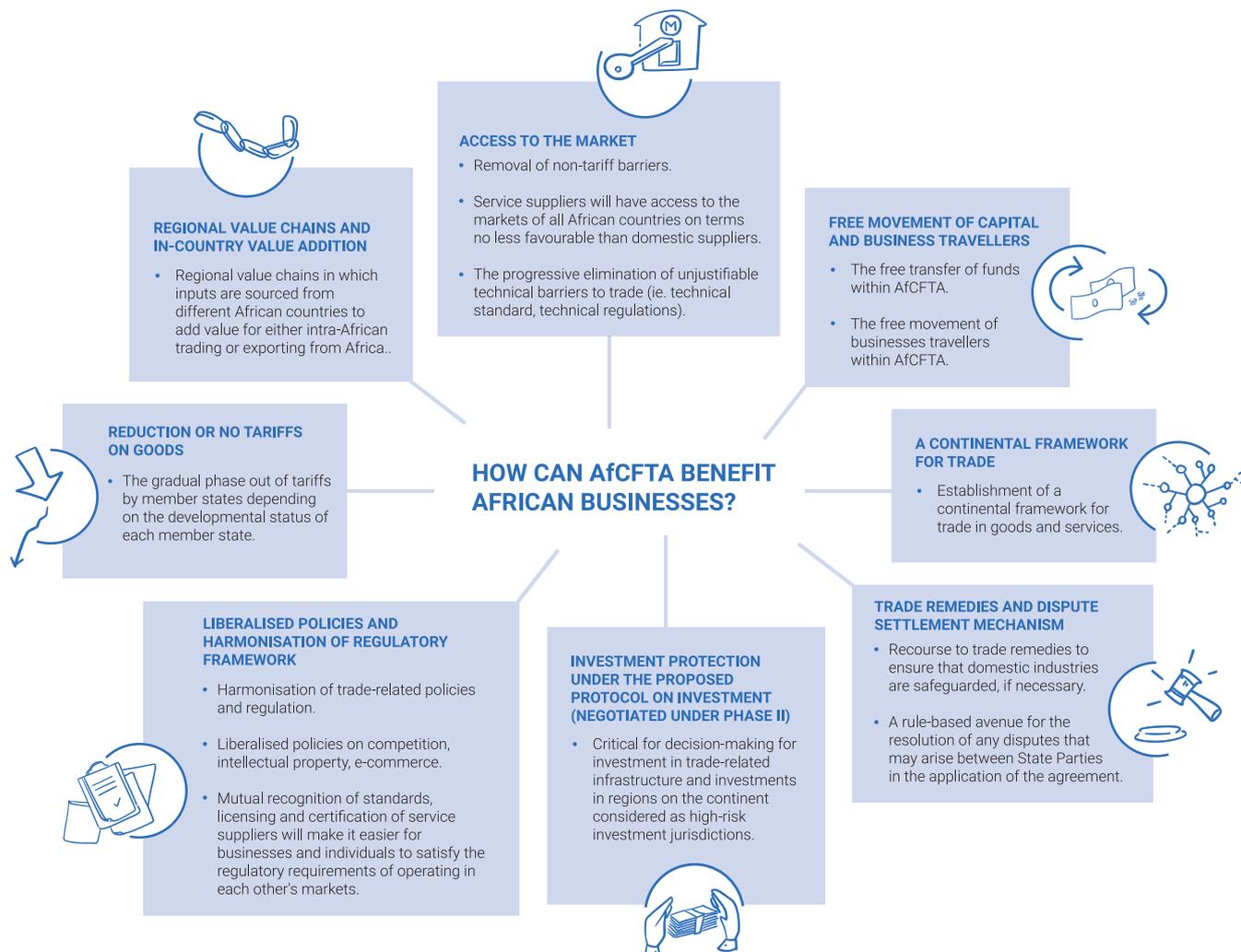


Figure 7.3: Benefits of successfully implementing the AfCFTA for African businesses (Feris and Wagacha 2021)

- ◆ Transition period for countries to catch up.
- ◆ Inadequate infrastructure for the ports and free trade zones.
- ◆ Limited financing and technologies.

In the subsequent section, we present tangible policy recommendations aimed at expediting the implementation of the AfCFTA and fostering an enabling environment for the proliferation of green businesses across Africa.

7.4 Trade and industrial policies to enable green business growth in Africa

While the AfCFTA offers businesses the opportunity to develop green technologies, goods, and services through intra-African value chains, capitalising on this potential necessitates a comprehensive understanding of how the evolving trade environment will impact their strategies for success in the region. Moreover, acknowledging and seizing the inherent value of this initiative becomes imperative for companies seeking to thrive within the framework of the trade agreement (WEF, 2023a). At the same time, governments need to accelerate the agreement's implementation while ensuring that outstanding negotiations can provide space for environmental and complementary provisions in the substantive protocols that can facilitate the proliferation of green businesses in the continent.

The following are some ways the AfCFTA provisions can be further negotiated to support green industries and businesses. Adapting these measures to particular national and regional contexts can spur an enabling environment that supports the growth of green industries and businesses in Africa, fostering sustainable development and contributing to the continent's transition to a low-carbon and environmentally friendly economy.



Photo Credits: SWITCH Africa Green

7.4.1 Deepening support for green businesses

Unlike several recent Free Trade Agreements, the AfCFTA does not incorporate explicit references to environmental protection, with only preambular language and exceptions addressing environmental concerns (van der Ven and Signé 2021). Despite this, there exist avenues through which the AfCFTA's substantive provisions can advance environmental objectives and strengthen support for green businesses, including:

FACILITATING TRADE IN ENVIRONMENTAL GOODS AND SERVICES

In the event that a continent-wide agreement on a definitive list of Environmental Goods and Services (EGS) becomes unattainable during the negotiation stage, sub-units like customs unions and individual state parties can adopt proactive measures.

- ◆ **Goods:** State parties and customs unions could consider incorporating their own tariff concessions on products and technologies that align with Africa's environmental priorities and can be competitively manufactured within the continent. This

strategic move will foster intra-African trade in these environmentally beneficial goods, promoting regional sustainability and economic growth. (van der Ven and Signé 2021). Similarly, there is an opportunity to develop continent-wide standards, for example, in the area of circular economy in areas of relevance for the continent. This reduces inefficiencies and costs associated with different standards and regulations adopted across jurisdictions (van der Ven and Signé 2021).

- ♦ **Services:** Services can be liberalised in identified priority sectors, such as those highlighted in the previous chapters and those that directly improve the environment and ecosystem quality. These include services that reduce exhaust gases and improve air quality, treat and clean up polluted water, and services that dispose of solid and hazardous waste. Also, more essential services such as sustainable infrastructure and low-cost solutions to digitalisation may not seem explicitly environmentally related but are critical for Africa's green economic transition (van der Ven and Signé 2021).

Relevant State parties can reduce or restrict trade in environmentally harmful products. Just like the list of Environmental Goods and Services (EGS) can be very specific per the needs and capacities of the continent, products deemed environmentally harmful can vary widely. Some examples include restricting trade in protected animal or plant species to prevent overexploitation; prohibiting subsidies on illegal fishing; and banning or restricting the import of unsustainable products like single-use plastic packaging or waste that is unfit for recycling (van der Ven and Signé 2021). State parties can draw inspiration from existing provisions in other agreements to effectively regulate these products or incentives. For instance, when addressing environmentally harmful subsidies, they may consider adopting provisions akin to those under discussion at the World Trade

Organization (WTO) concerning fisheries. These provisions aim to restrict or prohibit subsidies that contribute to overcapacity, overfishing, and the depletion of fish stocks, offering a model for managing environmentally sensitive sectors.

For border measures such as bans, the AfCFTA contains three annexes focusing on enhancing intra-African customs procedures, including establishing one-stop border post controls. Implementing such one-stop border posts would minimise the number of customs checks. It could significantly facilitate the development of customs capacity equipped to adopt a smooth inspection procedure to prevent the import/export of illegal or hazardous goods (van der Ven and Signé 2021).

7.4.2 Greening protocols on investment, intellectual property, competition, and e-commerce.

In the AfCFTA, there is a need to secure policy space for adopting environmental regulations and measures to comply with the commitments under various multilateral environmental agreements (MEASs).

Protocol on Investment: By creating a stable regulatory regime, the Protocol on Investment can reduce the risk associated with intra-African investment, which could promote cross-border investment flows, including in areas such as renewable energy and low emissions technology, waste management, and pollution control. As per the final draft of the protocol, it is expected to include language requiring investors not to undermine environmental obligations to create a more favourable investment climate (Article 34) (AFCTA, 2023).

Protocol on Intellectual Property (IP): Regarding intellectual property rights, it would be important for AfCFTA State parties to develop the Protocol on IP to address the misappropriation of genetic resources in order to preserve biodiversity, whereas, in the

context of investment, State parties could consider adopting a more balanced approach concerning investors' rights and obligations such that domestic environmental regulations are respected, and commitments under multilateral environmental agreements are not deprioritised.

Protocol on Competition: Adopting competition provisions across the African continent would ensure that the benefits of creating an intra-African market would not be undermined by restrictive or anticompetitive practices adopted by a handful of influential firms (Hartzenberg, 2019). Disciplining anti-competitive practices would be particularly important for Africa's green growth agenda, given that monopolies and oligopolies tend to be particularly prevalent in infrastructure, and environmental services, such as waste management (ITC, 2014).

Protocol on e-Commerce: By encouraging the development of a digital enabling environment in Africa, the Protocol on eCommerce could spur the adoption of digital technologies critical for environmental preservation and climate change initiatives. For instance, artificial intelligence (AI), 3D printing, and other emerging technologies will facilitate a transition from current linear economic models to circular ones (Bouchene et al., 2021b).

In parallel, State parties can explore adding a **Protocol on the Environment and Sustainable Development**. Doing so would allow State parties to address environmental challenges and concerns of specific relevance to building a prosperous, inclusive, and sustainable Africa (van der Ven and Signé 2021). Figure 7.4 shows provisions for environmental measures that can be incorporated and adopted to advance sustainability objectives.



Figure 7.4: Overview of how trade agreements can advance environmental objectives. (Van Der Ven and Signé 2021)

7.4.3 Complementing trade policy frameworks with supporting industrial policies to combine sustainability and socio-economic development

In addition to greening trade policy tools, governments can also consider designing and developing industrial policies that actively support the learning processes of local firms. Governments can promote local firm learning by attracting the ‘right kind of foreign direct investment’ and assisting local firms in leveraging technology from these foreign firms. An inter-ministerial department can be established at the highest level of government to prioritise creating an enabling policy environment. This department should be responsible for reducing tariff barriers, increasing subsidies, boosting procurement from green enterprises, and harmonising regional standards. Figure 7.5 shows the actions that this department can undertake. The department might fall within the Ministry of Industry, Trade and Investment, or Finance depending on the country. To succeed, the department must possess a meaningful budget, a fair degree of autonomy, and the freedom to act (Hill et al., 2022).

Governments also need to make public investments in creating industry-specific knowledge and skills and supporting partnerships in research between local and foreign firms and researchers (Whitfield, 2022). These include incentives and rules, business incubation initiatives, supplier development programmes, support measures for SMEs, and promoting industrial clusters. They create the structural underpinnings for viable local supply chains through infrastructure spending (providing essential public goods such as electricity, roads and telecommunications), programmes to bolster local firms’ access to finance and information, and boost their capacities along the value chain, as well as a set of well-designed local content incentives and requirements (IRENA and AfDB, 2022).

A dedicated inter-ministerial department to ensure enabling environment



Figure 7.5: Actions that prioritise enabling policies for green ventures (Hill et al., 2022)

7.4.4 Unlocking green financing and enhancing the transparency of the financing system

With an estimated \$2 trillion investment over 30 years required to achieve net zero in Africa, stakeholders can consider three actions:

- ◆ Developing a solid pipeline of investable green projects;
- ◆ Developing new green financing instruments that match the different risk and return profiles for green investments; and
- ◆ Establishing a solid baseline and verification system for GHG emissions that give financiers confidence that their investments are yielding the expected carbon savings.

A transparent financing system could help make investors the de facto enforcers of companies' committed decarbonisation efforts.

7.4.5 Supporting upskilling and reskilling of the workforce by offering support to SMEs

Supporting upskilling and reskilling of the workforce is crucial for empowering individuals with the skills needed to thrive in a rapidly evolving business landscape. Extending assistance to SMEs can facilitate access to training programs and resources, enabling employees to acquire new competencies or enhance existing ones required for the green economy (Bouchene et al., 2021b).

- ◆ Workforce planning and simulations could help to identify critical changes and anticipate future skills required in the job market, as well as to define new occupational standards and develop appropriate curricula;
- ◆ The development of skills certifications for new green jobs could support skills mobility;
- ◆ Shared infrastructure development, such as training institutes and factories, could help to speed up reskilling.



Photo Credits: SWITCH Africa Green

7.4.6 Accelerating R&D through private and public sector support

- ◆ Local research could focus on projects relevant to Africa, such as local circular economy solutions and processes to reduce emissions.
- ◆ With the help of development finance institutions and under the auspices of the AfCFTA, governments could jointly set up dedicated green manufacturing accelerators to spur innovation and enable the scale-up of new green manufacturing technologies (notably through research partnerships) and businesses across the continent.

7.5 Conclusion

According to the World Bank, the successful implementation of the AfCFTA is projected to uplift 30 million Africans from extreme poverty and enhance the incomes of approximately 68 million individuals living on less than \$5.50 a day. This ambitious trade agreement could potentially bolster Africa's overall income by \$450 billion by 2035 while concurrently adding \$76 billion to the income of other regions worldwide. Moreover, it is anticipated to result in a significant increase in Africa's exports, estimated at \$560 billion, primarily attributed to the manufacturing sector's growth.

However, beyond the implementation of tariffs and other policies, there remains a lot to address, including the improvement of infrastructure, which can hinder trade even with open doors. Businesses must innovatively prepare themselves to seize this opportunity while ensuring their actions prioritise environmental sustainability and do not compromise it.





CHAPTER

08

Strategies and Policies for Scaling Africa's Green Business



Photo Credits: SWITCH Africa Green

8.1 Introduction

As African governments grapple with economic development and the urgency for rapid growth in tandem with the continent's rising population and needs, they must address the consequences of climate change and the disruptions it portends for achieving inclusive and sustainable growth. Africa may be considered as facing a Catch-22 situation, where priorities for economic prosperity are not decoupled from achieving the Sustainable Global Goals (SDGs) and the pursuit of the former conflicts with the achievement of the latter. Africa's quest to boost economic growth could accelerate climate change. Although the continent has made the least contribution to this global phenomenon, it could heat up 1.5 times faster than the rest of the world. It is quite apparent that being essentially a resource- and commodity-dependent continent, the physical impacts of climate change seen by more frequent and intense floods, droughts, harvest failures, soaring temperatures and tropical storms could derail Africa's projected

economic growth trajectories, plunging more Africans into poverty and conflict. Figure 8.1 illustrates the continent's prosperity dilemma between achieving growth and sustainability.

To address this twin challenge, there have been calls for Africa to leverage its unique opportunity to leapfrog development and avoid the failures of actions taken by the developed world that have led to the climate crisis. Deploying green and innovative technologies, business models, and infrastructure can form the foundation for economic growth and job creation on the continent. Africa is awash with lucrative business opportunities and green ventures that minimise their impact on the environment and contribute to addressing the climate crisis. These have ample prospects to embed themselves in the fabric of change that decouples economic growth from environmental sustainability.

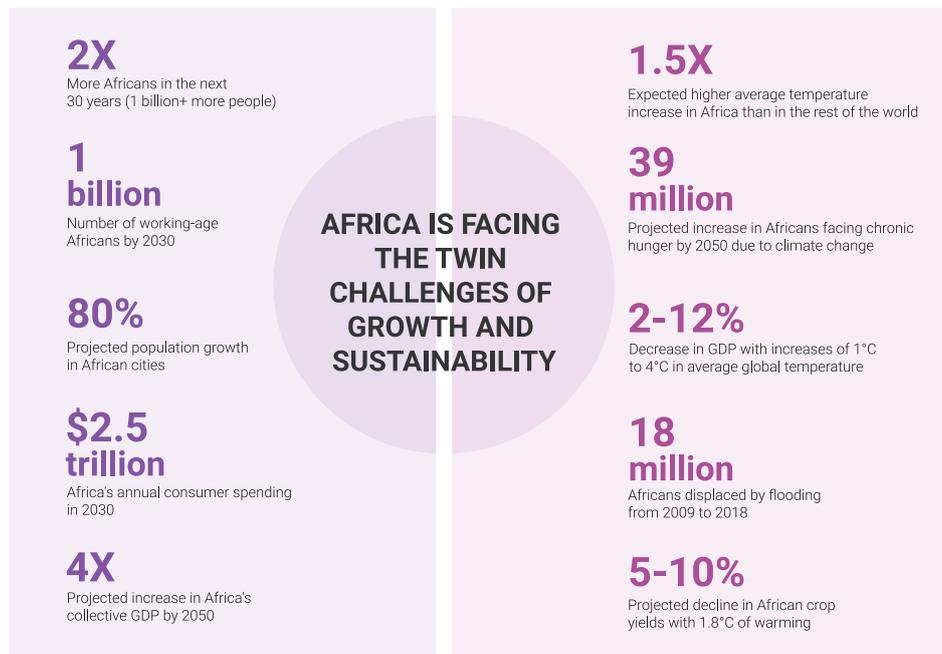


Figure 8.1: Africa's twin challenge of growth and sustainability (Hill et al., 2022)

8.2 Green business opportunities

As mentioned in previous chapters, the fact that Africa is still developing and much of its manufacturing, infrastructural and economic capacity is yet to be built is an advantage for the continent, as the challenge of locked-in or legacy-based development is not a threat to its sustainable growth and development. The opportunity to drive strategic investments towards the growth of a low-carbon and eco-friendly economy is enormous. For example, a pipeline of high-impact investments of about \$3 trillion focused on decarbonisation in Africa is imminent, and digital technologies for the agribusiness sector have the potential to create a \$1 trillion market, driving the innovation required to feed the continent's 2.5 billion inhabitants by 2050 (Inamdar, 2022). Research conducted by the European Investment Bank (EIB), International Solar Alliance and the African Union (AU) reveals that Africa has extraordinary green hydrogen potential and could produce \$1.15 trillion worth of green hydrogen annually by 2035 (EIB, 2022). Figure 8.2 shows Africa's most prominent business opportunities for meeting the SDGs involving green businesses.

A Bolton Consulting Group (BCG) report identified over 500 business ventures operating in green businesses while analysing the investment portfolios of 90 large investors in Africa in 2022. These ventures, primarily startups, offer eco-smart products and services to consumers in the African market and operate in sectors such as e-mobility and transportation, clean energy, sustainable materials, agriculture and nature-based solutions (NbS). This number of green ventures saw a 300 per cent increase over the past 15 years, evidencing the enormous growth prospects (Hill et al., 2022).

Climate change has also spurred the birth of new industries in Africa focused on NbS, which address multifaceted challenges such as climate change, food and water security, human health and disaster risk reduction. Multilateral development banks such as the World Bank and African Development Bank have invested in related projects across Africa, as well as international organisations looking to offset their carbon emissions through NbS. However, there is ample room for the pace and scale of these investments to ramp up.

Delivering the Global Goals in Africa could generate over \$1 trillion worth business opportunities

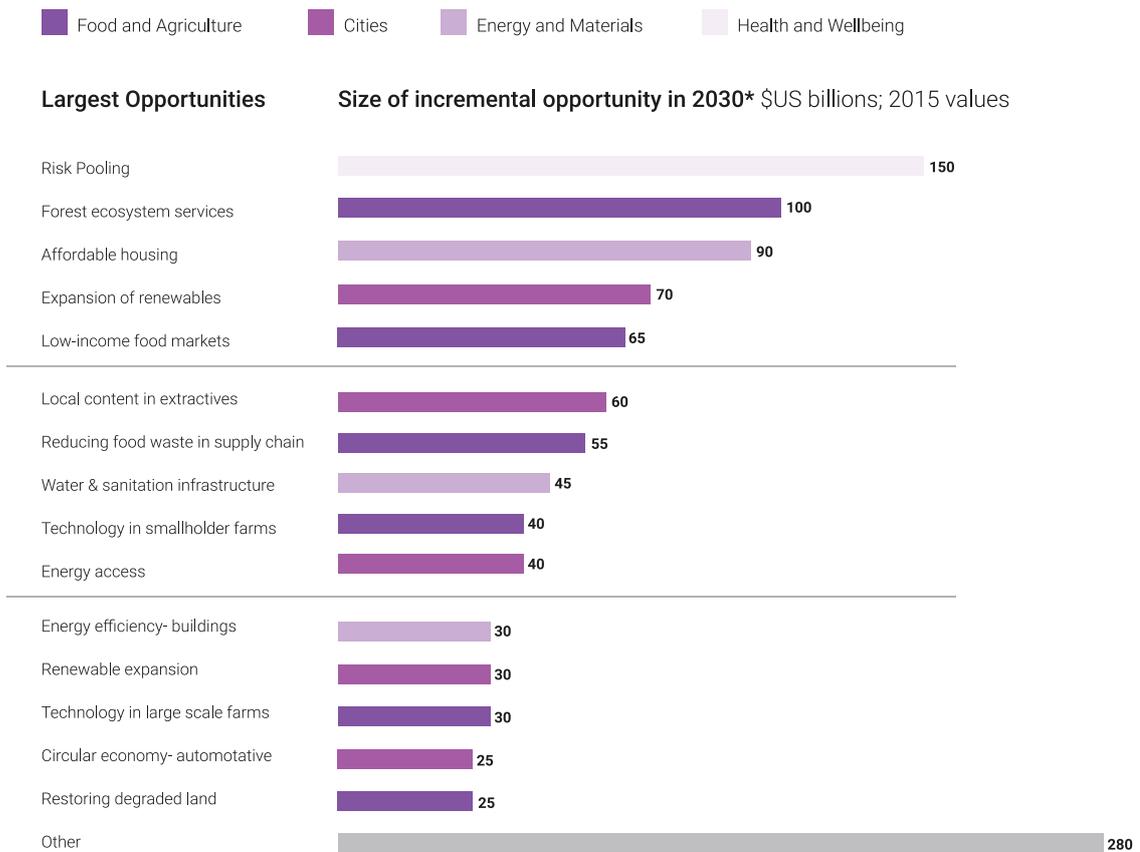


Figure 8.2: Green business opportunities in Africa (BSDC, 2017)

8.3 Barriers to scaling green businesses

While there has been growth in the establishment of green businesses in Africa over the years, there has been a challenge of scale for most of Africa's existing green ventures vis-à-vis the extent of green business growth needed to support rapid economic development. Many African green businesses have remained relatively small compared to the size of the available opportunity. The three significant impediments to the scaling up capabilities of these enterprises are capital, policy and industry structure (Hill et al., 2022).

