AFRICAN DEVELOPMENT BANK GROUP

GGGI

Africa Green Growth Readiness Assessment

A joint study of the African Development Bank Group and the Global Green Growth Institute to support NDC, LT-LEDs and SDG implementation planning in Africa

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Acronyms and abbreviations

4C Morocco	Climate Change Competency Centre of Morocco
AF	Adaptation Fund
AFD	French Development Agency *(Agence Française de Développement)*
AfDB	African Development Bank
ASAL	Arid and semi-arid land
BAU	Business as usual
CC	Climate change
CDM	Clean Development Mechanism
CE	Clean energy (renewable energy + energy efficiency)
COP24	24th Conference of Parties to the UN Framework Convention on Climate Change (2018)
CRGE	Climate Resilient Green Economy Strategy (Ethiopia)
CSE	Centre for Ecological Monitoring (Senegal; *Centre de Suivi Écologique*)
CSO	Civil society organisation
CSP	Concentrated solar power
CSR	Corporate social responsibility
DNA	Designated National Authority (CDM Mechanism)
DRR	Disaster risk reduction
EE	Energy efficiency
EIA	Environmental impact assessment
ESP	Emerging Senegal Plan
FONERWA	Rwanda Green Fund
GCF	Green Climate Fund
GDP	Gross domestic product
GE	Green economy
GESIP	Green Economy Strategy and Implementation Plan (Kenya)
GG	Green growth
GGCRS	Green Growth and Climate Resilience Strategy (Rwanda)
GGGI	Global Green Growth Institute
GGRA	Green Growth Readiness Assessment
GHG	Greenhouse gas
GIZ	German Development Agency
GTP	Growth and Transformation Plan (Ethiopia)
FDI	Foreign direct investment
FNDS	National Fund for Sustainable Development (Mozambique, *Fundo Nacional de Desenvolvimento Sustentável*)
HCP	High Commission for Planning (Morocco)
HDI	Human Development Index
IEA	International Energy Agency
ILO	International Labour Organization
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contributions
INS	National Statistics Institute (Tunisia; *Institut National de la Statistique*)
IRENA	International Renewable Energy Agency
LDC	Least developed country
LT-LEDS	Long-term Low Emissions Development Strategy
MALE	Ministry of Local Affairs and Environment (Tunisia; *Ministère des Affaires Locales et de l'Environnement*)
MITADER	Ministry of Rural Development and Environment (Mozambique; *Ministério da Terra, Ambiente e Desenvolvimento Rural*)
MRV	Measurement, reporting, and verification
NAMA	Nationally Appropriate Mitigation Action
NCCAMS	National Climate Change Adaptation and Mitigation Strategy (Mozambique)
NCCAP	National Climate Change Action Plan (Kenya)
NDA	National Designated Authority (Green Climate Fund)
NDC	Nationally Determined Contribution
ND-GAIN	Notre Dame Global Adaptation Index
OECD	Organisation for Economic Co-operation and Development
OTEDD	Tunisian Observatory for Environment and Sustainable Development (*Observatoire Tunisien de l'Environnement et du Développement Durable*)
PAYG	Pay-as-you-go
PES	Payment for ecosystem services
PPA	Power purchase agreement
PSGE	Emerging Gabon Strategic Plan (*Plan Stratégique Gabon Émergent*)
RE	Renewable energy

RECPC	Resource Efficient and Cleaner Production Centre (Rwanda)
R&D	Research and development
REEF	Renewable Energy and Energy Efficiency Fund (Senegal)
REMA	Rwanda Environment Management Authority
SDG	Sustainable Development Goal
SDSN	Sustainable Development Solutions Network
SEDD	Secretariat of State in Charge of Sustainable Development (Morocco*; Secrétariat d'État chargé du Développement Durable*)
SEZ	Special economic zone
SME	Small- or medium-sized enterprise
SNDD	National Strategy for Sustainable Development (Morocco; *Strategie Nationale de Développement Durable*)
SSA	Sub-Saharan Africa
STEM	Science, technology, engineering, and mathematics
STI	Science, technology, and innovation
SWH	Solar water heater
TNA	Technology Needs Assessment
TVET	Technical, vocational, and educational training
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VNR	Voluntary National Review (of SDG progress)

Preface

Dr Frank Rijsberman Director General of the Global Green Growth Institute

The Global Green Growth institute (GGGI) was established with the mandate of promoting and advancing the green growth model as a pathway to sustainable development for developing economies. Since the adoption of the UN Sustainable Development Goals (SDGs) and the Paris Agreement on climate change in 2015, green growth has been pursued within these global frameworks. It is used as an approach for the consolidated implementation of the national climate plans under the Paris Agreement (Nationally Determined Contributions or NDCs) and the SDGs with a strong focus on local context.

With the advent of the COVID-19 pandemic, the importance of building back better with a green growth model is now greater than ever for sustainable development in the continent. As major economies are announcing ambitious goals to achieve net-zero carbon and unveiling green recovery and sustainable infrastructure investment initiatives, African economies should not wait to join this movement, in order to benefit from this global momentum and spill-over effects from major economies' green recovery initiatives. COVID-19 has laid bare the vulnerabilities of communities characterised by wide inequality, high rates of informal labour, and weak healthcare services. The green growth model can address many of these vulnerabilities by prioritising job-creating investments in resilient infrastructure and adaptation measures that would particularly benefit youth and women who are often vulnerable to shocks like COVID-19 and climate change.