Capital deployment: Despite investment from several sources of capital from private investors, multilateral development banks, foreign governments and development finance institutions, green businesses have been unable to scale quickly. This stagnancy

is attributed to insufficient funds for green companies and the structure of the funds provided needing to be better suited for scaling. Global financial institutions are reported to have invested equity of about \$7.4 billion in small and large enterprises in Africa in 2021, but green businesses only attracted a fraction of these funds (Hill et al., 2022). Figure 8.3 shows that the share of investments across African startups that went to green industry beneficiaries was less than 23 per cent in 2021.

Significant funds in long-term financing and working capital are needed for green businesses as their modus operandi requires that they would deploy additional infrastructure and innovative hardware to operate effectively. These funds are expensive and difficult to access in the African financial marketplace. For



Figure 8.3: Global investments across business sectors in Africa (Hill et al., 2022)

instance, the most popular financial instrument used to fund African startups' infrastructure and working capital expenses is equity capital, rather than debt capital which is needed more by these businesses. These enterprises become challenged by needing help to adequately meet their working capital requirements or finance effective strategies to scale up operations such as expansions, mergers, acquisitions and diversifications.

Policy: Regulations typically applicable to green businesses tend to differ from regular traditional enterprises, as they are subject to special regulations and licenses and are more susceptible to customs and import duties. Governments treat green growth policies mainly from an environmental perspective, taking a siloed approach to formulating enabling policies rather than an integrated or systemic approach where holistic policies interlinking green businesses with economic, social, and environmental sustenance are developed. This siloed approach creates complex and multiple bureaucratic hurdles for green companies to scale as they have to deal with separate policies that relate to their multi-pronged business objectives.

Industry structure: The nature of green businesses requires developing more sophisticated management and technological proficiencies. A pool of skilled talent is also a prerequisite to successfully scaling operations locally, regionally, and globally sustainably.

8.4 Strategies for scaling green businesses

The ecosystem to drive investments that allow for scaling up green businesses on the continent requires novel strategies, innovative ideas, and coordinated collaboration by key players, which include investors, governments and enterprises. National governments need to prioritise the establishment and growth of green enterprises by creating policies that accelerate scaling up, investments with funding instruments such as concessional finance, debt and well-structured equity need to be adequately provided, and green enterprises need to scale up the management aptitudes required to sustain faster growth in the future (Hill et al., 2022).

8.4.1 Strategy for capital

- ◆ A massive inflow of blended capital with suitable funding structures targeted at Africa's green businesses is essential. Mechanisms should include equity, reasonably priced debts in local currency, grants and concessional financing.
 - ◆ The medium- to long-term focus and keen environmental, social and governance (ESG) policies of private equity funds make them well-suited as a funding source to fill the finance gap for green businesses. For instance, companies in sectors particularly reliant on biodiversity improvements, such as food, energy, infrastructure and mobility, and fashion, offer great investment opportunities for private equity investors (Nielsen et al., 2023).
 - ◆ Funds that enhance the credit profiles of the businesses should be set aside, thereby de-risking and enabling them to attract debt from local financial institutions on terms suitable for their growth.
 - ◆ Innovative mechanisms should be developed, such as carbon-financing vehicles and results-based financing models that target an increase in end-user access and provide opportunities to build organisational capabilities required for rapid growth.
 - ◆ Green businesses in Africa need to tap into monetising carbon sequestration as the demand for carbon offsets grows to meet global net-zero ambitions. With the proper rules, the carbon offset market is projected to become a \$1 trillion market by 2037 (BloombergNEF, 2023).
 - ◆ Specialised private equity funds targeting early- and later-stage ventures should be structured, as only some African businesses have reached this stage and can absorb the size of the available funds for late-stage ventures.
 - ◆ The capacity of Africa's green businesses to absorb investments should be enhanced by providing targeted funds that support operational improvement so that these businesses are investment-ready.
- Figure 8.4 summarises capital sources and imperatives for the flow and utilisation of funds to support the growth and expansion of African green businesses.



Tea picker. Photo Credits: UNEP

Debt investors	Local currency funds	Create affordable local-currency debt funds to finance green ventures.
	Leverage and support from local commercial banks	Provide credit-enhancement and risk-mitigation products to local banks to stimulate lending to green ventures.
	Blended finance and risk instruments	Establish blended finance funds that offer a one-stop shop for debt financing across the venture's life cycle, from feasibility and project finance to working capital.
	Carbon financing	Institutionalise carbon financing models, lower transaction costs, and scale the monetisation of carbon sequestration.
Equity investors	Investments to take ventures to scale	Establish funds to lead funding rounds, close transactions quickly, and support companies through multiple funding rounds until they reach the scale at which global climate funds will invest. Weigh the risks of climate inaction against perceived company risk.
	Specialised investors with local context	Scale with sectoral expertise and local teams that understand Africa's industry.
Capability creators	Talent and capabilities	Invest in technical support, recognising that green ventures will look different when bigger; help founders and leadership teams develop management systems; catalyse investments in digital technologies; reevaluate operating and partnership models; recruit key talent; and catalyse structural changes in sustainable industries.

Source: BCG analysis

Figure 8.4: *Capital flow and utilisation suggestions for green businesses (Hill et al., 2022)*

8.4.2 Strategy for Policy

Governments need to recognise the role of green businesses in the industrialisation and greening of the affected economies and prioritise promulgating policies to catalyse their growth into global competitors. Policy support for businesses, as mentioned in Chapter 7, should include the creation of a dedicated government agency or department with reasonable autonomy. Policy hurdles preventing scale should be within the purview of this government department, such as fiscal barriers, access to subsidies, increasing procurement from green businesses and harmonising regional standards.

- ◆ **Fiscal barriers** - customs duty and tax concessions for sustainable industries' input.
- ◆ **Access to subsidies** - offering concessionary loans, tax credits and breaks, social bonds and results-based financing models.
- ◆ **Increase procurement from green businesses** - government procurement policy can prioritise purchasing goods and services from local green businesses to

benefit both parties. While the companies benefit from government patronage and scale sustainably, the government can contribute to its sustainability-related goals.

- ◆ **Harmonising regional standards** - leveraging regional standards such as the African Continental Free Trade Area (AfCFTA) to address green innovation and develop policies for green ventures. Governments can develop national AfCFTA implementation plans aligned with climate action plans and related goods and services.

8.4.3 Strategy for building industry structure

- ◆ Green businesses must adopt front-line management practices and technologies to scale operations successfully. Investment support from investors, development finance institutions, government and other donors would be beneficial to build capacities.
- ◆ Cross-sector partnerships must be forged between green enterprises and their peers,

incumbents, and multinational companies, to reduce vertically integrated business models, which increase costs, decrease profit margins and hinder them from the agility needed to grow. These partnerships allow businesses to focus on core competencies, encourage specialisation in the industry, accelerate growth and scale up.

- ◆ Consolidation through mergers and acquisitions can help scale green enterprises as this helps to focus investments on more extensive initiatives rather than spreading resources thinly over various identical models.

- ◆ African green businesses must understand multinational companies' trajectories and growth priorities to make a case for African investments. Forging alliances with these organisations will enable African green companies to attract investments, get up-to-date technology transfer and access resources, expertise and export markets.

Developing and implementing sophisticated management and technological capabilities are essential for successfully scaling green businesses. Figure 8.5 summarises strategies to achieve this.



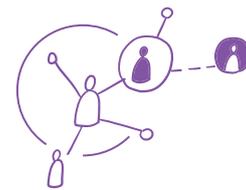
STRIKE PARTNERSHIPS

- Green growth ventures must form cross-sector partnerships with peers, incumbents and multinational companies.
- They must crack the code of partnership to enable each venture to focus on its core competencies and to scale.



SPUR CONSOLIDATION

- CEOs must think about consolidation through mergers.
- Investors must be willing to support M&A¹ deals and provide postmerger integration capabilities.



FORGE ALLIANCES

- Africa's green ventures must woo multinational companies, so that the latter invest in them, transfer next-generation technologies to them, and provide them with access to export markets.

Source: BCG analysis
 Note: 1. M&A (Mergers and Acquisitions)

Figure 8.5: Strategies to build green business capabilities (Hill et al., 2022)

8.5 Conclusion

The tremendous potential for green businesses in Africa is underscored by numerous reports and studies, highlighting opportunities such as the \$3 trillion investment pipeline for decarbonisation, the creation of a \$1 trillion market through digital technologies in the agribusiness sector, and the projected annual value of \$1.15 trillion in green hydrogen production by 2035. To fully realise the potential of these enterprises, Africa must address challenges related to capital, policy, and industry structure. Implementing innovative financing mechanisms and blended capital inflows with suitable funding structures is essential to supporting green businesses. This includes equity, reasonably priced debt, grants, and concessional financing. Governments must

also acknowledge the pivotal role of green businesses in the continent's industrialisation and prioritise policies that foster their growth into global competitors.

Building a solid industry structure requires adopting cutting-edge management practices and technologies. Additionally, forging cross-sector partnerships and considering consolidation through mergers and acquisitions are crucial for scaling operations effectively. By implementing these strategies, African enterprises can significantly contribute to sustainable economic development, job creation, and environmental stewardship throughout the continent.



Oolu client with a radio in a rural village. Photo Credits: Oolu Solar

WEND-WAOGA N°1

GRO

BOUTIQUE
S
D
TTTS



COUPEMENT WEND-WAO GA

CHAPTER

09

Strategies and Policies for Minimising Risks



Photo Credits: SWITCH Africa Green

9.1 Introduction

Like any worthwhile venture, doing business in Africa offers risks and opportunities. Assessing the opportunities and risks landscape and developing strategies to unlock the opportunities while minimising and managing the risks enables informed decision-making on where to play and how to win in Africa. Understanding the people, markets, regulatory and political landscapes of the countries and industries of interest is critical, especially in today's fast-evolving settings. This allows for developing informed and dynamic strategies for growing business or investing in Africa.

Chief Executives operating in Africa are said to be increasingly concerned about increasing risks arising from ongoing political, economic, and social developments. Alongside others, concerns over infrastructure deficits, healthcare

access, food security, and climate change impacts are on the rise. At the same time, technological innovations and disruptions have increased the need to manage cybercrime and cyberterrorism. However, Africa's executives and boards are also adopting measures to effectively address risk strategy and management to ensure the sustainability of their enterprises. This practice has set them ahead of their global peers as leaders in risk management (PwC, 2015).

Africa's compelling opportunities compensate for these risks for businesses that can effectively incorporate the identified risk impacts into their short, medium, and long-term strategies. Figure 9.1 shows a snapshot of the Risk-Reward scores of some African countries as of 2022. The bubble represents the size of each country's Gross Domestic Product (GDP.)

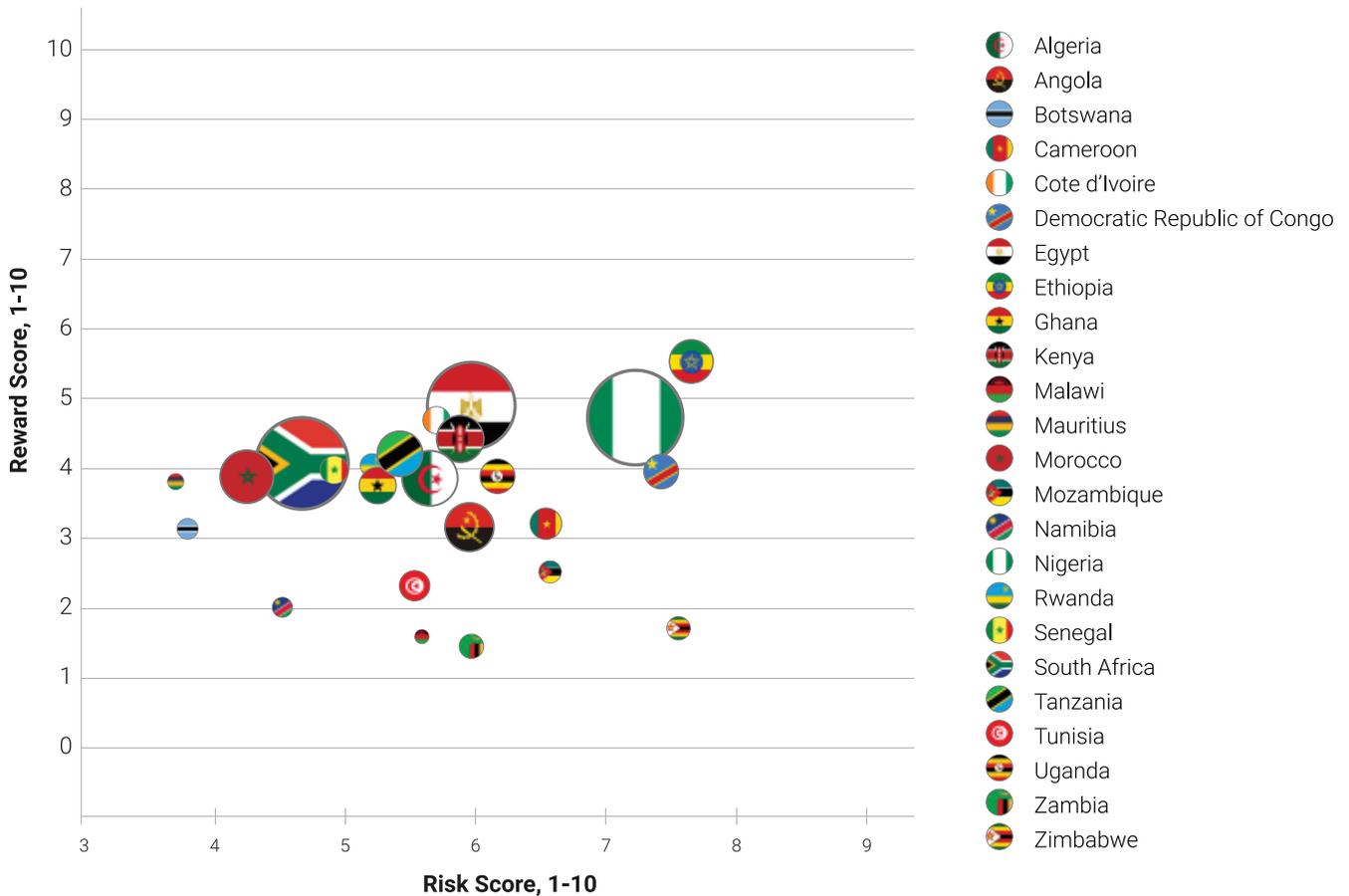


Figure 9.1: Africa Risk-Reward Index (OEA, Control Risks, 2022)

9.2 Risk management overview

The first step for risk management strategies and policies is risk identification. This involves detecting and documenting direct and indirect risk factors and the triggers a company is exposed to. It encompasses apparent risks and the knock-on effects that could impact whole value chains and business relationships with stakeholders (Lamarre and Pergler, 2009). It consists of focusing on the critical processes of the company which should not be compromised, such as sales transactions or the supply chain, and identifying the sources of known threats, such as natural disasters and political and economic stability.

The second step is to categorise the risks into the four risk category areas:

- ♦ **Strategic risk:** risks regarding brand image and reputation, customer relations and public relationships, etc.

- ♦ **Financial risk:** risks regarding market dynamics, tax, recovery, liability, etc.

- ♦ **Compliance and governance risk:** risks regarding ethics, regulations, supervision, good practices, etc.

- ♦ **Operational risk:** risks regarding data and technology security and privacy, supply chain, worker's health and safety, natural disasters, etc.

Figure 9.2 provides a risk identification map showing risk triggers and their cascading impacts on a company's operations and performance along its value chain.

Stakeholders such as competitors, supply chain actors, distributors and customers are all exposed to risks that could impact a company's operations.

Risk Triggers

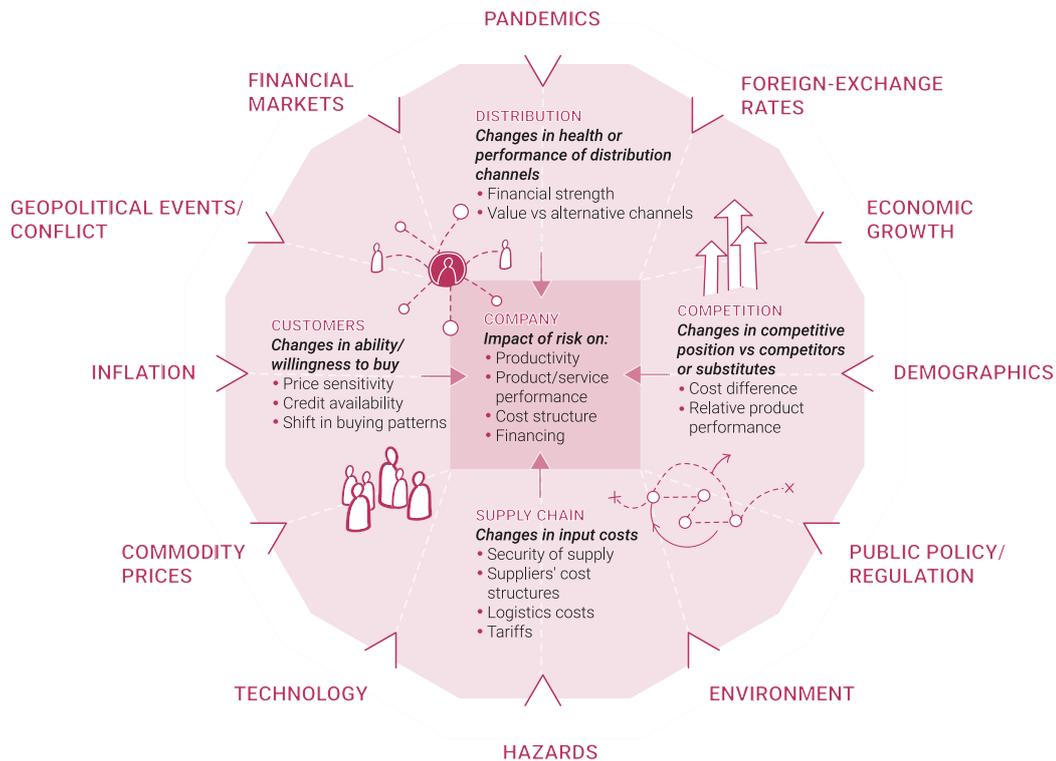


Figure 9.2: Cascading Risks (Lamarre and Pergler 2009)

For instance:

- ◆ A company is exposed to competitive risk when its business model differs from that of its competitors, and a change in the market environment could also change its cost position relative to competitors or substitute products and services.
- ◆ Risks cascading from supply chains could arise from shifts in suppliers' cost structures and logistics as well as supply distributions due to the unavailability of raw materials.
- ◆ Indirect risks from distribution channels, such as radical disruptions in business models, inability to reach end customers, change in distribution costs, and a change in the financial position of distributors, could significantly impact a company's operations.

◆ Customers present more complex and diverse risk cascade effects through their market responses, reflected in shifts in buying patterns and demand levels.

The third step is risk likelihood and impact analysis. This step calculates the probability of a risky event occurring and estimates the impact of the consequences should it happen. Indirect risks may pose an equal or even more significant threat to a company's operations than direct risks, and thoroughly assessing knock-on effects that could undermine value chains through risk cascades is an essential part of this assessment.

The fourth step is risk treatment, which consists of selecting and implementing measures to reach an acceptable level of risk.

The final step is regular monitoring and review, which should be an integral part of the risk management process and involves ensuring that risks remain within the limits established by the organisation.

9.3 Global risks and their potential impacts on African Businesses

In an increasingly complex and interconnected world, risk landscapes are no longer the product of singular factors acting in isolation but rather are a function of economic, environmental and societal factors intersecting and influencing one another. At a time when political and socioeconomic forces are affecting Africa and the effects of climate change are becoming increasingly severe, it is essential that stakeholders on the continent looking to shape its future understand how these factors are coming together globally and their impacts on the region.

In the latest risk perception survey by the World Economic Forum (WEF), societal, environmental, technological and geopolitical risk categories are the top ten concerns identified at the global level. Figure 9.3 shows the top ten global risks over the short term

(2 years) identified by government and business stakeholders in the survey.

Environmental risks have featured prominently in the top ten global risks in the last few years. Some risks include the failure to mitigate and adapt to climate change, natural disasters, and extreme weather events. Many of these are pertinent to the African continent. Business and government stakeholders should expect to see an increase in the proportion of environmental risks making up the top ten concerns over the next ten years due to the impacts of climate change (WEF, 2023b).

In the context of the above global risks, it is useful to zoom into the Africa-specific risks that are relevant to green business, and the following section explores some of these.



Figure 9.3: Top 10 global risks over the short term (WEF, 2023b)

9.4 Risks in Africa

Economic-related issues took the top spots in the WEF 2019 regional risk report reflecting country and business perspectives on global risks. They ranked the highest risks for doing business in North Africa, while economic, governance, social and geopolitical issues ranked highest in sub-Saharan Africa. The top five risks businesses in sub-Saharan Africa identified were unemployment or underemployment, failure of national governance, failure of critical infrastructure, energy price shock and fiscal crises. The top five risks for North Africa were energy price shock, fiscal crises, unemployment or underemployment, unmanageable inflation and asset bubble (WEF, 2019). Table 9.1 lists the top ten risks ranked by severity identified by businesses operating in sub-Saharan Africa and North Africa in 2019. It is important to note that these risks are identified, assessed and ranked annually by businesses operating in Africa and have the potential to vary from year to year, depending on the pace

of change, which brings with it varying risks, opportunities and materiality of the related impacts.