To promote and scale up climate action and SDGs implementation, between 2015 and 2020, GGGI has mobilised more than $2 billion of green and climate investment commitments from various public and private financiers for our Member and Partner countries. Going forward to 2030, we are implementing programmes that aim to reduce 1.6 gigatons of CO_2e emissions while generating four million green jobs, enhancing the adaptative capacity of 16 million people, protecting 20 million hectares of natural land, and providing access to energy and other sustainable services to 500 million people in GGGI's Member and Partner countries. As one of our COVID-19 recovery support measures, GGGI is now providing technical assistance to five African countries for the design of green recovery measures and collaborating with new resource partners to implement job-generating initiatives in the areas of climate-smart agriculture, off-grid renewable energy, and nature-based solutions.

As more countries recognise the benefits of green growth, more donors and governments are choosing GGGI as a delivery partner. GGGI now has 39 Member countries and our technical assistance programmes for the development of green growth policies, investments, and knowledge sharing are active across 34 countries worldwide. In Africa, GGGI has eleven Member and Partner countries and an expanding portfolio of activities. Working with the African Development Bank Group and other development partners, GGGI strives to accelerate uptake and scale-up of the green growth model for economic development in Africa. GGGI is working hard to demonstrate and implement green growth as a practical approach for the implementation of the NDCs and SDGs, which can allow African economies to leapfrog the incumbent unsustainable economic model in favour of one that is clean, green, and able to deliver sustainable human development and prosperity on the continent. Pre-2015, green growth strategies developed by GGGI served as the basis for first NDCs and 2030 targets in many of our Member and partner countries, such as the Climate Resilient Green Economy strategy for Ethiopia that GGGI helped develop. Now, to assist countries in their longer term 2050 visions and plans aligned to the 1.5°C climate goal and national SDGs, we are gearing up our supports in the development and implementation of long-term low-emissions development strategies (LT-LEDS) in the continent, starting with supports to Ethiopia and Burkina Faso this year and made possible with contributions from the *Agence Française de Développement*.

This study is the first joint endeavour between the GGGI and AfDB and is significant because of the holistic frameworks and methodologies it employs to draw out actionable insights that can advance green growth in Africa. We will use the findings to inform our technical assistance activities in Africa and we expect that governments and the development community will also benefit from the recommendations and best practices for effective green growth implementation found in this report. Working with the AfDB, GGGI will continue to strengthen its support for our Member and Partner countries in Africa in their pursuit of green and inclusive economic growth.

Dr Kevin Kariuki Vice President of the Power, Energy, Climate and Green Growth Complex, African Development Bank Group

This joint initiative between the African Development Bank and the Global Green Growth Institute assesses the current state of, and readiness for, the implementation of green growth policies and activities in the context of the NDCs and SDGs in Africa in general, and in selected countries.

The African Development Bank defines green growth as the means to promote and maximise opportunities for sustainable economic development through building resilience and managing natural resources efficiently and sustainably, including by enhancing agricultural productivity and promoting sustainable infrastructure. The Bank is at the forefront of the implementation of the transformative actions that are urgently required in African countries to effectively respond to climate change and poverty challenges and to achieve the targets set out in the Nationally Determined Contributions (NDCs), Long-term Low Emissions Development Strategies (LT-LEDSs) and Sustainable Development Goals (SDGs).

The aforementioned actions are guided by the Bank's Green Growth Framework, adopted in 2014, and its second Climate Change Action Plan 2016-2021. The Bank's first Climate Change Action Plan (2011-2015) helped mobilise about $11.8 billion in climate finance, and the targets of its successor are to ensure that 40% of the Bank's project approvals are allocated as climate finance and that all resulting projects and strategies are based on climate-informed design by 2020. The Bank was on track to reach its 40% climate finance target by the end of 2020, following concerted action since 2016, which resulted in increases in the share of climate finance from 9% to 28%, 32%, 36% and 34% in 2016, 2017, 2018, 2019 and 2020, respectively.[1] Cumulatively, between 2016 and 2020 the Bank invested $12.3 billion in climate actions. Of this amount, $5.2 billion (43%) was spent on climate change adaptation and $7.1 billion (57%) on mitigation. Subsequently, the Bank has committed to investing a further $25 billion as climate finance between 2020 and 2025.

If Africa is to remain a low-emitting continent whilst sustaining its economic growth, it must avoid the 'grow now, clean up later' model and chart a greener growth path, driven by the ambition to achieve the SDGs, LT-LEDSs and NDCs. In this regard, recently, the Bank has actively engaged with African countries through the Africa NDC Hub to support the implementation of their NDCs in compliance with the respective national development plans. In addition, through the African Financial Alliance on Climate Change, the Bank is bringing together the main financial sector players and purveyors of capital to support the mobilisation and deployment of climate finance in Africa. The Bank is also establishing the Africa Circular Economy Facility, a multi-donor trust fund, with the support of Finland and the Nordic Development Fund. Furthermore, the Bank hosts the Secretariat of the Africa Circular Economy Alliance, created by African countries, and launched during the 7th African Ministerial Conference on the Environment, in November 2019 in Durban, South Africa. As part of this programme, the Bank is already implementing an initiative funded by the Korea-Africa Economic Cooperation, titled 'Development of a green growth investment programme in Africa focused on waste management and the circular economy' in Algeria, Ethiopia, and Rwanda.

African countries are increasingly recognising the impacts of the convergence of climate change, dwindling natural capital, and widening social inequality on their efforts to reduce poverty. If not effectively addressed, this convergence will likely reverse years' worth of social and economic progress. Thus, recognition of the significance of this nexus underpins the green growth policy imperatives in most African nations. The Bank will continue to offer its support to African countries as they make their transition to a green growth trajectory.

Moving forward, the Bank is currently developing a comprehensive strategic framework on climate change and green growth, with the aim to scale up its ambitions and actions through a high-level policy, a 10-year strategy 2021-2030 and another 5-year action plan (2021-2025). Through this framework, the Bank will systematically align its future investments and operations with the Paris Agreement and SDGs, while positioning green growth as a key priority area and delivering on its ambitious climate finance targets, including the provision of $25 billion as climate finance by 2025.

1 The Bank was on course to achieve its 40% target, but prioritisation of COVID-19-related projects made it difficult to reach the target.

Executive summary

Climate change is already impacting Africa disproportionately, and will continue to do so, primarily by affecting the sectors that are key to the livelihoods of vulnerable communities, such as agriculture, forestry, and fisheries. Protecting natural areas and providing access to energy and quality infrastructure remain challenging in many countries on the continent, especially in Sub-Saharan Africa. The green growth approach is seen as a viable model for the delivery of climate-resilient and climate-compatible growth that ensures sustainable consumption and production patterns. As income and gender inequalities remain a significant barrier to achieving overall human development despite increases in average GDP per capita in many African countries, the green growth model is also pursued as a way to achieve inclusive growth by creating green and decent jobs; providing better basic services including access to energy, drinking water, and sanitation; closing the digital divide; improving air quality; and contributing to climate action simultaneously. Ensuring climate-compatible economic growth is especially crucial on a continent poised to become the growth frontier of the world; it currently hosts six of the top ten fastest-growing economies and its young and increasingly urban population will grow to 2.2 billion by 2030.

Climate action and inclusive green growth are particularly important at the current moment, as economies around the world have been ravaged by the COVID-19 pandemic. COVID-19 also tends to have more severe impacts on populations subjected to high levels of air pollution, which is generated by similar sources and can be addressed through the same mitigation measures as climate change. Furthermore, growing populations and the incumbent resource-intensive economic growth models will put further pressure on natural ecosystems and increase the risk of future pandemics. COVID-19 has highlighted the need for cleaner and greener economic models that create more jobs, deliver greater resilience to impending climate change, and minimise dangerous impacts on the environment when compared to carbon-intensive, polluting incumbent growth models.

While green growth offers many benefits, most countries' capacity for achieving it is reduced by a lack of readiness and of an enabling environment. The African Development Bank Group and the Global Green Growth Institute are two organisations with overarching mandates to support and realise green growth implementation.

The organisations joined hands to conduct this study, with the aim to develop a common understanding of the status of green growth implementation in Africa and identify the best way forward. This report presents the results of this study and outlines a set of novel frameworks, assessments, and recommendations to accelerate the transition to green growth.

The study assessed the current state of and trends in green growth in Africa, as well as green growth readiness levels of African countries, to derive recommendations for advancing green growth in the context of the implementation of the NDCs and SDGs. For the readiness assessment, the study conducted deep-dive case studies on seven target countries and assessed these using an analytical framework consisting of nine interlinked strategic and operational dimensions of green growth readiness at the national, sub-national and sectoral levels (Figure 1). The state and trend assessment used a set of interlinked indicators covering key aspects of climate vulnerability, socio-economic development, and green growth transition. The seven deep dive countries were selected to represent the five regions of the continent: Morocco and Tunisia for North Africa, Kenya and Rwanda for East Africa, Senegal for West Africa, Gabon for Central Africa, and Mozambique for Southern Africa.

The study also identifies and presents several best practices found on the continent, as well as challenges faced by African states in their transition to green growth. Along with desk research and data analysis, the authors consulted more than 100 stakeholders from seven countries, drawn from the government, private sector, development agencies, academia, and non-governmental organisations (NGOs), who provided insights through interviews, focus workshops, and online communications. An online survey of stakeholder perception further guided the assessments and supplemented findings.