Figure 9.4 shows an overview of a recommended risk assessment process for organisations considering business or investment in Africa. Below we provide further insight into some of the critical risks businesses operating in Africa may encounter. Organisations need to be aware of these challenges and take proactive measures to mitigate them.

Environmental risks: The continent already faces threats from climate change, and experts predict that these risks will only continue to increase. Climate change impacts expose businesses to physical, transition and liability risks. Physical threats, evidenced by the frequency and intensity of extreme weather events, and rise in average temperatures, affect systems such as liveability and workability, food systems, physical assets, natural capital

Table 9.1: Top 10 business risks in Africa (WEF, 2019)

RANK		RISKS
	Sub-Saharan Africa	Middle East & North Africa
1	Unemployment or underemployment	Energy price shock
2	Failure of national governance	Fiscal crises
3	Failure of critical infrastructure	Unemployment or underemployment
4	Energy price shock	Unmanageable inflation
5	Fiscal crises	Asset bubble
6	Profound social instability	Interstate conflict
7	Illicit trade	Water crises
8	Water crises	Cyberattacks
9	Terrorist attacks	Profound social instability
10	Failure of urban planning	Illicit trade



Figure 9.4: Overview risk assessment for organisations considering business or investment in Africa. (Deloitte, 2016)



Photo Credits: SWITCH Africa Green

and infrastructure services (Woetzel et al., 2020). By 2050, extreme precipitation events are expected to increase four-fold in Central Africa: drought-prone regions in Southern Africa could experience up to 80 per cent of a decade without water supply, West Africa is expected to see a significant rise in hot and humid weather conditions, and parts of North Africa will soon face water scarcity.

Figure 9.5 shows Africa's exposure to physical risks following a 2°C warming scenario by 2050. These scenarios show that climate change introduces new risks and uncertainties in doing business, particularly in Africa, where people, communities, natural and physical capital, and economic activities experience the physical impacts of climate change.

There is also potential exposure to transition risks arising from transitioning to a low-carbon economy. These risks involve changes in regulatory policies, new technologies and shifts in consumer preferences.

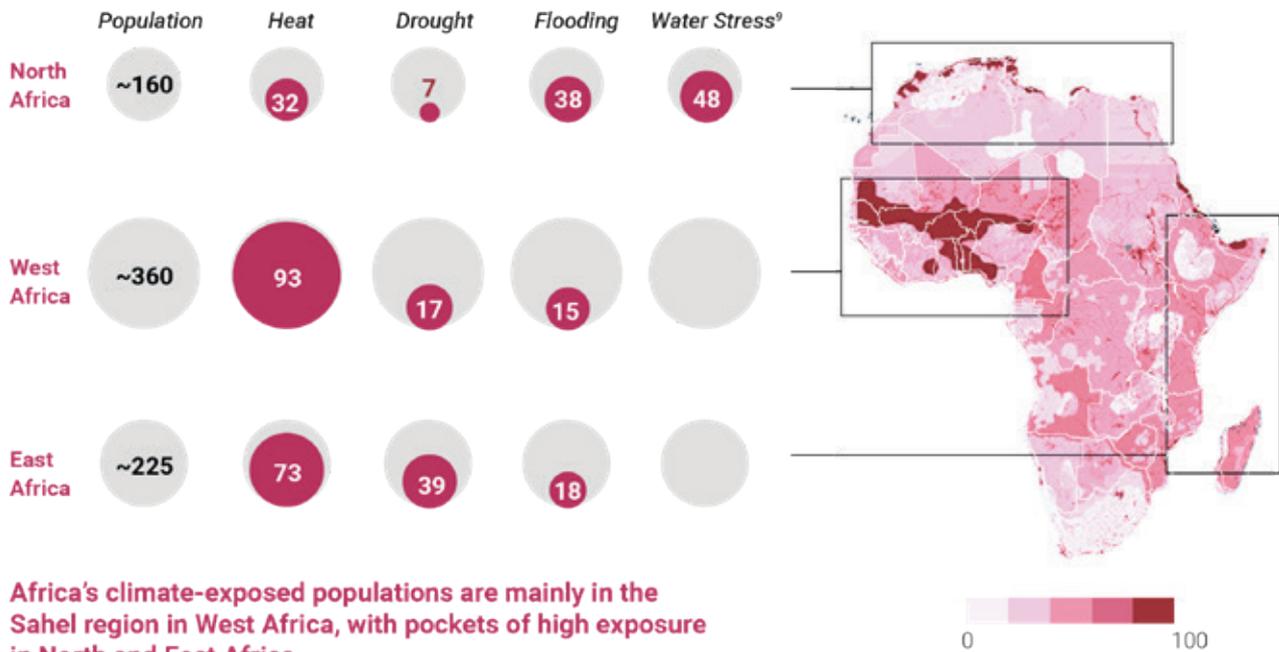
Political instability and security: Some African countries are prone to political instability, civil conflict, and security challenges from terrorism and organised crime that can expose businesses to threats. These can lead to disruptions in business operations, create uncertainty and pose risks to the safety of business assets and employees.

Economic volatility: Factors such as inflation, currency devaluation, commodity price fluctuations and limited access to financing result in economic volatility in some African countries, impacting business profitability and sustainability.

Pandemic: Overall, the COVID-19 pandemic had significant impacts on economies in several countries, disrupting tourism, trade, as well as financial and consumer markets. Many African economies are commodity-sensitive, and trade disruptions occasioned by the pandemic significantly impacted these economies. Figure 9.6 compares the oil price crash in 2014 to that during the onset of the COVID-19 pandemic.

People exposed to climate hazards under a 2°C warming scenario by 2050,¹ %

Millions of people exposed, % exposed (deduplicated)



Africa's climate-exposed populations are mainly in the Sahel region in West Africa, with pockets of high exposure in North and East Africa.

Figure 9.5: Africa's exposure to physical climate change risks (Bouchene et al., 2021b)

Remittances to the continent declined, and there were significant drops in the equity indices resulting in the depreciation of local currencies (Coulibaly and Madden 2020).

The pandemic triggered an unprecedented crisis in the tourism industry as lockdowns grounded movement and operations, severely hitting the sector (Monnier, 2021). The sector is a significant contributor to the GDP of many African countries, accounting for about 7 per cent in 2019, and employs millions of people on the continent. The AU estimated that as of July 2020, the travel and tourism industry had lost around \$55 billion in revenue, and the first three months of the pandemic alone resulted in the loss of two million jobs. There were also cascading effects on the services and the several sectors that support and depend on tourism to thrive. Figure 9.7 compares the regional economic impacts in the travel and tourism sector, showing that the economy in 2022 still lagged behind the pre-COVID period in 2019.

Corruption: Corruption is a significant concern in the African marketplace and poses substantial risks for businesses, including reputational and legal risks. It could also lead to unfair competition.

Infrastructure and Technological change: Infrastructure gaps and challenges in critical sectors, including inadequate energy, transportation, and telecommunication, are prevalent in some African countries. There are also concerns about poorly maintained and ageing infrastructure. These issues can affect operational efficiency, supply chains, and logistics. In addition, threats from cyber risks and attacks, exposure from the interconnectivity of IT systems, and an inadequate technology skill set to support new digital strategies across all industry sectors are areas of concern for African businesses.

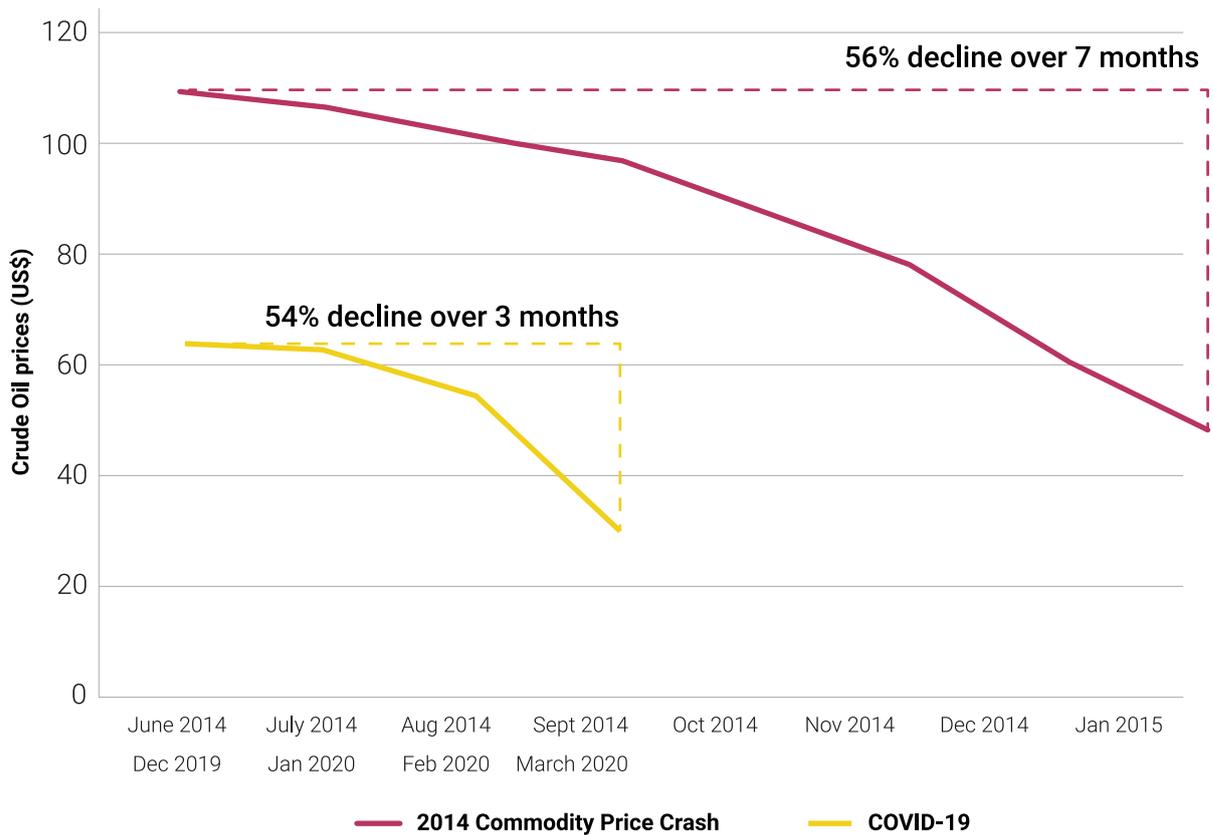


Figure 9.6: Oil price crash during COVID-19 (Coulibaly and Madden 2020)

Public policy and increasing regulatory complexity:

There are often complex and evolving policy and regulatory frameworks in some African countries, which can pose challenges for businesses operating within these countries. Additionally, challenges with inconsistent enforcement and lack of clarity may expose businesses to risks of non-compliance.

9.5 Risk mitigation strategies

Political instability and conflicts: Conducting business operations in countries prone to political instability, civil conflicts and security challenges requires thorough political and security risk assessments before entering the market. Developing crisis management and emergency response plans and investing in physical and cyber security measures would minimise a company's exposure to these risks. Building strong partnerships with the relevant local stakeholders also aids in navigating

political and security challenges effectively. In addition, risk transfer mechanisms such as relevant insurance policies provide a suitable mitigation strategy.

Climate change: While climate change mitigation and adaptation are the overarching measures to respond to climate change risks, climate hazards manifest locally. Therefore, businesses need to understand the impacts in the context of the geographically defined areas



TRAVEL & TOURISM: ECONOMIC IMPACT 2023¹

¹ All values are in constant 2022 prices & exchange rates. As reported in March 2023

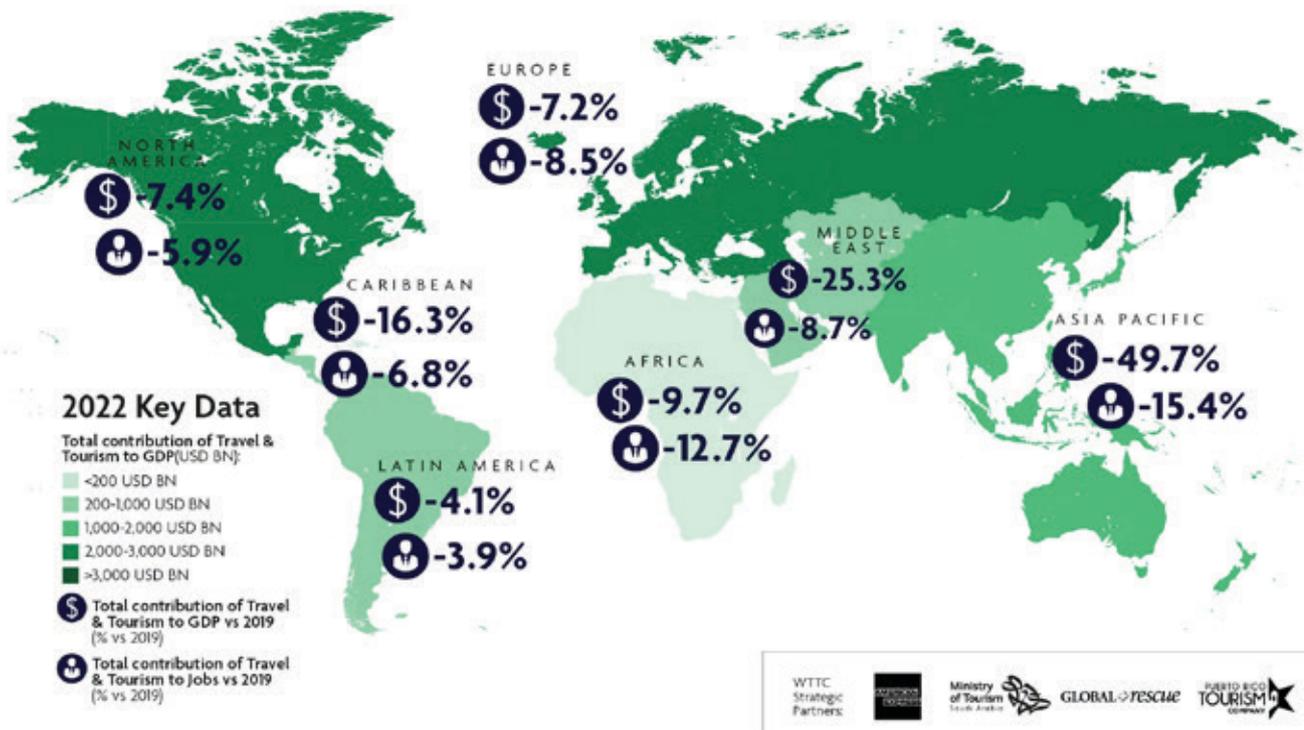


Figure 9.7: Regional comparison of pre-and post-covid economic impacts (WTCC, 2023.)

where they operate or plan to operate. There also needs to be an understanding of the knock-on effects of interconnected socioeconomic and financial systems across regions and sectors that could also impact the business (Woetzel et al., 2020). With this knowledge, sector and location-specific measures can be put in place to incorporate climate uncertainties into decision-making, risk management approach and frameworks. Measures that can be implemented include:

- ♦ building resilient physical infrastructure,
- ♦ developing an emergency response, backup plans, and capacity (for example, building backup inventory levels in supply chains, diversifying supplier sources and locations),
- ♦ protecting people and assets, and
- ♦ ensuring that appropriate financing and insurance policies are in place to help

absorb and manage risks (for example, parameterised insurance and catastrophic bonds).

Exposure to transition risks can be minimised by staying ahead of the curve in adopting clean technologies and environmentally sustainable practices and keeping abreast of changing policies and regulations. A robust environmental risk management strategy should include an assessment of physical, transition and liability risks and the interaction between these risk types.

Pandemic resilience: Building flexibility into operational structures and business models that allows for innovation as part of crisis management strategies can minimise risks from pandemic events. Businesses can find ways to develop or strengthen alternative income streams and prepare employees with any additional skills and capacities needed in the event of pandemic-induced disruptions.

Anti-corruption: The development and implementation of robust anti-corruption and compliance policies and procedures can minimise the threats that risk from corruption poses. Other measures include carrying out due diligence screening on third parties such as business partners and suppliers, establishing transparent and ethical business practices, developing workable compliance programmes, and providing anti-corruption training and capacity building for employees. A good strategy is an active engagement with local organisations that promote transparency and accountability.

Infrastructure gaps: Investing in reliable backup systems and renewable energy power solutions, implementing digital solutions and e-commerce platforms, and collaborating with local authorities and infrastructure development initiatives are some strategies that can minimise a company's exposure to infrastructure deficit risks.

Economic volatility: Exposure to economic volatility risks can be mitigated by conducting comprehensive viability studies and market research before entering a market, diversifying revenue streams and customer bases to reduce the risk of concentration on specific sectors or regions, implementing financial risk management strategies such as hedging against fluctuations and having a diverse pool of funding sources.

Policy and regulations: Some of the strategies to reduce the risk of regulatory and policy inconsistencies in the African market are for businesses to work with experienced legal teams and counsel that are knowledgeable in local laws and regulations, set up internal compliance programmes to ensure applicable policies and laws are followed, and engage with local authorities and industry groups to influence enabling regulatory environments. In general, combining forward-looking diligent risk assessment, careful and intentional planning, adaptability, strong partnerships, and

coordinated action with local stakeholders, as well as committing to responsible and ethical business practices, constitute a good strategy for minimising business risks and taking advantage of the complex interplay of risk and opportunity. Organisations can build enterprise resilience while leveraging upside risk by aligning risk functions with other business functions and entrenching risk activities into day-to-day operations. This approach fosters a risk culture and strategy that cuts across the organisation.

For early-stage organisations looking to explore and tap into business opportunities in Africa while minimising risks, the following general risk management strategies are recommended (PwC, 2015):

- ◆ Develop a formal risk strategy document that aligns with business strategy documents and implement this at the business unit level within the organisation. This document should be reviewed and updated regularly.
- ◆ Introduce a formal integrated stakeholder management plan which details the process to manage and monitor the organisation's relationship with key stakeholders such as investors, regulators, employees, civil society groups, and other internal and external stakeholders. Assess the effectiveness of this strategy and update as required.
- ◆ Build a formal risk culture assessment and conduct it regularly. The training tools should be continuously measured for effectiveness, and the process benchmarked periodically.
- ◆ Create an internal audit function vital to building and supporting the organisational risk and compliance infrastructure.
- ◆ Risk monitoring should be a routine process rather than an ad-hoc activity

and should start at the board level. Risk monitoring activities and analysis should be at the business unit level.

- ◆ Integrate risk-adjusted performance incentives into organisation compensation plans, starting at the board and senior management level and gradually across the organisation. These incentives and strategic and tactical organisational plans should also be reviewed and updated.

9.6 Conclusion

Africa has experienced its share of challenges over the last decade. Ebola, the COVID-19 pandemic, the impact of Russia's invasion of Ukraine, debt distress and the effects of climate change are several deterrents to new investments. Conflicts in Ethiopia, Mozambique, the Sahel, and most recently, Sudan, have also weakened the investment climate. These shocks heighten the perception of risk and divert domestic resources and policymakers' priorities away from creating an enabling environment for investment. However, effective risk identification and management strategies can give businesses a head start and significant advantages by tapping into the vast potential of the continent's emerging markets.





CHAPTER

10

Enhancing
African Business
Processes
with Digital
Transformation



Photo Credits: SWITCH Africa Green

10.1 Digital transformation for Africa

The Digital revolution began in the 1970s and has significantly impacted global economies. The concept of the digital economy came to the fore due to global economies undergoing a digital transformation as digital innovations advanced, impacting product and service offerings, businesses and consumers. Countries have attained varying digitisation levels with new technologies such as blockchain, Artificial Intelligence (AI), 5G, 3D printing, the Internet of Things (IoT), nanotechnology, solar photovoltaic and many other frontier technologies changing the face of domestic economies globally. The advancement in digitisation has shifted the nature and functionality of both the demand and supply sides of labour markets (Bhorat et al., 2023).

Innovation drives the world, and unless African policymakers reap the potential benefits of this digital era, the global divide will continue

growing. Africa has an opportunity to leapfrog development via digitisation, and its vast economic potential and unique labour market, fuelled by its youthful population and high self and informal employment rates, provides a huge opportunity to achieve digitally enabled and sustainable socio-economic development. The continent has seen an increase in mobile phone subscriptions, internet access and mobile banking innovations, demonstrating the critical role that digitisation will play in how its economies function. In Africa, the focus must shift to retention and wealth creation, effective resource management, fostering inclusivity, moving up on global value chains, economic diversification, energy mix optimisation and making human capital central to policymaking. This shift would happen by fostering investment in research, development and innovation (R&D&I) to kick-start Africa's economic structures and catch up



technologically with the rest of the world. Digital Transformation and Innovation (DT&I) is a crucial driver of inclusive and sustainable growth and has become a necessary component of efforts to achieve Africa's Agenda 2063 and the Global Goals (AU, 2020). DT&I addresses challenges such as poverty, food security, education, health, energy, delivery of goods and services, and reducing inequality.

In this regard, the African Union Commission (AUC) developed a Digital Transformation Strategy for Africa with a vision to create an integrated and inclusive digital society and economy that enables an improvement in citizens' quality of life, strengthens the existing economic sector, encourages its development and diversification, and secures continental ownership with Africa as both producers and consumers in the global economy (AU, 2020). The strategy was developed in cooperation with the African Development Bank, Africa Telecommunications Union, UN Economic Commission for Africa, Smart Africa, AUDA-NEPAD, International

Telecommunication Union, Regional Economic Communities, Africa Capacity Building Foundation and the World Bank (AU, 2020).

10.2 Foundation pillars of a digital ecosystem

The AU's Digital Transformation Strategy and the supporting World Bank's Digital Economy for Africa Initiative recognise structures upon which a stable and self-sustaining digital transformation ecosystem is built to gain critical digital dividends across and between many sectors. These foundational pillars include an enabling policy and regulatory environment, digital infrastructure, digital entrepreneurship, digital trade and finance, digital public platforms and digital skills (WB, 2023d).

Digital Strategies of African Countries

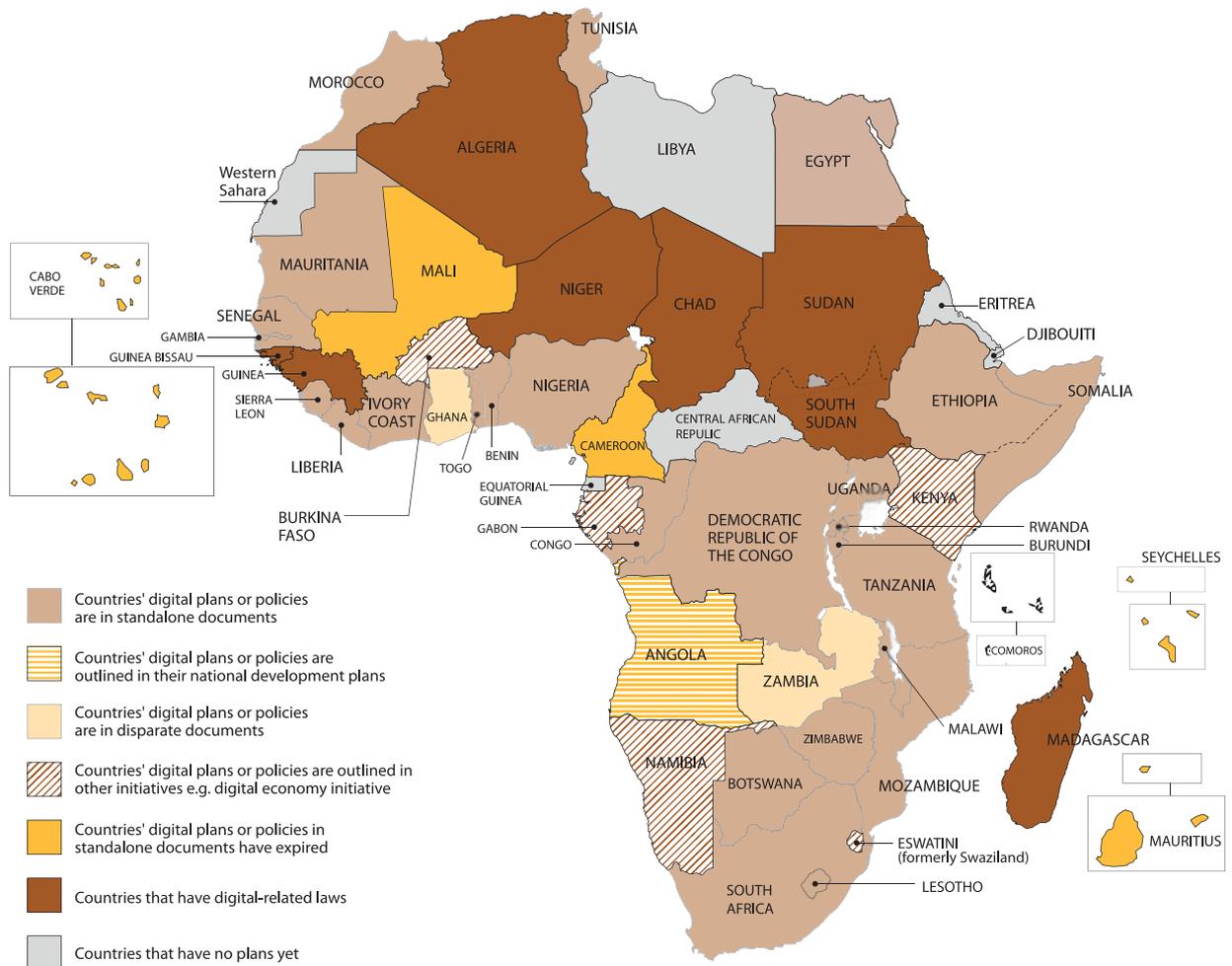


Figure 10.1: *The status of digital agendas, policies, and plans in Africa (Abimbola et al., 2021)*

10.2.1 Policy and regulatory environment

African governments are responsible for creating policies and regulations that provide an enabling environment to support digital transformation across all crucial sectors. By keeping pace with technological advancements and addressing new regulatory frontiers, policymakers and regulators can ensure the stability and sustainability of the policy environment. A conducive environment that adopts flexible, incentive-based and market-driven best practices pushes frontiers, stimulates demand for digital solutions and provides comfort for private-sector investments to grow. Achieving the potential that digital transformation affords economies on the continent hinges on providing relevant regulatory frameworks that serve as the foundation of a thriving ecosystem and filling

the gaps for Africa to catch up with the rest of the world. Figure 10.1 shows that most African countries have some form of digital policy or strategic plan as of 2021. The state of these policies varies in detail and coverage and ranges from existing as dedicated policy documents to featuring within national development plans (Abimbola et al., 2021). African governments are encouraged to (AU, 2020):

- ◆ Develop and implement national, regional and continental digital transformation strategies that stimulate market forces and allow the scaling up of digital initiatives that address developmental challenges impacting the continent.

- ◆ Establish harmonised legal, policy and regulatory frameworks.
- ◆ Integrate public and private sector-developed e-services with adequate regulation at all levels that respect data protection principles while ensuring that African countries host associated data readily available upon request.
- ◆ Strengthen the collaboration between African institutions and regulators responsible for digitalisation and personal data protection.

10.2.2 Digital infrastructure

The availability of high-quality broadband infrastructure required to engage in digital activities that facilitate the development, provision and utilisation of digital products and services, and connect people and businesses globally is the digital infrastructure needed for a thriving digital ecosystem. These include fixed and wireless telecommunications networks, terrestrial fibre optic networks, fibre over power lines, submarine cables, mobile communication, satellite communication, data centres, telecentres, and digital and smart devices (AU, 2020). The accessibility and affordability of digital infrastructure are essential to driving inclusive digital transformation and economic growth. Studies have shown the relationship between high-quality broadband penetration and economic development; for example, a World Bank study in 2016 estimates a 10 per cent increase in the penetration of broadband services in low and middle-income countries resulting in a corresponding growth of 1.38 per cent in GDP (Minges, 2016). The national and regional expansion of broadband coverage boosts the connectivity of people and things and drives innovation and productivity.

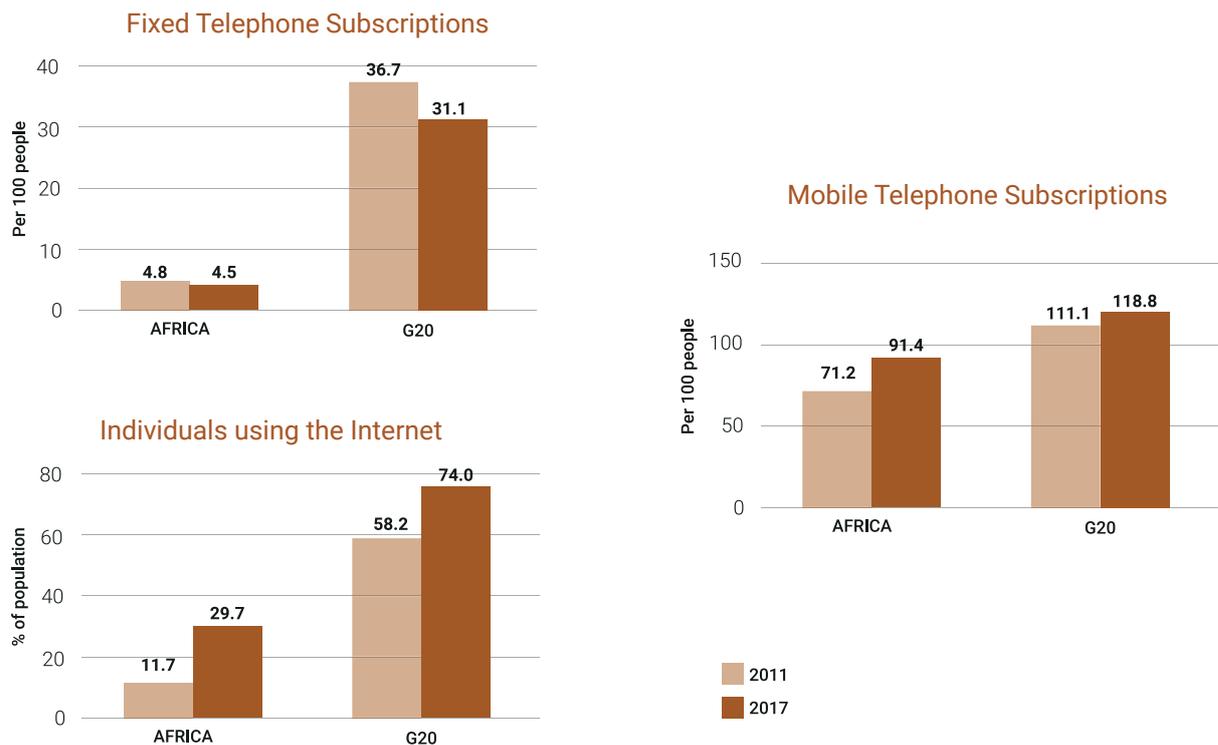
The state of Africa's digital infrastructure is unevenly spread at the country level but has witnessed advancement in infrastructure indicator measures. For instance, there has

been rapid growth in fixed-line internet and fibre optic connections to businesses and homes recently (Bhorat et al., 2023). Figure 10.2 compares seven African countries and some G20 countries regarding the shift in digital infrastructure across fixed telephone subscriptions, mobile telephone subscriptions and individuals using the Internet between 2011 and 2017.

As seen in the figure, fixed telephones are declining in favour of mobile telephones in line with global technological advancements, as 91 out of 100 people had mobile subscriptions in 2017 in Africa, compared with 4.5 individuals with a fixed subscription in 2017. The mobile phone revolution unlocked the prospects for private sector investments, with new business models significantly driving the extension of sustainable communication services. Factoring in African country heterogeneity, the gap in the number of people who use the internet in Africa and the G20 as of 2017 indicates the opportunities for digital infrastructure growth on the continent. Despite this infrastructure challenge, it is estimated that an additional 300 million people in Africa will connect to the Internet by 2025 (AU, 2020).

Segments of the digital infrastructure market have been unbundled in most member states of the AU to encourage competition in the digital infrastructure networks value chain and to boost the development of the local digital industry. For instance, data centre localisation will allow for cost savings on international connectivity and the protection of data sovereignty. Some of the policy actions to drive the expansion of digital infrastructure on the continent include (AU, 2020):

- ◆ Developing and implementing national, regional and continental digital infrastructure master plans while considering technologies convergence.
- ◆ Promoting infrastructure sharing by collaborating and coordinating with



Source: World Bank (2022), authors' calculations.

Notes [1] African sample countries include: Algeria, Benin, Botswana, Cameroon, Egypt, Ethiopia, Madagascar (excluding 2017: Percentage of individuals using the internet), Malawi, Mali, Mauritius, Namibia, Niger, Nigeria (excluding 2011: Fixed broadband subscriptions), Rwanda, Senegal, South Africa, Tanzania, Togo, Tunisia, Zambia (excluding 2017: Percentage of individuals using the internet), and Zimbabwe.

[2] G20 sample countries include: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of South Korea, Mexico, Russia, Saudi Arabia, Spain, Turkey, the UK, and the USA.

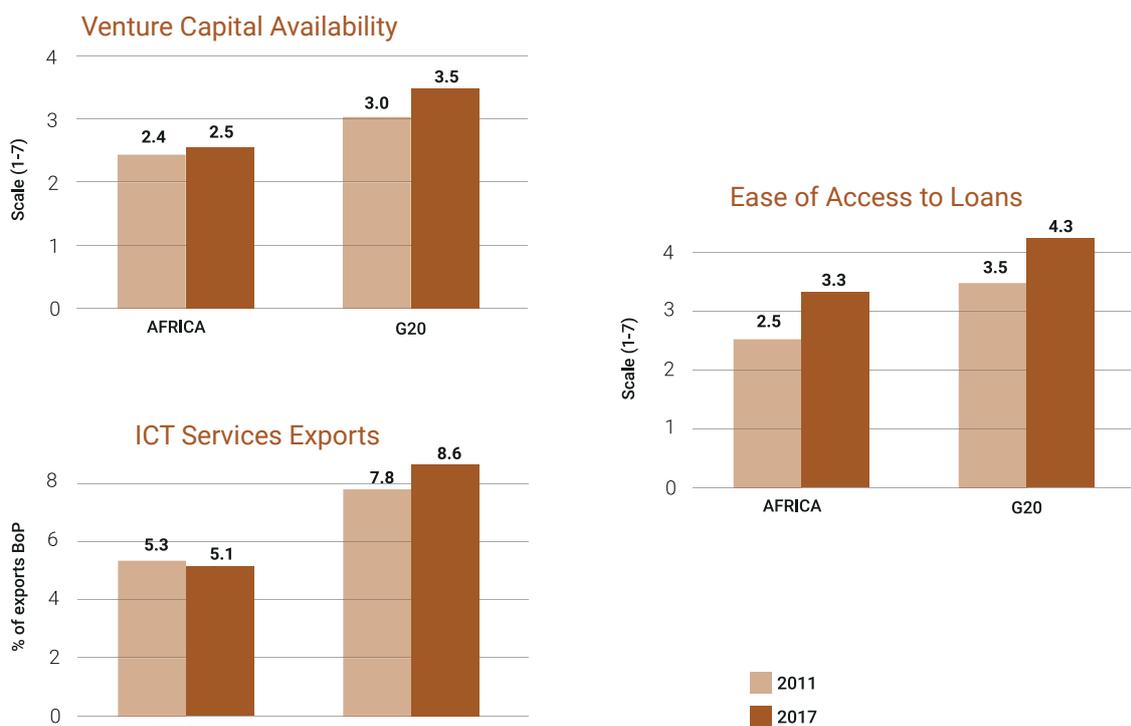
Figure 10.2: Comparing Digital infrastructure in Africa and G20 in 2011 and 2017 (Bhorat et al., 2023)

essential utilities (water, electricity, transportation) infrastructure networks in the rollout of digital infrastructure.

- ◆ Boosting investment in telecom infrastructure interconnectivity at national, regional and continental levels and developing financial instruments through partnerships between investors, government, financial institutions, and international partners to scale existing initiatives and bridge the gap in underserved areas.
- ◆ Promoting a conducive regulatory environment that encourages competitive and harmonised regional and continental connectivity markets.
- ◆ Defining a new framework that defines and deploys the postal sector's role in providing universal access to digital technologies and facilitating access to funding for related development and capacity building.

10.2.3 Digital entrepreneurship

The ease of exploring and creating new products and opportunities that also contribute to creating jobs in the digital space by entrepreneurs is a vital component of a robust digital economy. Digital entrepreneurship is expanding in Africa, and entrepreneurs are taking advantage of the consistent global innovation in digital hardware, software and networks to drive change and growth in the industrial, commercial and social sectors of African economies. In trying to keep pace with the rest of the world, inspired African entrepreneurs are actively bringing the benefits of the digital era to the continent's citizens by using digital technologies to solve the continent's development challenges. For example, innovations such as mobile money and PAYG solar solutions provide glimpses of the enormous potential of digital transformation in contributing to achieving Global Goals.



Source: World Bank (2022), authors' calculations.

Notes: [1] African sample countries include: Algeria, Benin, Botswana, Cameroon, Egypt, Ethiopia, Madagascar, Malawi, Mali, Mauritius, Namibia, Niger (excluding venture capital availability (2011 & 2017) and ease of access to loans (2011 & 2017)), Nigeria, Rwanda, Senegal, South Africa, Tanzania, Togo, Tunisia (excluding venture capital availability (2011 & 2017) and ease of access to loans (2011 & 2017)), Zambia, and Zimbabwe. [2] G20 sample countries include: Argentina (excluding ease of access to loans (2011 & 2017)), Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of South Korea, Mexico, Russia, Saudi Arabia, Spain (excluding ICT services exports (2011)), Turkey, the UK, and the USA.

Figure 10.3: Indicators of digital entrepreneurship in Africa in 2011 and 2017 (Bhorat et al., 2023)

Technology start-ups and supporting organisations have increased recently, with over 400 technology hubs in 93 cities across 42 countries. Funding has also increased, with start-ups raising a record \$1.1 billion in 2018 (AU, 2020), showing steady progress in entrepreneurial access to venture capital financing and general credit. However, there is a digital and innovation divide between sectors, communities and economies within the continent, and the nascent potential in the entrepreneurial ecosystem is yet to translate into vibrant commercial digital hubs that play at the highest global levels. Figure 10.3 compares the performance of crucial digital entrepreneurship indicators between Africa and the G20.

Some policy regulations and proposed actions to drive the growth and stability of digital entrepreneurship in Africa include (AU, 2020):

- ♦ Improving policies for digital innovation and entrepreneurship.

- ♦ Creating a favourable environment that empowers innovation and facilitates access to finance and funding mechanisms for digital enterprises.
- ♦ Creating an enabling ecosystem to address interrelated barriers and improving advisory services that stimulate digital entrepreneurship for digital enterprises.
- ♦ Integrating digital entrepreneurship in continental, regional and national policies to build partnerships and enable structured policy dialogue between public and private stakeholders to instruct policy decision-making.

10.2.4 Digital trade and finance

The availability and use of digital financial services that allow households and individuals to conveniently pay, save, and borrow is crucial for poverty reduction and economic growth. Digital financial services are accessed and delivered via digital channels such as mobile phones, the Internet, Automated Teller Machines (ATM), and Point of Sale stations (POS). Digital finance boosts financial inclusion in Africa by lowering costs, maximising economies of scale and increasing the speed, security, and transparency of tailored transactions that serve people experiencing poverty (WB, 2020c). In Africa, the emergence of mobile money services, which involves using mobile telephones to access and execute financial services and transactions, has become a game changer in increasing financial inclusion on the continent. As of 2019, Boston Consulting Group estimated that revenue from mobile financial service providers in sub-Saharan Africa could be up to \$1.5 billion (Kuipers et al., 2015).

Mobile money is prevalent in sub-Saharan Africa, and the number of registered and active users almost surpasses all other developing world regions combined, with transaction values of about \$490 billion using mobile money providers alone, as shown in Figure 10.4 (Statista, 2021).

Digital trade or e-commerce involves the digitally enabled exchange of goods and services delivered physically or through digital platforms. The rapid growth of e-commerce and digital financial inclusion can facilitate Africa's integration into a single digital market by leveraging economies of scale and economic opportunities that the AfCFTA will provide. The AfCFTA expects to host 1.2 billion consumers by 2030 and a combined GDP of \$2.5 trillion (AU, 2020). In May 2021, the AU Council of Ministers established its Committee on Digital Trade to coordinate and facilitate the negotiations of the protocol on digital trade under the AfCFTA. The Committee

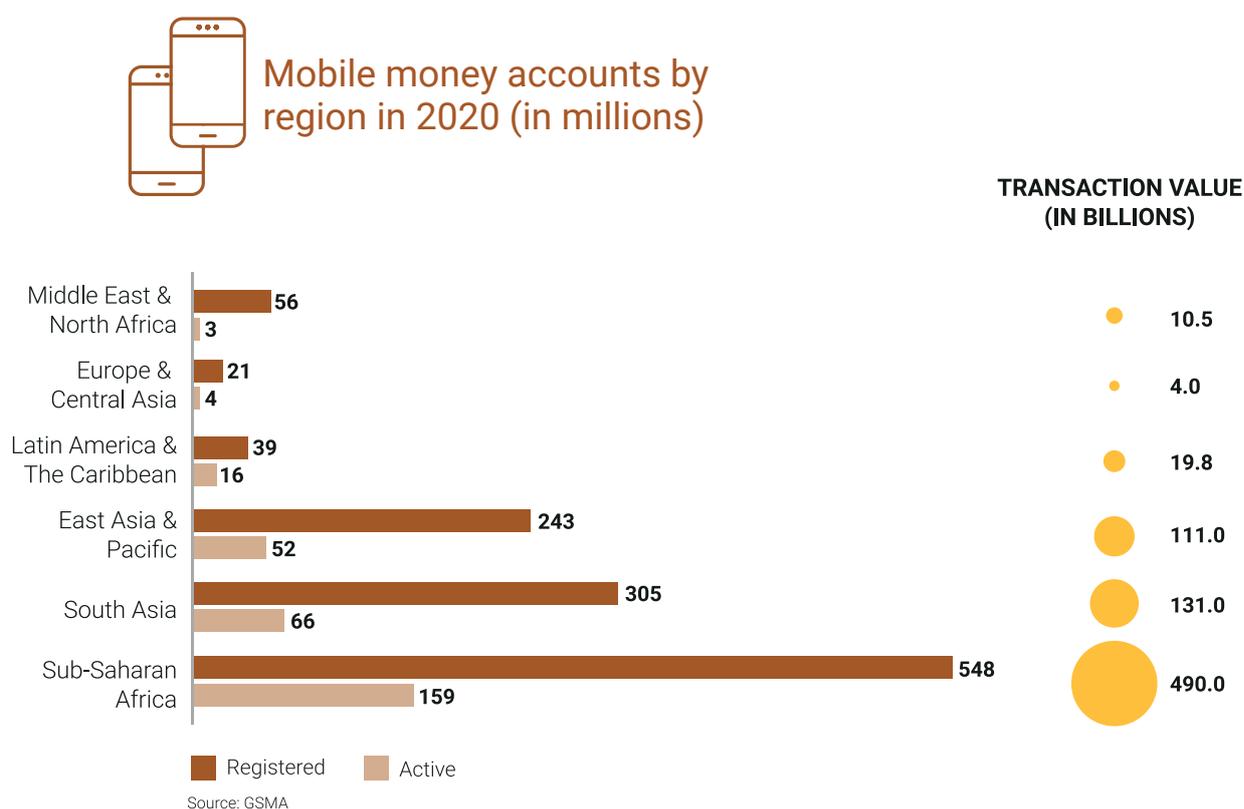
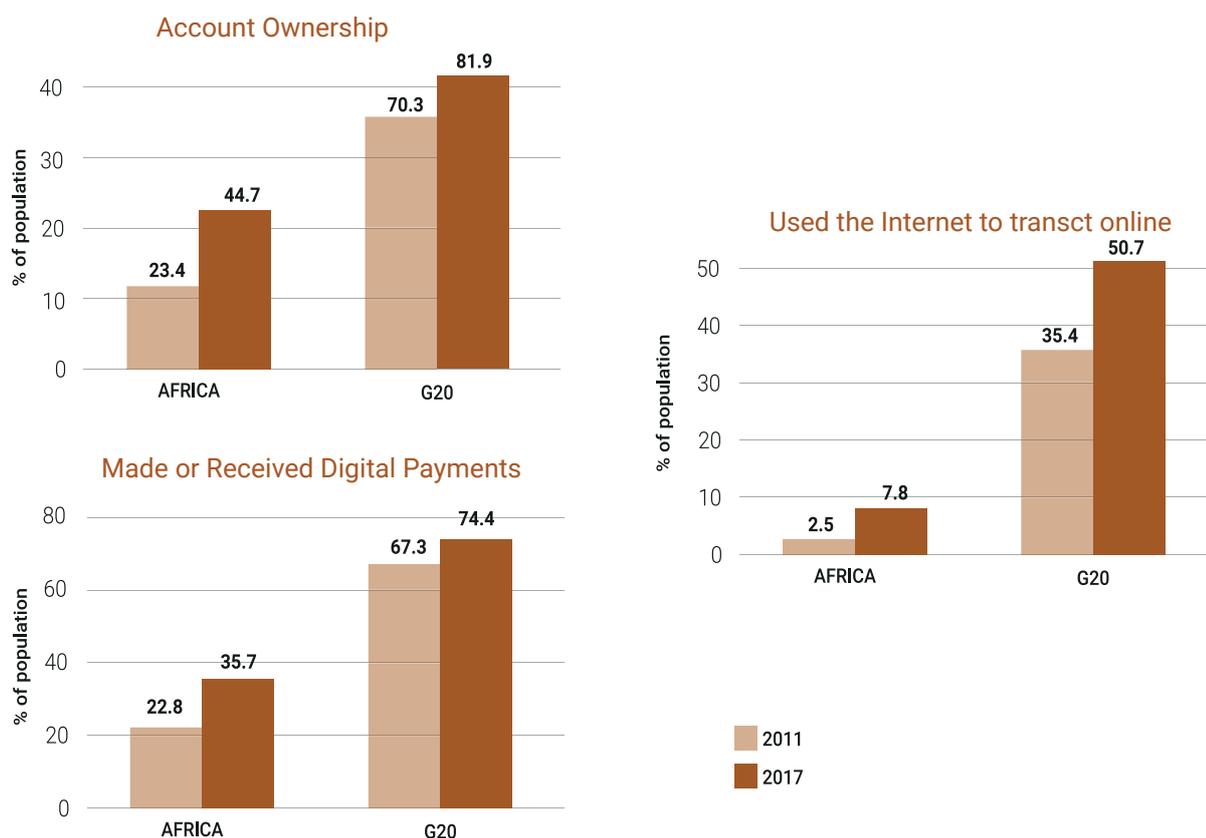


Figure 10.4: Mobile Money accounts by region (Statista, 2021)



Source: World Bank (2022), authors' calculations.