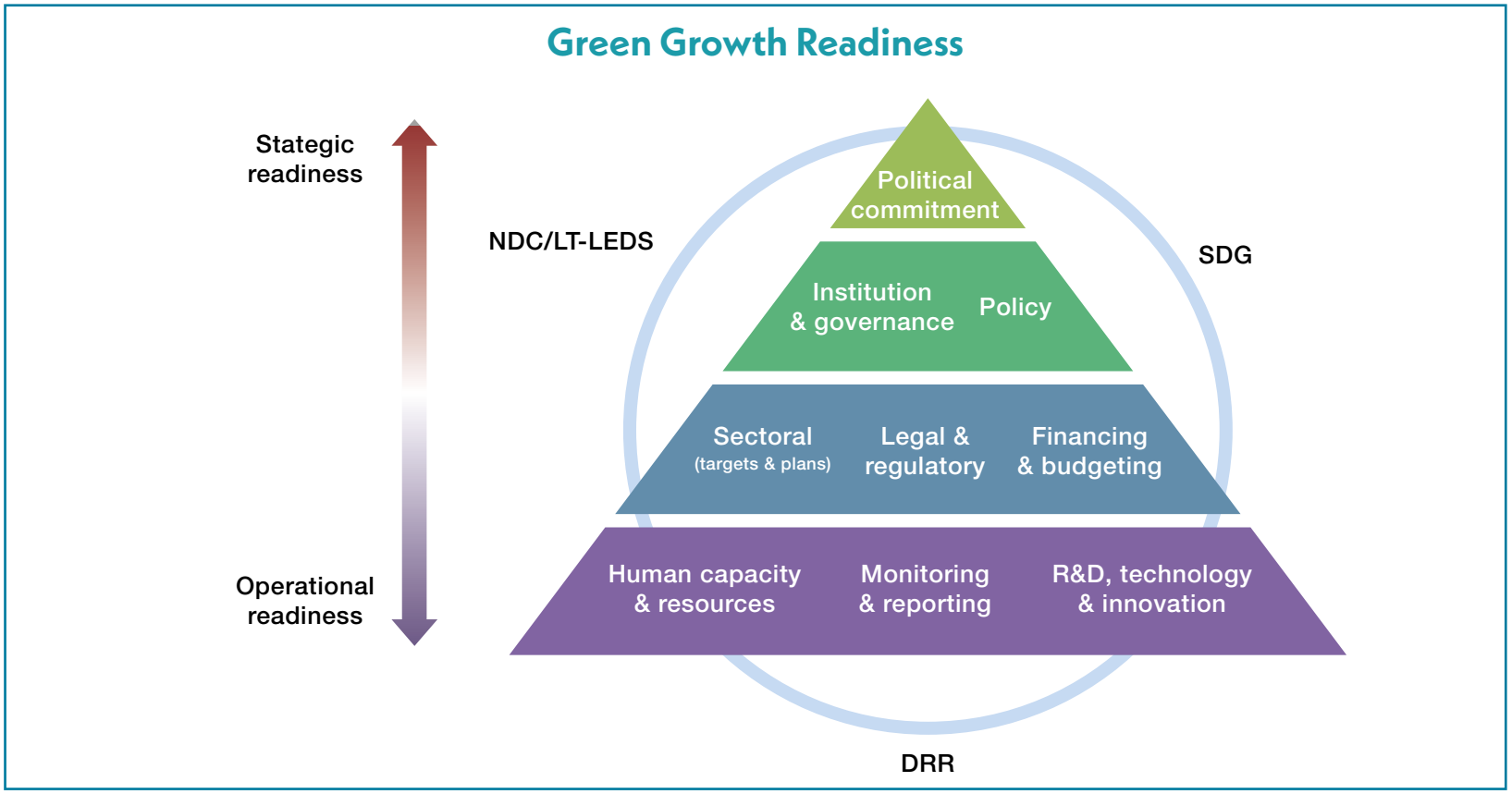

Figure 1: The Green Growth Readiness Framework

The readiness assessment found evidence of growing high-level political commitment to green growth in Africa, including active championing of NDC and SDG implementation by heads of state and government in Rwanda, Kenya, and Morocco. All focus countries have developed national climate change or green growth strategies, and in some cases complementary action plans. Examples are the 'Green Gabon Plan', part of the 'Emerging Gabon Strategic Plan', the 'Morocco Green Plan', and the 'Emerging Senegal Plan', which includes a green growth strategy. While these plans and strategies are stated to be aligned with national development plans, there is limited evidence that full alignment with existing sectoral policies, strategies, and programmes has been pursued. Achieving strong, broad stakeholder buy-in and mainstreaming NDCs, LT-LEDSs, and green growth into planning processes are still considered work in progress.

African NDCs and LT-LEDSs are yet to be translated into the costed investment plans required to attract private sector financing. In some cases, green investment plans exist at the sectoral level. These are often limited to sectors such as renewable energy, transportation, and resource-efficient manufacturing, and tend not to cover other important sectors, such as agriculture, forestry, and waste management. Mozambique's 'Forest Investment Plan' is an exception and is primarily focused on implementing the national REDD+ strategy, including through reform of the forest sector. For the energy sector, the $200 million Renewable Energy and Energy Efficiency Fund (REEF) in Senegal is a good example. It doubles as a renewable energy plan to support private sector-led pilot projects. Similarly, Tunisia's Solar Programme (PROSOL) has successfully expanded the use of residential solar water heaters.

The COVID-19 pandemic has underlined the unsustainability and inequalities inherent in current economic and social systems, but it has also created an opportunity to promote a green growth recovery and rethink such systems, and hence generate a paradigm shift towards more sustainable development. For instance, the study 'Socio-economic, climate and environmental impacts of COVID-19 in Tunisia in 2020' shows that among the impacts of COVID-19 were

GHG emissions reduction, air pollution reduction, a positive effect on biodiversity, consumer behaviour change, energy consumption reduction, *etc*, and proposes a way forward that includes considering climate and environmental variables in policy design and overall decision making (GIZ, 2021).