Notes: [1] African sample countries include: Algeria, Benin (excluding use of a debit/credit card (2011)), Botswana, Cameroon (excluding use of a debit/credit card (2011)), Egypt, Ethiopia (excluding account ownership (2011) and use of a debit/credit card (2011 & 2017)), Madagascar (excluding use of a debit/credit card (2011 & 2017)), Malawi, Mali (excluding use of a debit/credit card (2011)), Mauritius, Namibia (excluding account ownership (2011)), Niger (excluding use of a debit/credit card (2011 & 2017)), Nigeria, Rwanda, Senegal (excluding use of a debit/credit card (2011)), South Africa, Tanzania, Togo (excluding use of a debit/credit card (2011)), Tunisia (excluding account ownership (2011)), Zambia (excluding 2017: Percentage of individuals using the internet), and Zimbabwe. [2] G20 sample countries include: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of South Korea, Mexico, Russia, Saudi Arabia, Spain, Turkey, the UK, and the USA.

Figure 10.5: Indicators of digital finance penetration in Africa in 2017 (Bhorat et al., 2023)

consists of all State parties to the Agreement. Unfortunately, the AfCFTA Secretariat has not set a timeline for when the digital trade protocol will come into effect.

The public and private sectors increasingly use e-commerce channels to drive ease, flexibility, affordability, and inclusivity in exchanging goods and services. However, a significant gap exists between Africa and the world's developed nations, as shown in Figure 10.5. Digital finance indicators such as the percentage of the population that owns bank accounts, carry out online internet transactions, and makes or receives digital payments showed growth in Africa between 2011 and 2017 but also demonstrated the untapped potential in the continent.

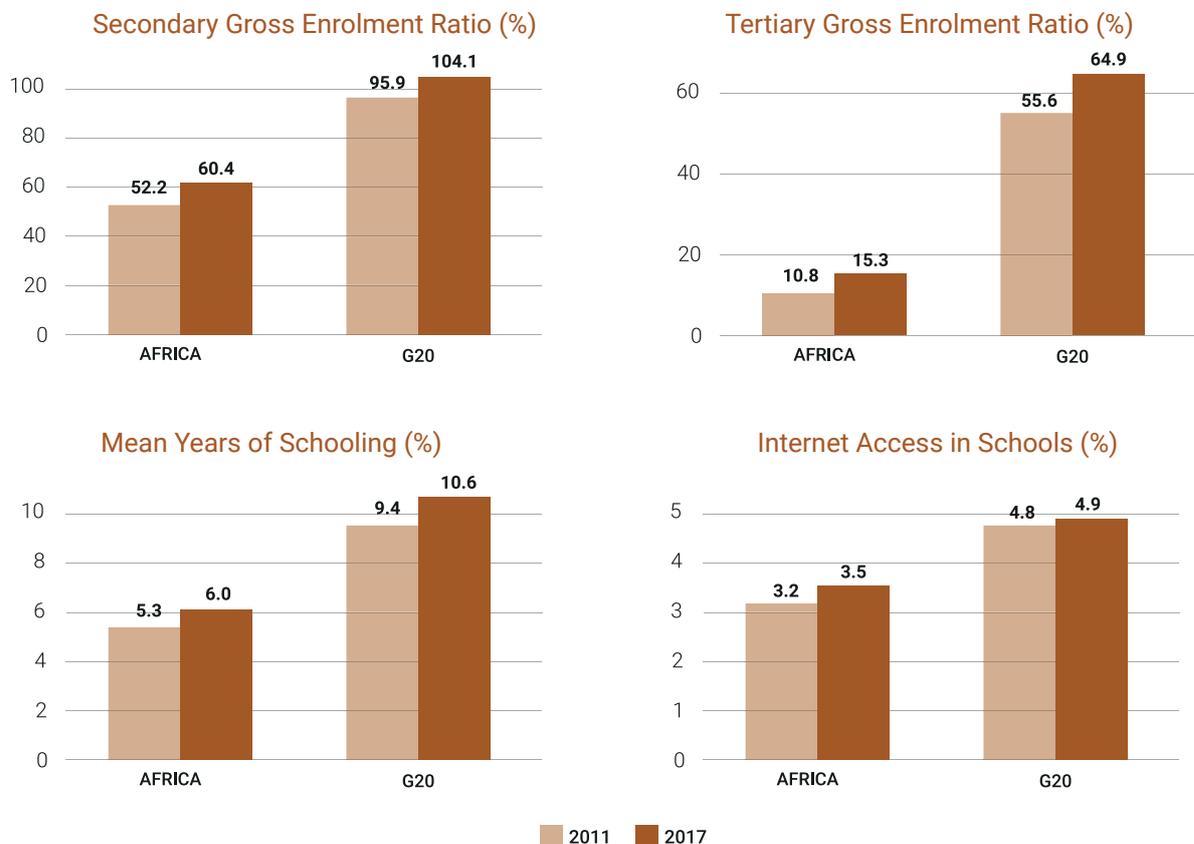
The development of robust and forward-looking policies and regulations, and broad financial infrastructure types that support the expansion of digital trade and financial services, are crucial for a thriving digital ecosystem (Bhorat et al., 2023). Some policy recommendations and actions to promote the penetration and expansion of digital trade and digital financial services in Africa include (AU, 2020):

- ◆ Promoting intra-African digital trade integration to achieve broader cross-border participation by enterprises through inclusivity, reducing trade barriers and market access, integrating African data markets, training and outreach campaigns, and improving the trans-continental regulatory landscape.

- ◆ Boosting the development and adoption of digital financial services by creating conducive operating environments through harmonising rules for compliance by member states, fostering public and private dialogue, strengthening consumer protection, enabling the use of low-cost delivery agents, leveraging blockchain technology for e-transactions, and increasing the ease of doing business through supportive legislation.
- ◆ African Continental Free Trade Area (AfCFTA) Secretariat to support prioritising the completion of high-standard AfCFTA protocols for digital trade.

10.2.5 Digital skills

The availability of skills and education required for participation in the digital ecosystem is a prerequisite for developing a dynamic, flourishing, inclusive and globally competitive digital ecosystem. Human capital investments, developing the digital workforce, and participation of consumers in the digital market all contribute to the overall sustainability of the digital economy vis-a-vis the ability to innovate, use, and adapt to the ever-evolving digital market (Bhorat et al., 2023). Developing a collective human and institutional digital capacity strategy is essential to leverage home-grown and adaptive technological advancements effectively. As the continent seeks to disrupt business-as-usual practices by adopting new technologies and boosting innovation, it is imperative that African governments continually address the skills gap that spans all demographics (WB, 2017).



Source: World Bank (2022), authors' calculations.
 Notes: [1] African sample countries include: Algeria, Benin, Botswana, Cameroon, Egypt, Ethiopia, Madagascar, Malawi, Mali, Mauritius, Namibia, Niger (excluding secondary gross enrollment ratio (2017)), tertiary gross enrollment ratio (2017), mean years of schooling (2017) and internet access in schools (2017)), Nigeria, Rwanda, Senegal, South Africa, Tanzania, Togo (excluding internet access in schools (2011 & 2017)), Tunisia, Zambia, and Zimbabwe. [2] G20 sample countries include: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of South Korea, Mexico, Russia, Saudi Arabia, Spain, Turkey, the UK, and the USA.

Figure 10.6: Digital skills proxy indicators in Africa from 2011-2017 (Bhorat et al., 2023)

The digital era provides new job creation pathways for Africa's youthful population. Governments and the private sector can capitalise on this valuable asset to chart digital pathways toward inclusive growth and development. Africa, however, has a digital skills gap fuelled by poverty, gender inequality, poor literacy rates and the shortage of locally trained skilled labour. For instance, pre-primary, secondary and tertiary education enrolments in Africa are about 27 per cent less than the global average (AU, 2020). Using proxy digital skill indicators to compare digital skills in Africa and G20 countries shows the gap that Africa must fill and surpass to have a globally competitive digital ecosystem. Figure 10.6 provides the ratios of secondary and tertiary education gross enrolments, mean years of schooling and access to the Internet in schools for African and G20 countries in 2011 and 2017. While the indices have improved over the years, Africa needs more rapid improvement, especially in tertiary education enrolment, a key indicator of the continent's digital transformation readiness.

To address the skills gap challenge, a holistic approach that is deliberate, locally owned, people-centric, and systematically designed must be developed to empower and upskill

individuals, organisations, and communities to adapt, develop and maintain the requisite digital capabilities and skills over time. African educational systems need flexibility, proactivity and adaptability to produce graduates with digital and digitally complementary skills that can effectively participate in the evolving digital world.

Digital skills development across a constantly updated continuum in line with technological changes and a digital skills framework help capture the required skills and changes to enable policymakers and digital skills providers to ensure that programmes and training curricula remain updated and relevant. Figure 10.7 shows an example of a continuum of basic, intermediate and advanced digital skills.

Some of the policy recommendations and actions needed for developing and maintaining the digital skills required for successfully operating a digital ecosystem and its contribution to the digital economy include:

- ◆ Reviewing the education curricula per the evolving landscape and trends in the digital economy and society.
- ◆ Providing technology equipment, broadband internet connection for schools and other



Figure 10.7: Continuum of digital skills (ITU, 2018)

educational institutions, and digital training access for teachers.

- ◆ Promoting technology-supported learning and scaling up e-learning platforms to reach people from diverse educational and social backgrounds and regions.
- ◆ Engaging public and private sector stakeholders, including governments, private organisations, international organisations and donors, universities and NGOs to provide expertise on market needs and co-create education curricula and programmes at all levels focusing on digital skills.
- ◆ Mainstreaming digital skills and responsible online behaviour among all citizens and raising awareness of risks regarding online safety, security, and digital rights.
- ◆ Facilitating digital skills development across all economic sectors, focusing on governments, administrations, service providers and civil society.
- ◆ Creating a skills-related policy and business environment that enables a business environment where trained professionals can connect with relevant business opportunities.
- ◆ Developing national and regional innovation hubs.

10.2.6 Digital public platforms – E-governance

An effective government is the foundation for inclusive growth and reducing poverty and adopting technology can be a transformational factor that improves governance and the performance of government (AU, 2020). E-government focuses on the use of technology by governments in the delivery of services and information. The presence of public digital channels of communication and engagement platforms through which the government provides public services is a significant enabler of a digital economy, allowing private and public sector organisations to create better outcomes for citizens (Bhorat et al., 2023). According to the UN's e-government development index (EGDI), which is a weighted average of the three most important dimensions of e-government, namely inherent human capital, scope and quality of online services, and the development status of telecommunication infrastructure, Africa's average score increased by 3.6 per cent between 2020 and 2023. Although Africa made the most notable progress across the period compared to other regions, the continent is still lagging, with an average EGDI value of 0.4054 compared to a global average of 0.6102. Figure 10.8 shows the regional distribution of countries' EGDI values from very high to low EGDI in each global region.

There are no countries with very high EGDI values in Africa, while 59 per cent and 30 per cent are in the middle and high EGDI groups, respectively. However, it shows promise that there is a declining trend in the number of African countries in the low and middle EGDI groups. Four countries on the continent score above the global EGDI: Mauritius, Seychelles, Tunisia and South Africa (UN, 2022b).

In Africa, efforts at digitalising government services to increase efficiency and process automation have taken a siloed approach mirroring the government organisation or the donors undertaking the measure. This approach

has reduced the efficiency potential due to a lack of synergy between government systems and entities, and so allowed for complexity and frustrations for businesses and individuals dealing with multiple government institutions' separate processes and procedures. Political will, coordinating structures among the AU member states, and a unified pan-African digital ID system will improve Africa's level of digital governance. Policy recommendations and actions in this regard include:

- ◆ Facilitating the deployment of digital governance services through the development of enabling national, regional and continental policies, standards, guidelines and strategies.
- ◆ Deployment of essential building blocks of e-governance services in line with best practices.
- ◆ Promoting private-public partnerships in the development of digital services.

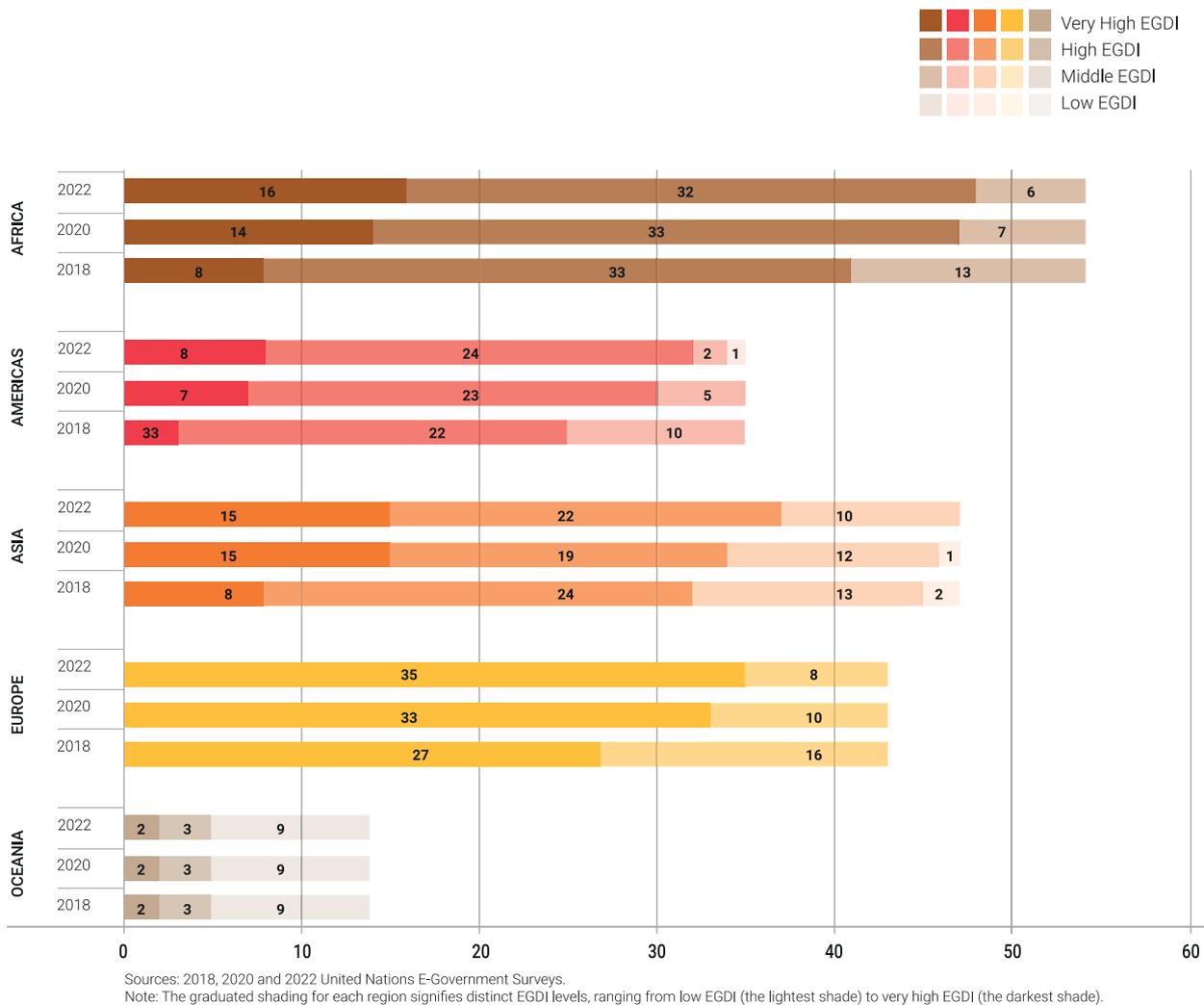
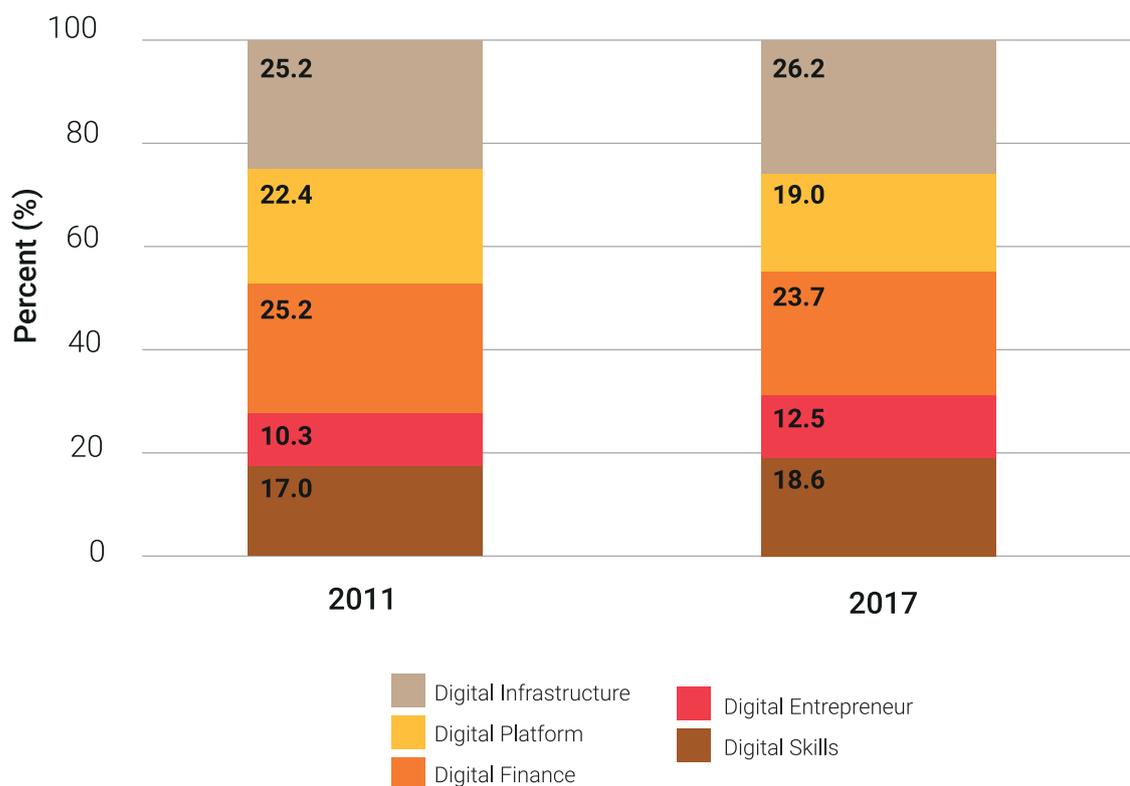


Figure 10.8: Number of countries in EGD groups by region, 2018-2022 (UN, 2022b)

10.3 Digitisation gap contributions

In a study by Brookings Institution’s Global Economy and Development Programme, a Digitalisation Gap Index was developed by measuring the five pillars of digital transformation in some African countries, reflecting the progress of digitalisation and the digital economy. This exercise facilitates understanding each pillar’s percentage contribution and relative importance in driving the overall digitalisation gap over time (Bhorat et al., 2023). Figure 10.9 shows the percentage contribution of each pillar to the aggregate digital gap index in 2011 and 2017, which was measured relative to a sample of G20 countries.

The study revealed that gaps in digital infrastructure, followed closely by digital finance, have contributed the most to the digitisation gap in Africa and contributed to its poor performance in the digital economy. Digital public platforms or e-governance have contributed less over time to digital vulnerability, evidenced by improved EDGI values. However, the contribution of digital skills to the digital gap has increased over time, indicating an urgent need to ramp up the required skills and capacities to drive Africa’s digital economy.



Source: Authors’ calculations, World Bank Group, World Development Indicators, Education Statistics, TCdata260, Global Findex (various years), United Nations E-Government Knowledgebase (2021), UNDP (2012, 2015), International Telecommunication Union (ITU) (various years).

Figure 10.9: Average contribution to the digital gap index by the foundational pillar, 2011-2017 (Bhorat et al., 2023)

10.4 Conclusion

To fully harness the advantages of digitalisation in Africa, local policymakers must prioritise critical areas that form the foundation of a sustainable digital ecosystem. The continent has witnessed a significant rise in technology start-ups and organisations, with over 400 technology hubs in 93 cities across 42 countries. Funding opportunities have also increased, with start-ups raising a record-breaking \$1.1 billion in 2018. While this demonstrates the immense growth potential for digital entrepreneurship, a digital and innovation gap within the continent still exists, limiting global participation.

To establish vibrant commercial digital hubs that play pivotal roles in digitising business processes, attention must be directed towards developing and sustaining digital skills, promoting digital financial inclusion, and improving access to digital infrastructure and platforms. This includes expanding fixed broadband and internet usage to facilitate national and regional digital trade. Formulating comprehensive policies and strategies at the national, regional, and continental levels tailored to local contexts, is essential. The African Continental Free Trade Area (AfCFTA), expected to encompass 1.2 billion consumers and a combined GDP of \$2.5 trillion, should be utilised to facilitate Africa's integration into a unified digital economy.



Photo Credits: SWITCH Africa Green





A woman picking coffee. Photo credit: UNEP

Photo Credits: SWITCH Africa Green



References and literature list

- Ababouch Lahsen, C. C., 2015. *Fisheries and Aquaculture in the Context of Blue Economy*. s.l.:African Development Bank. Available at: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Events/DakAgri2015/Fisheries_and_Aquaculture_in_the_Context_of_Blue_Economy.pdf [Accessed 01 July 2023].
- Abimbola, O., Aggad, F. and Ndzendze, B., 2021. *What is Africa's Digital Agenda?* Policy Brief No.3, Berlin: Africa Policy Research Institute (APRI).
- Acha, L. and Landry, S., 2019. *Spotlighting opportunities for business in Africa and strategies to succeed in the world's next big growth market*. [Online] Available at: <https://www.brookings.edu/research/spotlighting-opportunities-for-business-in-africa-and-strategies-to-succeed-in-the-worlds-next-big-growth-market/> [Accessed May 2023].
- Africa Carbon Markets Initiative, 2022. *Africa Carbon Markets Initiative: Roadmap Report. Harnessing carbon markets for Africa*, s.l.: s.n.
- Africa Energy Portal, 2023. *Mauritius: Floating Solar PV Project to Be Set Up At Tamarind Falls Reservoir, Says Minister Lesjongard*. [Online] Available at: <https://africa-energy-portal.org/news/mauritius-floating-solar-pv-project-be-set-tamarind-falls-reservoir-says-minister-lesjongard>
- Africa News, 2023. *African leaders to re-initiate free trade zone discussions*. [Online] Available at: <https://www.africanews.com/2023/02/16/african-leaders-to-re-initiate-free-trade-zone-discussions/>
- Africa Renewal, 2023. *Climate Change: How Kenyan Coastal Villagers are Cashing in on Carbon Credits*. [Online] Available at: <https://www.un.org/africarenewal/magazine/january-2023/how-kenyan-coastal-villagers-are-cashing-carbon-credits> [Accessed 27 June 2023].
- African Business, 2021. *Arnergy Launches Diaspora Initiative For Clean Energy Remittances*. [Online] Available at: <https://africabusiness.com/2021/11/29/arnergy-launches-diaspora-initiative-for-clean-energy-remittances/> [Accessed 3 July 2023].
- African Business, 2022. *AfDB and partners launch Alliance for Green Infrastructure in Africa*. [Online] Available at: <https://africabusiness.com/2022/06/30/afdb-and-partners-launch-alliance-for-green-infrastructure-in-africa/> [Accessed 30 June 2023].
- African Continental Free Trade Area Secretariat, 2023. *A New Era of Trade in Africa: Accelerating AfCFTA Implementation*, s.l.: The African Continental Free Trade Area (AfCFTA) Secretariat.
- African Continental Free Trade Area, 2023. *The AfCFTA Investment Protocol – A potential game changer for the African continent?* [Online] Available at: <https://au-afcfta.org/2023/05/the-afcfta-investment-protocol-a-potential-game-changer-for-the-african-continent/> [Accessed 1 June 2023].
- African Development Bank, 2014. *Tracking Africa's Progress in Figures, Tunis: African Development Bank Group*. Available at: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Tracking_Africa%E2%80%99s_Progress_in_Figures.pdf [Accessed 03 July 2023].
- African Development Bank, 2018a. *African Tourism Monitor: The High 5s - Tourism as a Pathway to Industrialization, Integration, Quality of Life, Agriculture, and Powering Up Africa, Abidjan: African Development Bank*. Available at: <https://www.afdb.org/en/documents/africa-tourism-monitor-2018> [Accessed 01 July 2023]
- African Development Bank, 2018b. *News and Events*. [Online] Available at: <https://www.afdb.org/en/news-and-events/africa-agribusiness-a-us-1-trillion-business-by-2030-18678>
- African Development Bank, 2019. *Feed Africa*. [Online] Available at: www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Brochure_Feed_Africa_-En.pdf [Accessed June 2023].
- African Development Bank, 2022a. *African Economic Outlook: Supporting Climate Resilience and a Just Energy Transition in Africa*, Cote d'Ivoire: African Development Bank.
- African Development Bank, 2022b. *COP27: African and Global Partners Launch Multi-Billion Alliance for Green Infrastructure*. [Online] Available at: <https://www.afdb.org/en/news-and-events/press-releases/cop27-african-and-global-partners-launch-multi-billion-alliance-green-infrastructure-56403> [Accessed 30 June 2023].
- African Development Bank, 2023a. *News and Events: African Development Bank*. [Online] Available at: <https://www.afdb.org/en/news-and-events/press-releases/africas-economic-growth-outpace-global-forecast-2023-2024-african-development-bank-biannual-report-58293> [Accessed 17 May 2023].
- African Development Bank, 2023b. *African Economic Outlook 2023: Mobilizing Private Sector Financing for Climate and Green Growth in Africa*. [Online] Available at: <https://www.afdb.org/en/documents/african-economic-outlook-2023> [Accessed June 2023].

- African Union, 2020. *The Digital Transformation Strategy For Africa (2020-2030)*, Addis Ababa: African Union.
- African Union – Inter-African Bureau for Animal Resources, 2019. *Africa Blue Economy Strategy*, Nairobi: African Union – Inter-African Bureau for Animal Resources (AU-IBAR). Available at: https://www.au-ibar.org/sites/default/files/202010/sd_20200313_africa_blue_economy_strategy_en.pdf [Accessed 28 June 2023].
- Asian Development Bank, 2022. *Financing the Blue Economy: Investments in Sustainable Blue Small–Medium Enterprises and Projects in Asia and the Pacific*, Manila: s.n. Available at <https://dx.doi.org/10.22617/TCS220281-2> [Accessed 01 July 2023].
- Atteridge, A. et al., 2022. *Assessing Finance for Nature-based Solutions to Climate Change*. SEI working paper.
- Babayemi, J., Nnorom, I. C., Osibanjo, O. and Weber, R., 2019. *Ensuring Sustainability in Plastics Use in Africa: Consumption, Waste Generation, and Projections*. *Environmental Sciences Europe*, 31(1).
- Baldé, C. P., Wang, F., Kuehr, R. and Huisman, J., 2015. *The Global E-Waste Monitor*, Bonn: United Nations University.
- Bawumia, M., 2023. *Africa Will be Transformed by the Potential of AI and Data – If We Can Get Investment*. [Online] Available at: <https://www.theguardian.com/commentisfree/2023/jun/01/africa-will-be-transformed-by-the-potential-of-ai-and-data-if-we-can-get-investment> [Accessed June 2023].
- Begazo, T., Blimpo, M. P. and Dutz, M. A., 2023. *Digital Africa: Technological Transformation For Jobs*, Washington, DC: World Bank.
- Bhorat, H. et al., 2023. *Digitalization and Digital Skills Gaps in Africa: An Empirical Profile*, s.l.: Brookings Institution, Global Economy and Development.
- Biniek, K. et al., 2022. *Scaling the CCUS industry to achieve net-zero emissions*. [Online] Available at: https://www.mckinsey.com/~media/mckinsey/industries/oil%20and%20gas/our%20insights/scaling%20the%20ccus%20industry%20to%20achieve%20net%20zero%20emissions/scaling%20the%20ccus%20industry%20to%20achieve_final.pdf [Accessed 08 07 2023].
- Blaufelder, C., Levy, C., Mannion, P. and Pinner, D., 2021. *McKinsey Sustainability: A Blueprint for Scaling Voluntary Carbon Markets to Meet the Climate Challenge*. [Online] Available at: <https://www.mckinsey.com/capabilities/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge> [Accessed 25 June 2023].
- BloombergNEF, 2022. *The Untapped Power of Carbon Markets in Five Charts*. [Online] Available at: <https://about.bnef.com/blog/the-untapped-power-of-carbon-markets-in-five-charts/> [Accessed 25 June 2023].
- BloombergNEF, 2023. *Blog: Carbon Offset Market Could Reach \$1 Trillion With Right Rules*. [Online] Available at: <https://about.bnef.com/blog/carbon-offset-market-could-reach-1-trillion-with-right-rules/#:~:text=New%20York%20and%20London%2C%20January,in%20a%20new%20research%20report.> [Accessed 14 June 2023].
- Bouchene, L., Jayaram, K., Kendall, A. and Somers, K., 2021a. *Africa's green manufacturing crossroads: Choices for a low-carbon industrial future*. [Online] Available at: <https://www.mckinsey.com/capabilities/sustainability/our-insights/africas-green-manufacturing-crossroads-choices-for-a-low-carbon-industrial-future> [Accessed 2 June 2023].
- Bouchene, L. et al., 2021b. *Green Africa: A Growth and Resilience Agenda for the Continent*, s.l.: McKinsey & Company.
- Brears, R. C., 2022. *Financing Nature-Based Solutions*. In: *Financing Nature-Based Solutions. Palgrave Studies in Impact Finance*. s.l.: Palgrave Macmillan, Cham.
- Bricker, D. and Ibbitson, J., 2019. *Empty Planet: The Shock of Global Population Decline*. [Online] [Accessed June 2023].
- Brown, W., 2022. *Kenya Taps the Earth's Heat*. [Online] Available at: <https://www.imf.org/en/Publications/fandd/issues/2022/12/country-case-kenya-taps-the-earth-heat> [Accessed June 2023].
- Bundesanstalt für Geowissenschaften und Rohstoffe, 2021. *Regional Project: Geothermal Energy - East Africa*. [Online] Available at: https://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Projekte/Abgeschlossen/Afrika/2029_2016-2066-5_RegionalOstafrika_Geothermie_en.html?nn=1548118 [Accessed 28 June 2023].
- Business and Sustainable Development Commission, 2017. *Better Business, Better World: Sustainable Business Opportunities in Africa*, London: Business and Sustainable Development Commission.
- Cáceres, A. L. et al., 2022. Potential hydropower contribution to mitigate climate risk and build resilience in Africa. *Nature Climate Change*, 12(8), pp. 719-727.
- Chakona, A. et al., 2022. Diversity, Distribution and Extinction Risk of Native Freshwater Fishes of South Africa. *Journal of Fish Biology*, 100(4), pp. 1044-1061.
- Changing Market Foundation, 2023. *Trashion: The stealth export of waste plastic clothes to Kenya*, Nairobi: Changing Market Foundation.

- Chen, J., 2022. *Investopedia*. [Online] Available at: <https://www.investopedia.com/terms/i/impact-investing.asp> [Accessed 17 June 2023].
- Chowdhury, A. et al., 2022. Enabling a low-carbon electricity system for Southern Africa. *Joule*, 6(8), pp. 1826-1844.
- Christie, I., Fernandes, E., Messerli, H. and Twining-Ward, L., 2013. *Tourism in Africa: Harnessing Tourism for Growth and Improved Livelihoods*, Washington DC: World Bank Group.
- Chui, M. et al., 2023. *The Economic Potential of Generative AI: The Next Productivity Frontier*. [Online] Available at: <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier> [Accessed July 2023].
- City of Cape Town, n.d. *Responsible Tourism*. [Online] Available at: <https://www.capetown.gov.za/Work%20and%20business/Doing-business-in-the-city/Business-support-and-guidance/Responsible-tourism> [Accessed 2 July 2023].
- Climate Champions, 2022. *News: Africa Carbon Markets Initiative Launched to Dramatically Expand Africa's Participation in Voluntary Carbon Market*. [Online] Available at: <https://climatechampions.unfccc.int/africa-carbon-markets-initiative/> [Accessed 25 June 2023].
- Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S., 2016. *Nature-Based Solutions to Address Global Societal Challenges*, Gland, Switzerland: IUCN.
- Committee on World Food Security, 2014. *Global Strategic Framework for Food Security & Nutrition (GSF)*. [Online] Available at: https://www.fao.org/fileadmin/templates/cfs/Docs/1314/GSF/GSF_Version_3_EN.pdf [Accessed June 2023].
- Coulibaly, B. S. and Madden, P., 2020. *Africa in Focus: Strategies for Coping with the Health and Economic Effects of the COVID-19 Pandemic in Africa*. [Online] Available at: <https://www.brookings.edu/blog/africa-in-focus/2020/03/18/strategies-for-coping-with-the-health-and-economic-effects-of-the-covid-19-pandemic-in-africa/> [Accessed 12 June 2023].
- CPMR Intermediterranean Commission and MedWaves, the UNEP/MAP Regional Activity Centre for SCP, 2022. *A Circular Blue Economy for the Mediterranean: Current practices and opportunities*, Rennes: CPMR and MedWaves.
- Czaplicki, J., 2019. *What is ESG and why is it important?* [Online] Available at: <https://medium.com/carbonclick/what-is-esg-and-why-is-it-important-f9036bb96d66> [Accessed July 2023].
- DeClerck, F. et al., 2023. A Whole Earth Approach to Nature-Positive Food: Biodiversity and Agriculture. In: *Science and Innovations for Food Systems Transformation*. s.l.:Springer, pp. 469-496.
- Deloitte, 2016. *Your essential guide to de-risking Africa*. [Online] Available at: https://www2.deloitte.com/content/dam/Deloitte/za/Documents/risk/ZA_De-risking%20Africa%20Brochure_FINAL_digi_spreads.pdf [Accessed 24 06 2023].
- Dettmering, D. et al., 2020. Potential and limitations of satellite altimetry constellations for monitoring surface water storage changes—A case study in the Mississippi Basin. *Remote Sensing*, 12(20), p. 3320.
- Digwatch, 2023. <https://www.mckinsey.com/capabilities/sustainability/our-insights/africas-green-manufacturing-crossroads-choices-for-a-low-carbon-industrial-future>. s.l.:Digwatch.
- European Environment Agency, 2014. *Resource-efficient green economy and EU policies. EEA Report No 2/2014*. [Online] Available at: <https://www.eea.europa.eu/highlights/do-we-live-in-a> [Accessed 16 June 2023].
- European Environment Agency, 2023. *EU exports of used textiles in Europe's circular economy*. [Online] Available at: <https://www.eea.europa.eu/publications/eu-exports-of-used-textiles>
- European Investment Bank, 2022. *Home: Media Center-New Study Confirms €1 Trillion Africa's Extraordinary Green Hydrogen Potential*. [Online] Available at: <https://www.eib.org/en/press/all/2022-574-new-study-confirms-eur-1-trillion-africa-s-extraordinary-green-hydrogen-potential> [Accessed 12 June 2023].
- Economics of Land Degradation Initiative and United Nations Environment Programme, 2015. *The Economics of Land Degradation in Africa: Benefits of Action Outweigh the Costs*. [Online] Available at: <https://wedocs.unep.org/bitstream/handle/20.500.11822/7467/-> [Accessed July 2023].
- Edmunds, 2023. *Cheapest Electric Vehicles & Plug-in Hybrids*. [Online] Available at: <https://www.edmunds.com/electric-car/articles/cheapest-electric-cars/> [Accessed June 2023].
- Edokpayi, J. N., Odiyo, J. O., Durowoju, O. and Adetoro, A., 2017. Household Hazardous Waste Management in Sub-Saharan Africa. In: *Household Hazardous Waste Management*. s.l.:s.n.
- Electric Vehicle Volumes, 2023. *Electric Vehicle World Sales Database*. [Online] Available at: <https://www.ev-volumes.com> [Accessed June 2023].
- Ellen Macarthur Foundation, 2023a. *Circular Economy in Africa: Plastics*. [Online] Available at: <https://ellen-macarthurfoundation.org/circular-economy-in-africa-plastics> [Accessed 3 July 2023].

- Ellen Macarthur Foundation, 2023b. *Circular Economy in Africa: Electronics and e-Waste*. [Online] Available at: <https://ellenmacarthurfoundation.org/circular-economy-in-africa-e-waste> [Accessed 3 July 2023].
- Ellen Macarthur Foundation, 2023c. *Circular Economy in Africa: Fashion and Textiles*. [Online] Available at: <https://ellenmacarthurfoundation.org/circular-economy-in-africa-fashion-and-textiles> [Accessed 3 July 2023].
- Ellen Macarthur Foundation, 2023d. *Circular Economy in Africa: Food and Agriculture*. [Online] Available at: <https://ellenmacarthurfoundation.org/circular-economy-in-africa-food-and-agriculture> [Accessed 3 July 2023].
- Ellen Macarthur Foundation, 2023e. *Circular Economy in Africa: Examples and Opportunities. Automotives*. [Online] Available at: <https://ellenmacarthurfoundation.org/circular-economy-in-africa-automotives> [Accessed 3 July 2023].
- Ernst and Young Global, 2020. *Why Africa is Becoming a Bigger Player in the Global Economy*. [Online] Available at: https://www.ey.com/en_gl/tax/why-africa-is-becoming-a-bigger-player-in-the-global-economy [Accessed 22 May 2023].
- European Commission, 2023. *Circular Economy Action Plan*. [Online] Available at: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en [Accessed 11 July 2023].
- European Commission, Directorate-General for International Cooperation and Development, 2018. *The Inclusive Green Economy in EU Development Cooperation: An Innovative Approach at the Intersection of the EU's Planet, People and Prosperity Objectives*, Publications Office: s.n.
- European Union, 2018. *World Atlas of Desertification. Third Edition. Rethinking Land Degradation and Sustainable Land Management*. [Online] Available at: https://catalogue.unced.int/601_JRC_WAD_fullVersion.pdf [Accessed July 2023].
- Fei, X. et al., 2023. The distribution, behavior, and release of macro-and micro-size plastic wastes in solid waste disposal sites. *Critical Reviews in Environmental Science and Technology*, 53(3), pp. 366-389.
- Feris, J. and Wagacha, N., 2021. *CDH Insights - African Continental Free Trade Area*. [Online] Available at: <https://www.cliffedekkerhofmeyr.com/news/publications/2021/AfCFTA/African-Continental-Free-Trade-Area.html>
- Fisher, S. et al., 2021. Air pollution and development in Africa: Impacts on health, the economy, and human capital. *The Lancet Planetary Health*, 5(10), pp. e681-e688.
- Flanagan, E. et al., 2022. Ambient and indoor air pollution exposure and adverse birth outcomes in Adama, Ethiopia. *Environment International*, Volume 164, p. 107251.
- Food and Agriculture Organization, 2020a. *Global Forest Resources Assessment 2020: Main Report*. Rome. [Online] Available at: <https://doi.org/10.4060/ca9825en> [Accessed June 2023].
- Food and Agriculture Organization, 2020b. *The State of World Fisheries and Aquaculture 2020. Sustainability in Action*. Rome.: <https://doi.org/10.4060/ca9229en>.
- Food and Agriculture Organization, 2021a. *Statistical Year Book: World Food and Agriculture 2021*. [Online] Available at: <https://www.fao.org/3/cb4477en/online/cb4477en.html> [Accessed June 2023].
- Food and Agriculture Organization, 2021b. *Pioneering Environmental Data Collection Initiative a World First for Africa*. [Online] Available at: <https://www.fao.org/in-action/action-against-desertification/news-and-multimedia/detail/en/c/1416711/> [Accessed June 2023].
- Food and Agriculture Organization, 2022. *World Food and Agriculture – Statistical Yearbook 2022*. Rome.: s.n.
- Food and Agriculture Organization, 2023. *Soil degradation*. [Online] Available at: <https://www.fao.org/soils-portal/soil-degradation-restoration/en/> [Accessed July 2023].
- Global Center on Adaptation, 2022. *State and Trends in Adaptation Reports 2021 and 2022*, Rotterdam and Abidjan: Global Center on Adaptation.
- Fripp, A., 2014. *Payments for Ecosystem Services (PES): A practical guide to assessing the feasibility of PES projects*. Jawa Barat: Center for International Forestry Research (CIFOR).
- Frost and Sullivan, 2022. *Showcasing Africa's Investable Infrastructure Opportunities*. [Online] Available at: <https://www.esi-africa.com/finance-and-policy/report-points-out-africas-investable-infrastructure-opportunities/> [Accessed 30 June 2023].
- Global Seafood Alliance, 2022. *Can Carbon Mitigation Strategies for Aquafeeds Help Cut Aquaculture's Greenhouse Gas Emissions?* [Online] Available at: [https://www.globalseafood.org/advocate/can-carbon-mitigation-strategies-for-aquafeeds-help-cut-aquacultures-greenhouse-gas-emissions/#:~:text="Aquaculture%27s%20GHG%20emissions%20are%20currently,aquaculture%20to%20reduce%20its%20emissions."](https://www.globalseafood.org/advocate/can-carbon-mitigation-strategies-for-aquafeeds-help-cut-aquacultures-greenhouse-gas-emissions/#:~:text=) [Accessed June 2023].
- Global Wind Energy Council, 2019. *Africa Wind Energy Handbook*. Brussels: Global Wind Energy Council.
- Government of Singapore Investment Corporation, Singapore Economic Development Board, McKinsey and Company, 2021. *Putting Carbon Markets to Work on the Path to Net Zero*, s.l.: GIC Singapore, Singapore Economic Development Board and McKinsey & Company.