With respect to legal and regulatory readiness for the transition to green growth, the picture in the focus countries is mixed. While the countries were found to be gaining experience in the design and implementation of relevant legislative and regulatory reforms, most of these reforms were found to be aimed at creating incentives for green growth actions or to motivate behavioural changes, and only a few involved mandatory regulations such as taxes and standards. Notable examples of regulatory mechanisms are Morocco's 'Water Law', which seeks to ensure sustainable use of groundwater for farming and household activities, and Kenya and Mozambique's petroleum product subsidy reforms, which encourage sustainable consumption and investment despite the political sensitivity of these issues. The assessment suggests that overall, countries still have limited capacity for and experience in formulating and enforcing green growth legislation and standards, and regional and international sharing of best practices would be beneficial. Robust enforcement of existing laws, such as those requiring environmental impact assessments (EIAs) and strategic environmental assessments (SEAs), as well as support for voluntary practices such as corporate social responsibility (CSR), could also contribute to green growth efforts on the continent.

Enhancing financing readiness – by addressing key barriers to access to finance – is key for green growth implementation, and national climate change/green growth funds are seen as important tools in support of this effort. Kenya, Rwanda, and Mozambique have established green funds to mobilise and disburse finance from domestic and international sources. Rwanda's FONERWA is often cited as a good example to be emulated. Morocco, among other countries, has been highly successful in mobilising funds for key sectors such as large-scale renewable energy generation through its Agency for Agricultural Development (ADA) and the investment bank CDG Capital SA, which are accredited to the Green Climate Fund (GCF). An important barrier to financing readiness, frequently quoted by stakeholders, is formed by incoherent and inadequate policies, strategies, and regulations which impede the attraction of private sector financing, including through the national climate change funds.

Activities undertaken to enhance human capital readiness in case study countries include mainstreaming green growth in higher education curricula and developing relevant technical, vocational, and educational training (TVET) courses. The Climate Change Competency Centre of Morocco (4C Morocco) serves as an exemplary model for the establishment of specialised capacity to provide people with the skills required for green jobs, in support of climate action and sustainable development.

The availability of measurement, reporting and verification (MRV) systems for planning and tracking NDC, LT-LEDS, and SDG implementation tends to be limited in African countries. The seven focus countries either do not have MRV systems or have MRV systems that are limited in scope. However, many countries have started integrating environmental indicators into their national statistical systems. For example, Rwanda's National Statistical System produces a thematic guideline on environment and natural resources, and Morocco's High Commission for Planning (HCP) reports on environmental indicators including domesticated SDG indicators. Major challenges cited for MRV readiness enhancement included a lack of technical capacity and a lack of financial support for the development and implementation of MRV systems.

This report presents a set of recommendations for governments and development partners working to accelerate the green growth transition in Africa. The study found that political commitment and broad stakeholder buy-in are important economy-wide drivers of green growth and should be actively pursued. As green growth requires multidisciplinary and multi-sectoral approaches, inter-ministerial and multi-stakeholder coordination are necessary for the production of coherent strategies and policies, to facilitate the integrated implementation of the NDC, SDG, and disaster risk reduction (DRR) agendas. Both horizontal and vertical coordination need to be strengthened, across sectors and levels, from national to local. Effective mechanisms for coordination also facilitate the mainstreaming of green growth into national development plans and budgeting processes and into strategies for key development sectors such as climate-smart agriculture, off-grid renewable energy access, and sustainable public transportation. In addition, coherent legal and regulatory reforms and market mechanisms can facilitate shifts in behaviour and investment towards greener production and consumption. Governments on the continent are also encouraged to develop LT-LEDS – holistic, long-term plans for the low-carbon transition that explore alternative scenarios to maximise co-benefits, such as job creation and synergies across sectors, while minimising climate risks.

The recommendations underscore the importance of national and sectoral funds to enhance access to affordable climate and green finance and to scale up private sector participation. The report also calls for greater international support for strengthening MRV systems in African countries, to allow for tracking of environmental and climate action data, facilitate long-term planning, and attract climate finance for the implementation of projects. Lastly, mainstreaming green growth in higher education and strengthening practical skills development programmes in key green growth sectors are recommended to harness the innovation and job creation potential that the green growth approach presents in Africa.

An effective foundation for a green growth transition thus consists of a set of soft infrastructure assets, or an enabling environment, including strong leadership, adequate governance, established institutions that coordinate effectively, skilled human capacity, and a commitment to achieve results through appropriate policies and regulations for attracting private sector investment. The deep dive country case studies provided useful insights for extrapolation to other African countries. Three broad categories of green growth models have emerged from the analysis:

A. MODEL FOR COUNTRIES WITH ADVANCED ENABLING ENVIRONMENTS (MOROCCO, RWANDA, TUNISIA)

These three countries have made significant progress towards green growth by developing their enabling environments to address key challenges and tap into key opportunities. Morocco and Tunisia have both benefited from a relatively advanced educational system and a pool of local human capacity as well as the experiences of their diasporas. Morocco has benefited from its long-term green growth agenda as well as from the strong leadership of the King, which has enabled the country to tap into its renewable resources and to mobilise international and climate finance to develop the world's largest solar thermal power plant.

Tunisia has adopted a broad green growth agenda, but has chosen to focus, in the short to medium term, on a more inclusive approach to sustainable energy through decentralised household solar energy and energy efficiency technology. Tunisia is also working on a long-term perspective, by developing a long-term strategy for decarbonisation and setting targets to be achieved through the implementation of a more ambitious NDC.

Rwanda has compensated for its relatively less well-developed enabling environment with exceptional leadership, speed of execution, and drive for results. While establishing a broad green growth agenda and working to develop the nine dimensions of green growth readiness, Rwanda has chosen to focus on inclusiveness and support for local entrepreneurship, resulting in significant numbers of new green jobs.

B. MODEL FOR EMERGING COUNTRIES WITH INTERMEDIATE-LEVEL ENABLING ENVIRONMENTS (KENYA, GABON)

Gabon and Kenya have both achieved relatively high levels of economic performance and have shown similar levels of political commitment to green growth. Recognising its low levels of human capacity and institutional readiness, Gabon has decided to focus on its primary opportunity for green growth, which is the sustainable management of forest resources. Gabon has created the enabling environment for a private sector-led forest cluster to emerge under its Special Economic Zone regime. The private sector raises the necessary finance, introduces technological innovations, and mobilises specialist human capacity from overseas to train locals and transfer knowhow, with significant positive socio-economic and environmental impacts.

Although Kenya has been successful in engaging the public sector through effective institutional coordination mechanisms, its green growth-related activities have been largely limited to utility-scale renewable energy projects. Two strategies for boosting green growth outcomes are to increase public sector support for innovation and human capacity development, and to launch greater sectoral initiatives with associated incentive frameworks for the private sector.

C. MODEL FOR LESS-DEVELOPED COUNTRIES WITH LOWER-LEVEL ENABLING ENVIRONMENTS (MOZAMBIQUE, SENEGAL)

Senegal historically has had a more advanced administrative and educational system than Mozambique and is deemed to have a higher level of political commitment to green growth, as demonstrated in the 'Emerging Senegal Plan'. Mozambique, however, has been successful in delivering good green growth outcomes relative to the state of its enabling environment by focusing on tackling key green growth issues linked to livelihoods, such as deforestation. The country has used its limited capacity and resources to tackle deforestation and increase investments in forestry through a forest investment plan and through innovative performance-based payments that aim to ensure better conservation of its precious forests. Learning from its recent experience with Cyclones Idai and Kenneth, which hit the country in 2019, Mozambique is currently in the process of updating its green growth action plan, under implementation since 2013, with a greater focus on climate resilience.

A focus on key high-impact sectors such as off-grid solar PV, energy efficiency, and climate resilient agriculture would enable Senegal to achieve greater green growth outcomes relative to its reasonably developed enabling environment. Senegal is committed to harnessing its green growth potential, particularly in the energy, transport, and urban development sectors, as evidenced by the implementation of impactful projects such as the Renewable Energy and Energy Efficiency Fund (REEF); the Rapid Express Train that links the capital of Dakar with the new city of Diamniadio, over a distance of 60 km; and the development of the 158 MW Taiba N'Diaye wind farm, the first large-scale wind farm in West Africa that, once realised, will supply nearly a sixth of the country's power needs.

This report is expected to stimulate valuable dialogue and debate about ways to advance climate action and green growth in Africa. It is also expected to inform the development of an Africa Green Growth Index by the AfDB and GGGI. AfDB and GGGI will continue to strengthen their partnership to advance green growth in Africa.

The research and analysis for this report were conducted prior to the onset of COVID-19 pandemic. As governments and development partners work to accelerate the recovery of economies and to bring back jobs and livelihoods on the continent to mitigate the pandemic's devastating effects, green, resilient measures must be prioritised in economic recovery packages to ensure sustainable development. If this imperative is ignored, governments risk locking in resource-intensive and carbon-intensive practices and exacerbating the vulnerability of their growing, increasingly urban populations to impending climate change. Based on recommendations by development partners, the report calls on development partners and governments to pursue green recovery programmes by incorporating the below considerations:

Screen all elements of recovery packages for their long-term implications, prioritising actions that promote net job creation and inequality reduction and combining and aligning green recovery with initiatives promoting inclusive digitisation. This should be pursued by adopting cross-sectoral, cross-government, long-term, and systemic approaches to the design of these recovery packages.

Build pipelines of 'shovel-ready' sustainable infrastructure and nature-based solution projects that support locally relevant sectors, such as solar-powered irrigation, reforestation, watershed management, and ecosystem rehabilitation. For example, mangrove restoration projects can create jobs and increase the income and resilience of poorer communities.

Maintain (and increase) the ambition of long-term environmental objectives (including net-zero GHG emissions). This would require designing recovery plans to support or strengthen existing climate and green growth plans and diverting subsidies from brown sectors to greener ones.

Actively support the development of green finance flows to improve resilience, such as by encouraging public finance to catalyse private investment and improve capacities to assess, manage and publicly disclose climate change-related financial risks.

Chapter 1

Introduction

1.1 The case for green growth

It is widely accepted that sustained economic growth is a major driver of poverty reduction and human development, especially in developing countries. Evidence shows that rapid economic growth could pull more than 600 million people out of poverty and dramatically improve human development in regions across the world. However, it is also clear that the incumbent model of growth, which depends on an ever-increasing consumption of natural resources, is unsustainable and leads to a range of environmental problems, from rapid biodiversity loss and climate change to air pollution and the depletion of freshwater resources. This growth model ultimately results in a reduction of quality of life and will, in the long run, be ruinous to economies, human societies, and biodiversity.

The negative consequences of the incumbent fossil fuel- and natural resources-driven growth model have become apparent less than two centuries after it became dominant. Human activities have contributed to the warming of the planet by 1°C above pre-industrial levels (IPCC, 2018). Even if the current emissions reduction plans submitted by countries in INDCs, NDCs, and LT-LEDS (Long-term Low Emissions and Development Strategies) under the Paris Agreement are implemented in full, the planet will still see a temperature rise of 3.3°C by the end of the century (Climate Interactive, 2018).