- GSM Association, 2022a. *The Mobile Economy: Sub-Saharan Africa 2022*. [Online] Available at: <https://www.gsma.com/mobileeconomy/sub-saharan-africa/> [Accessed July 2023].
- GSM Association, 2022b. *The Mobile Economy: Middle East & North Africa 2022*. [Online] Available at: https://www.gsma.com/mobileeconomy/wp-content/uploads/2022/05/GSMA_MENA_ME2022_R_WebSingles.pdf [Accessed July 2023].
- Gulati, M. and Scholtz, L., 2020. *The Case for Investment in Green Infrastructure in African Cities*, Cape Town: WWF.
- Hako, N., 2022. *Report Points out Africa's Investable Infrastructure Opportunities*. [Online] Available at: <https://www.esi-africa.com/finance-and-policy/report-points-out-africas-investable-infrastructure-opportunities/> [Accessed 30 June 2023].
- Hartzenberg, T., 2019. *Cooperation on competition in the AfCTA*. [Online] Available at: <https://www.tralac.org/blog/article/14078-cooperation-on-competition-in-the-afcta.html>
- Hill, K. et al., 2022. *Strategies for Scaling Africa's Green Ventures*. [Online] Available at: <https://www.bcg.com/publications/2022/scaling-green-ventures-in-africa> [Accessed 2 June 2023].
- Hoegh-Guldberg, O. et al., 2019. *The Ocean as a Solution to Climate Change: Five Opportunities for Action*. [Online] Available at: https://www.etipocean.eu/wp-content/uploads/2022/01/HLP_Report_Ocean_Solution_Climate_Change_final.pdf [Accessed June 2023].
- Holtz, L. G. C., 2021. *Addressing Africa's extreme water insecurity*. [Online] Available at: <https://www.brookings.edu/articles/addressing-africas-extreme-water-insecurity/> [Accessed 21 July 2023].
- Inamdar, A., 2022. *Race to Resilience, Race to Zero*. [Online] Available at: <https://climatechampions.unfccc.int/powering-africas-green-growth-beyond-adaptation-and-resilience/> [Accessed 11 June 2023].
- InforMEA, 2023. Africa Regional Page: *Treaties and MEAs in Africa*. [Online] Available at: <https://www.informea.org/en/geographical-region/africa> [Accessed 10 June 2023].
- Institute for Security Studies, 2017. *Media Resources: Africa's Blue Economy*. [Online] Available at: <https://issafrica.org/media-resources/infographics/africas-blue-economy> [Accessed 1 July 2023].
- Intergovernmental Panel on Climate Change, 2022, 2022. *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge and New York: Cambridge University Press.
- International Energy Agency; International Renewable Energy Association; United Nations Statistics Division; World Bank; World Health Organization, 2023. *Tracking SDG 7: The Energy Progress Report*. [Online] Available at: <https://data.worldbank.org/indicator/EG.ELC.ACCTS.ZS?locations=ZG> [Accessed June 2023].
- International Energy Agency, 2022. *Record clean energy spending is set to help global energy investment grow by 8% in 2022 - News*. [Online] Available at: <https://www.iea.org/news/record-clean-energy-spending-is-set-to-help-global-energy-investment-grow-by-8-in-2022> [Accessed 22 06 2023].
- International Labour Organization, United Nations Environment Programme, International Union for Conservation of Nature, 2022. *Decent Jobs in Nature-Based Solutions*, Geneva: s.n.
- International Monetary Fund, 2019. *World Economic Outlook: Growth Slowdown, Precarious Recovery. April 2019*. [Online] Available at: <https://www.imf.org/en/Publications/WEO/Issues/2019/03/28/world-economic-outlook-april-2019#Full%20Report%20and%20Executive%20Summary> [Accessed June 2023].
- International Monetary Fund, 2020. *Adapting to Climate Change in Sub-Saharan Africa*. [Online] Available at: <https://www.imf.org/media/Files/Publications/REO/AFR/2020/April/English/ch2.ashx> [Accessed 26 July 2023].
- International Monetary Fund, 2023. *GDP, Current Prices*. [Online] Available at: <https://www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD/AFQ> [Accessed June 2023].
- International Renewable Energy Agency, 2018. *Planning and Prospects for Renewable Power: West Africa*, Abu Dhabi: International Renewable Energy Agency. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Nov/IRENA_Planning_West_Africa_2018.pdf [Accessed 30 June 2023].
- International Renewable Energy Agency, 2021. *Bracing For Climate Impact: Renewables as a climate change adaptation strategy*. [Online] Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Aug/IRENA_Bracing_for_climate_impact_2021.pdf [Accessed 29 June 2023].
- International Renewable Energy Agency and African Development Bank, 2022. *Renewable Energy Market Analysis: Africa and Its Regions*, Abu Dhabi and Abidjan: International Renewable Energy Agency and African Development Bank.

- International Renewable Energy Agency, 2018. *Planning and Prospects for Renewable Power: West Africa*, Abu Dhabi: International Renewable Energy Agency. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Nov/IRENA_Planning_West_Africa_2018.pdf [Accessed 30 June 2023].
- International Telecommunication Union, 2018. *Digital Skills Toolkit*, s.l.: International Telecommunications Union.
- International Telecommunication Union, 2021. *Workshops: Sustainable Digital Transformation in Africa*. [Online] Available at: <https://www.itu.int/en/ITU-T/Workshops-and-Seminars/sg05rg/sdtd/20210928/Pages/default.aspx> [Accessed 30 June 2023].
- International Telecommunication Union, 2022a. *Statistics*. [Online] Available at: <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx> [Accessed July 2023].
- International Telecommunication Union, 2022b. *Press Release: Internet Surge Slows, Leaving 2.7 Billion People Offline in 2022*. [Online] Available at: <https://www.itu.int/en/mediacentre/Pages/PR-2022-09-16-Internet-surge-slows.aspx> [Accessed July 2023].
- International Telecommunication Union, 2023. *Measuring digital development. Facts and Figures: Focus on Least Developed Countries. March 2023*. [Online] Available at: https://www.itu.int/hub/publication/d-ind-ict_mdd-2023/ [Accessed July 2023].
- International Trade Centre, 2014. *Trade in Environmental Goods and Services: Opportunities and Challenges*. Geneva: International Trade Centre.
- International Union for Conservation of Nature, 2020. *IUCN Global Standard for Nature-based Solutions: A User-friendly Framework For the Verification, Design and Scaling Up of NbS. First Edition*, Gland, Switzerland: International Union for Conservation of Nature.
- Iyer, V. et al., 2021. *Forest and Landscape Restoration: Entrepreneurs Need Funding to Restore Africa's Degraded Land*. [Online] Available at: <https://www.wri.org/insights/financing-entrepreneurs-reverse-land-degradation> [Accessed 2 July 2023].
- Jones, E., Bierkens, M. and van Puijenbroek, P., 2023. Sub-Saharan Africa will increasingly become the dominant hotspot of surface water pollution. *Nat Water*, pp. 602-613.
- Khan, M. R. and Munira, S., 2021. Climate Change Adaptation as a Global Public Good: Implications for Financing. *Climatic Change*, 167(50).
- King, N., 2021. Conservation Finance Options to Support African Post-2020 Biodiversity Priorities. Issue Occasional Paper 325.
- Kuipers, H., Michiels, M. and Seeberg, M., 2015. *Africa Blazes a Trail in Mobile Money: Time for Banks and Mobile Operators to Devise Strategies*. [Online] Available at: <https://www.bcg.com/publications/2015/financial-institutions-telecommunications-africa-blazes-trail-mobile-money> [Accessed 20 June 2023].
- Kumar, A. and Patel, A., 2020. *Digitising & unlocking climate finance for the off-grid sector. Shell Foundation*. [Online] Available at: <https://shellfoundation.org/opinion/digitizing-unlocking-climate-finance-for-the-off-grid-sector/> [Accessed 30 June 2023].
- Kuo, F. I., Fang, W. T. and LePage, B. A., 2022. Proactive Environmental Strategies in the Hotel Industry: Eco-innovation, Green Competitive Advantage, and Green Core Competence. *Journal of Sustainable Tourism*, 30(6), pp. 1240-1261.
- Lakshmi, A., 2023. *Sustainable logistics - a key conduit for trade in Africa*. [Online] Available at: <https://www.logupdateafrica.com/logistics/sustainable-logistics-a-key-conduit-for-trade-in-africa-1348624>
- Lamarre, E. and Pergler, M., 2009. *Risk: Seeing Around the Corners*. [Online] Available at: <https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/risk-seeing-around-the-corners> [Accessed 8 June 2023].
- Laube-Alvarez, T., 2022. *The Misattribution of Africa's Natural Resource Wealth: An Examination of the Diamond Industry*. [Online] Available at: <https://africaupclose.wilsoncenter.org/examination-of-the-diamond-industry/#:~:text=Diamonds%20represent%20an%20industry%20worth,global%20production%20sourced%20from%20Africa> [Accessed June 2023].
- Leke, A. and Signé, L., 2019. Spotlighting Opportunities for Business in Africa and Strategies to Succeed in the World's Next Big Growth Market. In: *Africa's Untapped Business Potential: Countries, Sectors, and Strategies*. Washington, DC: Brookings Institution.
- LiVecchi, A. et al., 2019. *Powering the Blue Economy; Exploring Opportunities for Marine Renewable Energy in Maritime Markets*, Washington, D.C.: U.S. Department of Energy.
- Ludwig, K., 2021. Financing NbS: Overview of relevant finance options. Berlin: Adelphi. Available at: https://snrd-asia.org/wp-content/uploads/2021/11/Module-4_Financing-NbS.pdf
- Lutz, G., 2023. *The rise of AI in aquaculture*. [Online] Available at: <https://thefishsite.com/articles/the-rise-of-ai-in-aquaculture-artificial-intelligence#:~:text=As%20a%20result%2C%20AI%20is,and%20reduction%20of%20labour%20costs.> [Accessed June 2023].

- Makungu, M. and Winiiecki, J., 2022. *Cold Chain in Emerging Markets*. [Online] Available at: <https://bfaglobal.com/catalyst-fund/insights/cold-chain-in-emerging-markets/>
- Manning, E., 2010. *Collaborative Actions for Sustainable Tourism (COAST): Project Overview and Synthesis of Training Needs*, s.l.: Tourisk Inc.
- Mansourian, S. and Berrahmouni, N., 2021. *Review of Forest and Landscape Restoration in Africa*. [Online] Available at: <https://doi.org/10.4060/cb6111en> [Accessed July 2023].
- Maritz, J., 2023. *Cold storage for African farmers: Entrepreneurs see big potential*. [Online] Available at: https://www.howwemadeitinafrica.com/cold-storage-for-african-farmers-entrepreneurs-see-big-potential/151362/?lp_txn_id=154185
- Masterson, V., 2022. *Using the sun to keep agricultural produce cool? How Ghana's farmers are benefiting from solar-powered cold storage*. [Online] Available at: <https://www.weforum.org/agenda/2022/09/ghana-akofresh-solar-powered-cold-storage/>
- McCarthy, N., 2020. *Automotive Industry: Where America's Used Vehicles Get Exported To*. [Online] Available at: <https://www.statista.com/chart/23326/countries-with-the-most-passenger-vehicle-imports-from-the-us/> [Accessed 3 July 2023].
- McKinsey and Company, 2022. *Nature and Financial Institutions in Africa: A First Assessment of Opportunities and Risks*. Available at: <https://www.mckinsey.com/capabilities/sustainability/our-insights/nature-and-financial-institutions-in-africa-a-first-assessment-of-opportunities-and-risks> [Accessed 17 June 2023].
- Minges, M., 2016. *World Development Report Digital Dividends: Exploring the Relationship Between Broadband and Economic Growth. Background Paper*, s.l.: s.n.
- Mmereki, D., Li, B., Hong, L. and Baldwin, A., 2017. Overview of Household Hazardous Waste Management in the African Context. In: *Household Hazardous Waste Management*. s.l.:s.n.
- Mo Ibrahim Foundation, 2022. *Forum Report. The Road to COP27: Making Africa's Case in the Global Climate Debate*, s.l.: s.n.
- Mo Ibrahim Foundation, 2023. *Global Africa: Africa in the World and the World in Africa. Facts & Figures, April 2023*. [Online] Available at: <https://mo.ibrahim.foundation/sites/default/files/2023-04/2023-facts-figures-global-africa.pdf> [Accessed June 2023].
- Mohammadi, F. and Saif, M., 2023. A comprehensive overview of electric vehicle batteries market. *Advances in Electrical Engineering, Electronics and Energy*, p. 100127.
- Monnier, O., 2021. *News: A Ticket to Recovery: Reinventing Africa's Tourism Industry*. [Online] Available at: https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/reinventing-africa-tourism [Accessed 14 June 2023].
- Mordor Intelligence and Advisory, 2023. *Africa LED Lighting Market Size & Share Analysis: Growth Trends & Forecasts*. [Online] Available at: <https://www.mordorintelligence.com/industry-reports/africa-led-lighting-market> [Accessed 5 July 2023].
- Mordor Intelligence, 2023. *Africa Textile Industry Size & Share Analysis- Growth Trends & Forecasts (2023-2028)*. [Online] Available at: <https://www.mordorintelligence.com/industry-reports/africa-textile-industry--growth-trends-and-forecast-2019---2024> [Accessed 3 July 2023].
- Muringai, R. T., Mafongoya, P. and Lottering, R. T., 2022. Sub-Saharan Africa Freshwater Fisheries under Climate Change: A Review of Impacts, Adaptation, and Mitigation Measures. *Fishes*, 7(3), p. 131.
- Nature-based Solutions, 2022. SESSION 6B. Financing NbS: delivering money when and to where it matters. Available at: <https://www.naturebasedsolutionsoxford.org/sessions/financing-nbs-delivering-money-when-and-to-where-it-matters/> [Accessed 17 June 2023].
- Nhede, N., 2023. *Maximizing Sustainability in African Mining: Five Key Strategies*. [Online] Available at: <https://energycapitalpower.com/africa-sustainability-in-mining/> [Accessed June 2023].
- Nicol, D. S., 2023. *Africa*. [Online] Available at: <https://www.britannica.com/place/Africa> [Accessed 2023 7 July].
- Nielsen, J. et al., 2023. *Sustainable Finance and Investing: The Case for Private Equity Investments in Biodiversity*. [Online] Available at: <https://www.bcg.com/publications/2023/making-the-case-for-private-equity-investments-in-biodiversity> [Accessed 12 June 2023].
- Njoroge, B. and White, Z., 2023. *Powering Mobility: The Rise of Digital Transportation in Africa*, s.l.: GSMA. Available at: <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2023/04/Powering-Mobility-The-rise-of-digital-transportation-in-Africa.pdf>
- O'Brien, G. et al., 2017. A Regional-scale Ecological Risk Framework for Environmental Flow Evaluations. *Hydrological Earth System Science*, 22(2), p. 957–975.
- Odusola, A., 2022. *Investing in Africa is sound business and a sustainable corporate strategy*. [Online] Available at: <https://www.un.org/africarenewal/web-features/investing-africa-sound-business-and-sustainable-corporate-strategy>, [Accessed May 2023].

- Ogbonna, O. E., Ogbuabor, J. E., Manasseh, C. O. and Ekeocha, D. O., 2022. Global Uncertainty, Economic Governance Institutions and Foreign Direct Investment Inflow in Africa. *Economic Change and Restructuring*, 55(4), pp. 2111-2136.
- Oliver, E. and Marsters, L., 2022. *Nature-Based Solutions in Sub-Saharan Africa for Climate and Water Resilience: A Methodology for Evaluating the Regional Status of Investments in Nature-Based Solutions from a Scan of Multilateral Development Bank Portfolios. Technical Note*, Washington, DC: World Resources Institute.
- Oloko, A. et al., 2022. The Challenges and Prospects of Women Fisherfolk in Makoko, Lagos State, Nigeria. *Coastal Management*, 50(2), pp. 124-141.
- Onyeneke, R. U., Chidiebere-Mark, N. M., Ankraah, D. A. and Onyeneke, L. U., 2023. Determinants of Access to Clean Fuels and Technologies for Cooking in Africa: A Panel Autoregressive Distributed Lag Approach.. *Environmental Progress & Sustainable Energy*, Volume e14147.
- Organisation for Economic Co-operation and Development, 2021. *ESG Investing and Climate Transition: Market Practices, Issues and Policy Considerations*, Paris: OECD.
- Organisation for Economic Cooperation and Development, 2023a. [Online] Available at: <https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/official-development-assistance.htm> [Accessed 23 June 2023].
- Organisation for Economic Cooperation and Development, 2023b. *Blended Finance for Development. Bridging the Sustainable Development Finance Gap: Innovations for the 2030 Agenda*. [Online] Available at: <https://www.oecd.org/dac/Blended%20Finance%20flyer%20DAC%20HLM%202017.pdf> [Accessed 6 July 2023].
- Orme, A. R., 2014. Africa, coastal morphology. *Beaches and Coastal Geology*, pp. 3-17.
- Our World in Data, 2021. *Clean Water and Sanitation*. [Online] Available at: <https://ourworldindata.org/water-access> [Accessed 21 July 2023].
- Our World in Data, 2023a. *Agricultural Land Use*. [Online] Available at: https://ourworldindata.org/grapher/agricultural-land?tab=chart&stackMode=relative®ion=Africa&country=~OWID_AFR [Accessed 20 July 2023].
- Our World in Data, 2023b. *Share of degraded land*, 2015. [Online] Available at: <https://ourworldindata.org/grapher/share-degraded-land> [Accessed July 2023].
- Our World in Data, 2023c. *Share of land covered by forest*. [Online] Available at: <https://ourworldindata.org/> [Accessed July 2023].
- Our World in Data, 2023d. *Share of global annual deforestation, 2015*. [Online] Available at: <https://ourworldindata.org/> [Accessed July 2023].
- Our World in Data, 2023e. *Population by world region*. [Online] Available at: <https://ourworldindata.org/grapher/population-long-run-with-projections> [Accessed 18 July 2023].
- Oxford Economics Africa and Control Risks, 2022. *Africa Risk-Reward Index 2022: Opportunity through Uncertainty*, s.l.: Oxford Economics Africa and Control Risks.
- Oyewo, A. S. et al., 2022. Contextualizing the scope, scale, and speed of energy pathways toward sustainable development in Africa. *iScience*, 25(9), p. 104965.
- Pan-African Payment and Settlement System, 2023. *How PAPSS Works*. [Online] Available at: <https://papss.com/how-it-works/> [Accessed June 2023].
- Pan African Resources, 2023. *A Blueprint for Sustainable Mining*. [Online] Available at: <https://www.panafricanresources.com/sustainable-mining/> [Accessed June 2023].
- Papa, F., Crétaux, J. and Grippa, M. e. a., 2023. Water Resources in Africa under Global Change: Monitoring Surface Waters from Space. *Surveys in Geophysics*, 44(1), pp. 43-93.
- Pérez, L. et al., 2022. *McKinsey Sustainability. Does ESG really matter - and why?*. [Online] Available at: <https://www.mckinsey.com/capabilities/sustainability/our-insights/does-esg-really-matter-and-why> [Accessed 1 July 2023].
- Pricewaterhouse Coopers, 2015. *Africa Risk in Review*, s.l.: Pricewaterhouse Coopers.
- R, H., Yongsheng, Z. and Jun, D., 2006. Municipal Solid Waste Management Challenges in Developing Countries: Kenyan Case Study. *Waste Management*, pp. 92-100.
- Ritchie, H. and Roser, M., 2022. *Plastic Pollution*. [Online] Available at: <https://ourworldindata.org/plastic-pollution> [Accessed 3 July 2023].
- Seabased, 2019. *SEABASED SIGNS 100 MW WAVE POWER PLANT CONTRACT WITH GHANA*. [Online] Available at: <https://seabased.com/news-insights/seabased-signs-100-mw-wave-power-plant-contract-with-ghana>
- Seddon, N. et al., 2020. Global Recognition of the Importance of Nature-Based Solutions to the Impacts of Climate Change. *Global Sustainability*, 12 May. Volume 3.
- Signe, L., 2018. *Africa's tourism potential Trends, drivers, opportunities, and strategies*, s.l.: Brookings Institute.