Unless countries reduce their production and consumption to sustainable levels, communities, economies and the natural ecosystems that support them will be seriously affected. Current production and consumption practices are leading to rapid biodiversity loss due not just to climate disruption, but also loss of habitat, overexploitation, invasive organisms, and pollution, as well as the interactions among these factors. The planet is already in the midst of a sixth mass extinction that will impact the history of life on earth and the supply of ecosystem services (Ceballos *et al*, 2017). According to WEF (2016), more than 30% of plastics used for packaging in modern economies end up in natural ecosystems, and the total volume of ocean plastics will grow with increasing consumption. If plastic use continues unchanged, there will be more plastics than fish in the oceans by 2050.

The elevated concentration of CO^2 in the atmosphere resulting from human actions is leading to increasing acidification of oceans, the 'evil twin of climate change'. Scientists believe that in the past 200 years, the oceans have become 30% more acidic, a more rapid change than any other known to have occurred in the past 50 billion years (Smithsonian Ocean, 2018). Acidification affects marine ecosystems and thus threatens the food and nutrition security of millions of people, as well as livelihoods linked to tourism and the blue economy.

In summary, as population growth and urbanisation continue, it is clear that pursuing high levels of economic growth and a good quality of life under the current growth model is not only unsustainable but will be disastrous for both economies and the planet. Evidence also suggests that economic growth in the past century has not benefitted everyone. The gap between the rich and the poor continues to grow, and this unequal distribution of wealth has been found to be causing social and economic instability (Piketty, 2015). Alternative growth models must also address this inequality.

The green growth model aims to turn these challenges into opportunities and simultaneously balance the economic, social, and environmental pillars of sustainable development. In other words, green growth offers a new approach to development that seeks to deliver economic growth that is both environmentally sustainable and socially inclusive. It places equal emphasis on the quality and sustenance of economic growth and the means for and pathway to sustainable development.

1.2 Concepts and building blocks of green growth

The terms 'green growth' and 'green economy' are sometimes used interchangeably. Since green growth is a strategy to green and sustain the economy by investing in and protecting natural capital, it is considered a pre-requisite for building a green economy (UN ESCAP, 2013).

The concept of green growth is not new. It gained traction in the aftermath of the 2008-2009 global financial crisis, which prompted the search for alternative economic paradigms. The United Nations Rio+20 conference in June 2012 provided further impetus to the agenda and multilateral development banks called for a transition towards green growth to achieve sustainable development and prosperity. Since then, green growth policies and practices have been developed in countries and regions across the world, particularly in developing countries, and the concept has been adopted by a growing number of governments, development banks, research institutes, NGOs and civil society organisations (CSOs) as a practical approach for reconciling economic growth, climate action, environmental protection, and social inclusion. Achieving green and inclusive growth is now the overarching objective of the African Development Bank, Africa's premier multilateral development finance institution, and demonstrating the feasibility of green growth is the primary mandate of the Global Green Growth Institute (GGGI), a multilateral intergovernmental organisation.

In 2015, following the adoption of the 2030 United Nations Sustainable Development Agenda, with its 17 Sustainable Development Goals, and the Paris Agreement on Climate Change, the green growth narrative gained further interest as a means to jointly implement the SDGs and NDCs. The targets set in these two global frameworks are used as a guide for solving the pressing economic, social, and environmental challenges facing all countries, including those in Africa.

Climate action and the transition to a low-carbon economy are central tenets of the green growth agenda, which offers an integrated approach to delivering economic development and social progress in a climate-resilient and environmentally responsible manner. Green growth also recognises the strong interrelationships between climate mitigation and adaptation measures on the one hand and key SDGs on the other. Various studies have shown that the SDGs and climate action agenda are both inextricably linked and complementary (IPCC, 2018; Northrop *et al*, 2016).

Increased investment in activities and technologies that protect and enhance the earth's natural capital or reduce ecological scarcities and environmental risks, such as renewable energy, low-carbon transport, green buildings, sustainable agriculture, sustainable forest management and sustainable fisheries, contribute to both NDC and SDG targets. Concepts and practices such as 'eco-innovation', 'eco-efficiency' and 'circular economy' are also recognised as important for the green growth agenda, as they aim to spur innovation and enhance resource efficiency, which are two important drivers of green growth.

1.3 Green growth for sustainable development in Africa

Economic development in Africa has historically caused significant negative environmental and social externalities, which have not always been considered in development policies. Resulting environmental problems include the overexploitation of natural resources, including fish stocks, as well as deforestation, soil erosion, desertification, land degradation, and biodiversity loss. In the last three decades, Africa's economies have grown at rates that matched or surpassed global trends, with an average real annual GDP growth of 5.4% between 2000 and 2010.

In 2020, the continent saw its first contraction of 2.1% of GDP in half a century as a result of the COVID-19 pandemic. Although the continent had one of the lowest rates of COVID-19 deaths per capita in 2020, AfDB (2021a) estimated that if appropriate measures are not implemented, this could push 39 million Africans back into extreme poverty in 2021, with disproportionate effects on women. Tourism-dependent economies (-11.5%), oil-exporting economies (-1.5%) and other resource-intensive economies (-4.7%) were hardest hit, while non-resource-intensive economies reported a contraction of just 0.9%. The GDP of the continent is expected to grow by 3.4% in 2021 (AfDB, 2021a).