- Soppelsa, M. E., Lozano-Gracia, N. and Xu, L. C., 2021. The effects of pollution and business environment on firm productivity in Africa. *International Regional Science Review.*, 44(2), pp. 203-228.
- Standard and Poor Global, 2021. *The Next Era of Essential Intelligence*. [Online] Available at: <https://www.spglobal.com/en/annual-reports/2021/> [Accessed June 2023].
- Statista, 2021. *Mobile Payment: Where Money Goes Mobile*. [Online] Available at: <https://www.statista.com/chart/25713/mobile-money-accounts-by-region-in-2020/> [Accessed 20 June 2023].
- Statista, 2023a. *Share of professional investors increasing their environmental, social, and governance (ESG) investments worldwide in 2023*. [Online] Available at: <https://www.statista.com/statistics/1191755/esg-etf-increased-investment-next-year-worldwide/> [Accessed 18 July 2023].
- Statista, 2023b. *Agriculture Sector as a Share of GDP in Africa 2021, by Country*. [Online] Available at: <https://www.statista.com/statistics/1265139/agriculture-as-a-share-of-gdp-in-africa-by-country/> [Accessed June 2023].
- Sustainable Energy for ALL, 2023. *Africa Renewable Energy Manufacturing: Opportunity and Advancement*, s.l.: Sustainable Energy For All. Available at: https://www.seforall.org/system/files/2023-01/%5BFINAL%5D%2020220115_ZOD_SEForAll_AfricanManufacturingReport.pdf [Accessed 29 June 2023].
- Sustainable Tourism Africa, 2016. *Africa Sustainable and Responsible Tourism Chapter*. Marrakech: Sustainable Tourism Africa.
- Swann, S. L. et al., 2021. *Public International Funding of Nature-based Solutions for Adaptation: A Landscape Assessment*, Washington, DC: s.n.
- Swiss Re Group, 2023. [Online] Available at: <https://www.swissre.com/our-business/public-sector-solutions/our-solutions/nature-based-solutions.html> [Accessed 17 June 2023].
- SWITCH Africa Green, 2020a. *Sustainable Agriculture in Africa: Focus on Organic Agriculture*. [Online] Available at: <https://www.unep.org/switchafricagreen/resources/report/sustainable-agriculture-africa-focus-organic-agriculture>
- SWITCH Africa Green, 2020b. *Green Manufacturing in Africa: Focus on Micro, Small and Medium Enterprises (MSMEs)*. [Online] Available at: <https://www.unep.org/switchafricagreen/resources/report/green-manufacturing-africa-focus-micro-small-and-medium-enterprises-msmes> [Accessed 2 June 2023].
- SWITCH Africa Green, 2020c. *Integrated Waste Management in Africa: Focus on Circularity*. [Online] Available at: <https://www.unep.org/switchafricagreen/resources/report/integrated-waste-management-africa-focus-circularity> [Accessed 29 May 2023].
- SWITCH Africa Green, 2020d. *Sustainable Tourism in Africa: Focus on Ecotourism*. [Online] Available at: <https://www.unep.org/switchafricagreen/resources/report/sustainable-tourism-africa-focus-ecotourism> [Accessed 2 June 2023].
- SWITCH Africa Green, 2023a. *Who we are: Switch Africa Green*. [Online] Available at: <https://www.unep.org/switchafricagreen/who-we-are>
- SWITCH Africa Green, 2023b. *What we do: SWITCH Africa Green*. [Online] Available at: <https://www.unep.org/switchafricagreen/who-we-are> [Accessed 29 May 2023].
- SWITCH Africa Green, 2023c. *34 Projects At A Glance: Project Sheet for Switch Africa Green Programme*, s.l.: s.n.
- SWITCH Africa Green, 2023d. *Where We Work*. [Online] Available at: <https://www.unep.org/switchafricagreen/where-we-work> [Accessed July 2023].
- SWITCH to Green, 2020. *Regional Summary of Policy Recommendations to Support the Development of Green and Circular Businesses in the Mediterranean*, s.l.: s.n.
- SWITCH to Green, 2023a. *Resources*. [Online] Available at: https://www.unep.org/switchafricagreen/resources?%2Fresources=&keys=&type=All§or=All&field_country_page_target_id=&page=3 [Accessed 5 July 2023].
- SWITCH to Green, 2023b. *The EU SWITCH to Green Flagship Initiative*. [Online] Available at: <https://www.switchtogreen.eu/the-switch-to-green-flagship-initiative/> [Accessed 29 May 2023].
- SWITCH to Green, 2023c. *Switchmed*. [Online] Available at: <https://www.switchtogreen.eu/switchmed/> [Accessed 3 June 2023].
- SWITCH to Green, 2023d. *Inclusive Green Economy*. [Online] Available at: <https://www.switchtogreen.eu/inclusive-green-economy/> [Accessed 29 May 2023].
- SWITCH to Green, 2023e. *SWITCH to Green Services at a Glance*. [Online] Available at: <https://www.switchtogreen.eu/home/> [Accessed July 2023].
- SwitchMed, 2018a. *SwitchMed Magazine Algeria*, s.l.: s.n.
- SwitchMed, 2018b. *SwitchMed Magazine Morocco*, s.l.: s.n.

- SwitchMed, 2018c. *SwitchMed Magazine Tunisia*. [Online] Available at: <https://switchmed.eu/wp-content/uploads/2020/03/National-Supplement-EN-Tunisia.pdf> [Accessed 3 June 2023].
- SwitchMed, 2018d. *News: The pilot project "Atelier printemps" has become a green economic model to duplicate in Algeria*. [Online] Available at: <https://2014-2019.switchmed.eu/en/news/news-1/le-projet-pilote-atelier-primtemps-est-devenu-le-modele-economique-vert-a-dupliquer-en-algerie.html> [Accessed 3 June 2023].
- SwitchMed, 2018e. *SwitchMed Newspaper, Third Edition*. [Online] Available at: <https://www.unido.org/sites/default/files/files/2020-01/SwitchMed-newspaper-Third%20edition.pdf> [Accessed 3 June 2023].
- SwitchMed, 2023a. *Who We Are: SwitchMed*. [Online] Available at: <https://switchmed.eu/about-us/> [Accessed 3 June 2023].
- SwitchMed, 2023b. *About Us: SwitchMed*. [Online] Available at: <https://switchmed.eu/about-us/> [Accessed 2 June 2023].
- SwitchMed, 2023c. *Home: SwitchMed in Egypt*. [Online] Available at: <https://switchmed.eu/country-hub/egypt/> [Accessed 6 June 2023].
- Taskforce on Nature-related Financial Disclosures, 2023. *Draft Recommended Disclosures*. [Online] Available at: <https://framework.tnfd.global/draft-recommended-disclosures/> [Accessed 17 June 2023].
- Taskforce on Scaling Voluntary Carbon Markets, 2021. *Taskforce on Scaling Voluntary Carbon Markets: Final Report*, s.l.: s.n.
- Tony Elumelu Foundation, 2023. *Investing In Agribusiness: Opportunities And Challenges For African Entrepreneurs*. [Online] Available at: <https://www.tonyelumelufoundation.org/africapitalism/investing-in-agribusiness-opportunities-and-challenges-for-african-entrepreneurs>
- United Nations, 2019. *World Urbanization Prospects. The 2018 Revision*, New York: United Nations.
- United Nations, 2020. *Alongside the Pandemic, World Faces "Triple Planetary Emergency," Secretary-General Tells World Forum for Democracy, Citing Climate, Nature, Pollution Crises*. [Online] Available at: <https://press.un.org/en/2020/sgsm20422.doc.htm> [Accessed June 2023].
- United Nations, 2022a. *World Population Prospects 2022: Summary of Results*, New York: United Nations.
- United Nations, 2022b. *E-Government Survey: The Future of Digital Government*, New York: United Nations.
- United Nations Climate Change Conference UK, 2021. *MDB JOINT NATURE STATEMENT. Joint Statement by the Multilateral Development Banks: Nature, People and Planet*. Available at: <https://webarchive.nationalarchives.gov.uk/ukgwa/20230105153907/https://ukcop26.org/mdb-joint-statement/> [Accessed 17 June 2023].
- United Nations Conference on Trade and Development, 2021. *State of Commodity Dependence 2021*. [Online] Available at: https://unctad.org/system/files/official-document/aldcafrica2022_en.pdf [Accessed June 2023].
- United Nations Convention to Combat Desertification, 2023a. *The Regions: Africa*. [Online] Available at: <https://www.unccd.int/convention/regions/annex-i-africa> [Accessed July 2023].
- United Nations Convention to Combat Desertification, 2023b. *Land Management & Restoration*. [Online] Available at: <https://www.unccd.int/land-and-life/land-management-restoration/overview> [Accessed July 2023].
- United Nations Convention to Combat Desertification, 2023c. *UNCCD FAQ: What is Desertification?* [Online] Available at: <https://www.unccd.int/unccd-faq> [Accessed July 2023].
- United Nations Department of Economic and Social Affairs, 2022. *World Population Prospects 2022: Summary of Results*. [Online] Available at: <https://population.un.org/wpp/Publications/> [Accessed May 2023].
- United Nations Development Programme, 2021. *Precision Agriculture For Smallholder Farmers*, Singapore: UNDP Global Centre for Technology, Innovation and Sustainable Development. Available at: <https://www.undp.org/sites/g/files/zskgke326/files/2022-01/UNDP-Precision-Agriculture-for-Smallholder-Farmers-V2.pdf> [Accessed 01 July 2023].
- United Nations Development Programme, 2022. *Home: What are Carbon Markets and Why are they Important?* [Online] Available at: <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important> [Accessed 27 June 2023].
- United Nations Economic Commission for Africa, 2014. *Unlocking the full potential of the blue economy: are African small island developing states ready to embrace the opportunities?* Addis Ababa: United Nations Economic Commission for Africa.
- United Nations Economic Commission for Africa, 2016. *Africa's Blue Economy: A policy handbook*, Addis Ababa: Publications Economic Commission for Africa.
- United Nations Environment Programme, 2013. *Africa Environment Outlook 3: Our Environment, Our Health*. Nairobi: United Nations Environment Programme.

- United Nations Environment Programme, 2015a. *Global Waste Management Outlook*, s.l.: United Nations Environment Programme.
- United Nations Environment Programme, 2015b. *Blue Economy: Sharing Success Stories to Inspire Change*, Nairobi: UNEP.
- United Nations Environment Programme, 2016. *GEO-6 Regional Assessment for Africa*, Nairobi: United Nations Environment Programme.
- United Nations Environment Programme, 2018a. *Africa Waste Management Outlook*, Nairobi: United Nations Environment Programme.
- United Nations Environment Programme, 2018b. *In Africa, Tech-Savvy Entrepreneurs Sow Seeds of a Farming Revolution*. [Online] Available at: <https://www.unep.org/pt-br/node/24047> [Accessed 1 July 2023].
- United Nations Environment Programme, 2020. *Sustainable Consumption and Production National Action Plan: SwitchMed in Morocco - SwitchMed Programme [Fact-sheet]*, s.l.: United Nations Environment Programme.
- United Nations Environment Programme, 2021a. *Becoming #GenerationRestoration: Ecosystem Restoration for People, Nature and Climate*. [Online] Available at: <https://wedocs.unep.org/bitstream/handle/20.500.11822/36251/ERPNC.pdf> [Accessed July 2023].
- United Nations Environment Programme, 2021b. *Emissions Gap Report 2021: The Heat is On- A World of Climate Promises Not Yet Delivered*, Nairobi: United Nations Environment Programme. <https://www.unep.org/resources/emissions-gap-report-2021>. [Accessed July 2023].
- United Nations Environment Programme 2022a. *African Ministerial Conference on the Environment*. [Online] Available at: <https://www.unep.org/regions/africa/african-ministerial-conference-environment> [Accessed July 2023].
- United Nations Environment Programme, 2022b. *State of Finance for Nature 2022. Time to Act: Doubling Investment by 2025 and Eliminating Nature-Negative Finance Flows*, Nairobi: United Nations Environment Programme.
- United Nations Environment Programme, 2022c. *Nature-based Solutions: Opportunities and Challenges for Scaling Up*, Nairobi: s.n.
- United Nations Environment Programme, 2023a. *Africa's private sector supports fight against plastic pollution*. [Online] Available at: <https://www.unep.org/news-and-stories/story/africas-private-sector-supports-fight-against-plastic-pollution> [Accessed June. 2023].
- United Nations Environment Programme, 2023b. *What We Do: Sustainable Infrastructure Investment*. [Online] Available at: <https://www.unep.org/explore-topics/green-economy/what-we-do/sustainable-infrastructure-investment> [Accessed 30 June 2023].
- United Nations Environment Programme, 2023c. *Promoting Resource Efficiency: Green Economy*. [Online] Available at: <https://www.unep.org/regions/latin-america-and-caribbean/regional-initiatives/promoting-resource-efficiency/green> [Accessed 4 July 2023].
- United Nations Environment Programme, 2023d. *SwitchMed in Egypt: Reducing Plastic Bag Consumption in Egypt*, s.l.: s.n.
- United Nations Environment Programme, 2023e. *UNEP Circularity Platform*. [Online] Available at: <https://buildingcircularity.org/> [Accessed 7 July 2023].
- United Nations Environment Programme, 2023f. *Supporting Countries in Africa to Achieve Sustainable Development*. [Online] Available at: <https://www.unep.org/switchafricagreen/> [Accessed July 2023].
- United Nations Environment Programme Finance Initiative, 2023. *Unboxing Nature-related Risk: Insights from the UNEF-FI led TNFD Piloting Programme*, Geneva: UNEP Finance Initiative.
- United Nations Environment Programme and Food and Agriculture Organization, 2020. *Strategy for the UN Decade on Ecosystem Restoration*. [Online] Available at: <https://www.decadeonrestoration.org/strategy>. [Accessed July 2023].
- United Nations Environment Programme and Food and Agriculture Organization, 2021. *United Nations Decade on Ecosystem Restoration: Strategy*. [Online] Available at: <https://www.decadeonrestoration.org/strategy> [Accessed July 2023].
- United Nations Environment Programme, United Nations Development Programme and United Nations Office for Project Services, 2021. *Uganda: Demand-side Management of Water Use in Micro, Small and Medium-Sized Enterprises in Uganda through Promotion Of Water Use Efficiency Techniques and Practices - SWITCH Africa Green.*, s.l.: United Nations Environment Programme.
- United Nations Environment Programme, United Nations Office for Project Services and United Nations Development Programme, 2021. *Kenya: Enhancing Resource Productivity and Environmental Performance of MSMEs in 6 African countries through the Concept of Industrial Symbiosis (IS) - SWITCH Africa Green.*, s.l.: s.n.
- United Nations Framework Convention on Climate Change, 2021. *Report of the Standing Committee on Finance Addendum High-level summary of the first part of the Standing Committee on Finance Forum on*

- finance for nature-based solutions, s.l.: United Nations Framework Convention on Climate Change.
- United Nations Framework Convention on Climate Change, 2022a. *Developing Countries Adaptation Finance Needs: Insights from Domestic Adaptation Plans*. s.l.:s.n.
- United Nations Framework Convention on Climate Change, 2022b. *Report of the Standing Committee on Finance Addendum High-level summary of the second part of the Standing Committee on Finance Forum on finance for nature-based solutions*, s.l.: s.n.
- United Nations Global Compact, 2020. *Building Sustainable and Resilient Healthcare Infrastructure in BRI Countries to Accelerate the Sustainable Development Goals: Opportunities and Recommendations for Business to Leverage Technological Innovation and Enhance Collaboration to Close Healthcare*, New York: United Nations Global Compact. Available at: https://ungc-communications-assets.s3.amazonaws.com/docs/publications/UNGC%20BRI%20AP%20Healthcare%20Report_English.pdf [Accessed 30 June 2023].
- United Nations Global Compact, 2023. *Mapping Examples of Corporate Blended Finance*. [Online] Available at: <https://www.cfocoalition.org/blueprints/p3-3-3-mapping-examples-of-corporate-blended-finance#:~:text=The%20most%20common%20forms%20of,on%20corporate%20loans%20or%20bonds.> [Accessed 6 July 2023].
- United Nations Industrial Development Organization, 2019. *Independent Terminal Evaluation: SWITCH-Med Demonstration and Networking Components*, Vienna: United Nations Industrial Development Organization.
- United Nations Industrial Development Organization, n.d. *Collaborative Actions for Sustainable Tourism (COAST) Project*, Vienna: UNIDO.
- United Nations International Children's Emergency Fund, 2023. *A triple threat of water-related crises in endangering the lives of 190 million children*. [Online] Available at: <https://www.unicef.org/press-releases/triple-threat-water-related-crises-endangering-lives-190-million-children-unicef> [Accessed 21 July 2023].
- United Nations System Standing Committee on Nutrition, 2020. *Water and Nutrition Harmonizing Actions for the United Nations Decade of Action on Nutrition and the United Nations Water Action Decade*. [Online] Available at: <https://www.unscn.org/uploads/web/news/document/Water-Paper-EN-WEB-12feb.pdf> [Accessed June 2023].
- United States Agency for International Development, 2022. *Energy-Efficiency Opportunities in Sub-Saharan Africa: Scaling Up Renewable Energy (SURE)*, s.l.: s.n. Available at: https://pdf.usaid.gov/pdf_docs/PA00Z-JFN.pdf [Accessed 29 June 2023].
- van der Ven, C. and Signé, L., 2021. *Greening the AfCFTA: It is not too late*. [Online] Available at: <https://www.brookings.edu/wp-content/uploads/2021/09/21.09.15-Greening-the-AfCFTA.pdf>
- Vandana, K., 2023. *Future Planet: White Roofs Cooling Women's Homes in Indian Slums*. [Online] Available at: <https://www.bbc.com/future/article/20230628-the-white-roofs-cooling-womens-homes-in-indian-slums> [Accessed 5 July 2023].
- Whitfield, L., 2022. *Current Capabilities and Future Potential of African Textile & Apparel Value Chains: Focus on West Africa*, s.l.: Centre for Business and Development Studies (CBDS).
- Woetzel, J. et al., 2020. *Climate Risk and Response: Physical Hazards and Socioeconomic Impacts*, s.l.: McKinsey Global Institute.
- World Bank, 2017. *Tackling Africa's Skills Gap to Build More Robust and Diversified Economies*. [Online] Available at: <https://www.worldbank.org/en/region/afr/publication/tackling-africas-skills-gap-to-build-more-robust-and-diversified-economies> [Accessed 20 June 2023].
- World Bank, 2018. *Worldwide Governance Indicators*. [Online] Available at: <https://info.worldbank.org/governance/wgi/> [Accessed June 2023].
- World Bank, 2020a. *Mobile cellular subscriptions*. [Online] Available at: <https://data.worldbank.org/indicator/IT.CEL.SETS?view=map> [Accessed 29 May 2023].
- World Bank, 2020b. *Doing Business 2020: Comparing Business Regulation in 190 Economies*. [Online] Available at: <https://openknowledge.worldbank.org/server/api/core/bitstreams/75ea67f9-4bcb-5766-ada6-6963a992d64c/content> [Accessed 14 June 2023].
- World Bank, 2020c. *Digital Financial Services*, s.l.: The World Bank.
- World Bank, 2022a. *Water Challenges Inspire Innovation and a Circular Economy, From Senegal to India to Ecuador*. [Online] Available at: <https://www.worldbank.org/en/news/feature/2022/03/18/water-challenges-inspire-innovation-and-a-circular-economy-from-senegal-to-india-and-ecuador> [Accessed 3 July 2023].
- World Bank, 2022b. *Overview: Blue Economy for Resilient Africa Program*, Washington: World Bank Group.
- World Bank, 2023a. *The World Bank In Africa*. [Online] Available at: <https://www.worldbank.org/en/region/afr/overview> [Accessed 17 May 2023].
- World Bank, 2023b. *Agricultural land (% of land*

- area) - *Sub-Saharan Africa*. [Online] Available at: <https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?contextual=min&end=2020&locations=ZG&start=1961&view=chart> [Accessed June 2023].
- World Bank, 2023c. *Press Release: Ghana Begins Receiving Payments for Reducing Carbon Emissions in Forest Landscapes*. [Online] Available at: <https://www.worldbank.org/en/news/press-release/2023/01/24/ghana-begins-receiving-payments-for-reducing-carbon-emissions-in-forest-landscapes> [Accessed 27 June 2023].
- World Bank, 2023d. *The Digital Economy for Africa Initiative*. [Online] Available at: <https://www.worldbank.org/en/programs/all-africa-digital-transformation> [Accessed 19 June 2023].
- World Economic Forum, 2019. *Regional Risks for Doing Business*, Geneva: World Economic Forum.
- World Economic Forum, 2020. *New Nature Economy Report II: The Future of Nature And Business*, Geneva: World Economic Forum.
- World Economic Forum, 2022. *Digital Technologies Offer New Avenues for Economic Growth in Africa*. [Online] Available at: <https://www.weforum.org/agenda/2022/10/digital-technology-economy-africa-growth-security> [Accessed May 2023].
- World Economic Forum, 2023a. *AfCFTA: A New Era for Global Business and Investment in Africa. Insight Report*, s.l.: s.n.
- World Economic Forum, 2023b. *The Global Risks Report 2023: 18th Edition*, Geneva: World Economic Forum.
- World Health Organization, 2017. *Environmentally Sustainable Health Systems: A Strategic Document*. [Online] Available at: <https://www.who.int/publications/i/item/WHO-EURO-2017-2241-41996-57723>
- World Health Organization, 2023a. *Noncommunicable Diseases & Key Risk Factors*. [Online] Available at: <https://ncdportal.org/Home> [Accessed June 2023].
- World Health Organization, 2023b. *Tackling Health Impacts of Plastic Pollution in Africa*. [Online] Available at: <https://www.afro.who.int/news/tackling-health-impacts-plastic-pollution-africa#:~:text=However%2C%20less%20than%2010%25%20of,environmental%20pollution%20and%20health%20threats.> [Accessed 3 July 2023].
- World Meteorological Organization, 2022. *State of the Climate in Africa 2021*. s.l.:s.n.
- World Population Review, 2023. *Richest African Countries 2023*. [Online] Available at: <https://worldpopulationreview.com/country-rankings/richest-african-countries> [Accessed 17 May 2023].
- World Trade Organisation, 2022. *The Impact of Trade Opening on Climate Change*. [Online] [Accessed June 2023].
- World Travel and Tourism Council, 2023. *Research: Economic Impact Reports*. [Online] Available at: <https://wttc.org/research/economic-impact> [Accessed 14 June 2023].
- World Wildlife Fund, 2023a. *Building Sustainability into the Agri-Food Value Chains*. [Online] Available at: <https://www.wwf-scp.org/sustainability-in-agri-food-value-chains/> [Accessed 1 July 2023].
- World Wildlife Fund, 2023b. *Nature-Positive Business: Working with industry to drive net positive impacts on biodiversity, people and climate*. [Online] Available at: <https://www.worldwildlife.org/pages/nature-positive-business#:~:text=Nature%2Dpositive%20is%20defined%20as,on%20the%20path%20of%20recovery.> [Accessed 15 June 2023].
- Wu, C. et al., 2022. A review on source, occurrence, and impacts of microplastics in freshwater aquaculture systems in China. *Water Biology and Security*, 1(3), p. 100040.
- Yalowitz, K., Olivero, C., Gupta, S. and Norgaard, A., 2022. *Tuning Into Africa's Digital Transformation*, s.l.: Accenture.



This Africa Environment Outlook for Business edition focuses on ecologically friendly business opportunities which address the critical environmental challenges of biodiversity loss, climate change and pollution facing the continent. This edition's success stories aim to inspire green businesses for Africa's sustainable development by 2030. It is hoped that it will serve as a catalyst, inspiring policy and decision-makers at all levels in Africa to support the rapid growth of green businesses and entrepreneurs to pursue green business opportunities.