Despite this relatively rapid growth, Africa's anthropogenic GHG emissions remain the lowest of any continent. Per capita emissions are lower than two tonnes per capita, which is considered an equitable and sustainable level, in 48 out of 54 African nations. However, emissions are rising as African economies and populations grow, and economic growth continues to be driven by fossil fuel

consumption and heavily dependent on natural resources. If Africa is to remain a low-emitting continent and sustain its economic growth while tackling the above mentioned environmental challenges, it must avoid the 'grow now, clean up later' model and chart a greener growth pathway that is driven by the implementation and achievement of the SDGs and NDCs on the continent.

It is worth noting that the adoption of the SDGs and the Paris Agreement has been significant for many African countries that aim for continued economic progress and prosperity but wish to learn from decades of unsustainable development elsewhere. African countries have made substantial commitments to achieve the SDGs and NDCs, and they view the two international frameworks as blueprints for realising their aspirations for sustainable development. However, this will require significant efforts to enhance national policies and regulations as well as increase investments that can accelerate economic transformation by harnessing the natural capital of the continent in a more sustainable manner.

Africa is home to a significant share of the world's natural resources, both renewable and non-renewable, with natural capital accounting for 30-50% of total wealth on the continent. It is also estimated that over 70% of people living in Sub-Saharan Africa depend on forests and woodlands for their livelihoods. However, many of these resources are used unsustainably while others are lost through illegal activities. The question is often raised whether Africa should prioritise economic growth over the environment or consider a holistic approach towards sustainable development. There are concerns that adopting a green growth model may negatively affect economic growth on the continent, as some green growth policies and technologies are thought to be less productive or more expensive to adopt than traditional practices. However, as the experiences of countries on the continent and elsewhere show, these concerns are no longer valid. Key cost-effective technologies for realising green growth are making their way to the African market. There are also plenty of opportunities for South-South cooperation and learning, as African and other developing countries are positioning themselves as pioneers of and large investors in green technologies and approaches.

Africa has the youngest population of any continent. Its population will continue to grow in the coming decades, providing immense human capital potential for economic growth. The challenge of creating sufficient decent jobs for this young population remains a priority for African policymakers. The African Development Bank

estimated that in 2015, 12 million youths entered the labour market, while only 3.1 million jobs were created. The benefits of economic growth are felt most widely when opportunities are created for all. The green growth model for economic development has been found to have much higher potential for creating such opportunities than the business-as-usual growth model (ILO, 2018d).

As adaptation is a priority for Africa, it is imperative that climate resilience be considered an integral part of the green growth agenda in the African context. Despite generating just 4% of global GHG emissions, Africa has some of the regions that are most vulnerable to climate change, where critical resources such as freshwater are affected, and livelihoods and food security threatened. One important example is Lake Chad, which has shrunk by 40% in the last 40 years due to a 70-80% reduction in inflow into the lake and unsustainable levels of water use (Mahmood & Jia, 2018). If water use patterns on the continent go unchanged and population growth continues at present rates, African countries could exceed the limits of "economically usable, land-based water resources" before 2025 (Ashton, 2002).

Models predict increasing inter-annual climate variability in Africa and substantial multi-decadal variability in the Sahel region. Severe flooding events have already increased in frequency in the Niger Basin over the past decades, and the risk of flooding is likely to increase with rising temperatures (Serdeczny *et al*, 2016). Frequent severe droughts, floods and storms that affect the health of populations, ecosystems, and economies have become the new normal in Africa, and they threaten to halt or reverse development gains. When eastern and southern African countries were recently devastated by El Niño weather patterns, several were forced to reallocate resources from national development funds to disaster relief. Thus, severe weather events can pose a great threat to economic development. For instance, in 2017, Lesotho spent about $12 million from its limited development budget on relief after El Niño-related weather events, South Africa reallocated nearly $700 million to drought relief programmes, and the African Development Bank provided an emergency drought package worth $549 million to assist 14 countries affected by El Niño (AfDB, 2016). Projections suggest that Africa's climate change vulnerability will grow more severe between 2030 and 2050, and that the economic cost of climate change in Africa will increase as a result. If global temperatures were to increase by 4°C by 2100, it is projected that the economic cost of damages would grow to on average 7% of African countries' GDP (UNEP, 2013).

To summarise, on the one hand, economists are optimistic that Africa's 'lion economies' will continue to achieve steady economic growth at rates faster than the global average. On the other hand, there is great concern that the continent cannot maintain its current levels of economic growth without using its natural capital sustainably and addressing the negative impacts of climate change. It is therefore imperative to merge Africa's efforts to achieve and sustain economic development with the climate change and green growth agendas. Africa's economy needs to grow in such a way that it does not compromise environmental protection and social inclusion, while meeting the needs of future generations of the African population, which is expected to double to 2.5 billion by 2050.

1.4 Building back better after the COVID-19 pandemic

As governments worldwide took action to stop the spread of the COVID-19 pandemic, economic activities were disrupted, including in Africa. A recent study estimates that COVID-19 will halt or reverse several years' worth of development progress on the continent and jeopardise the achievement of SDGs. The latest estimates of the size of African economies in 2030 are $349-643 billion lower than pre-COVID estimates. Government revenue and health expenditure are projected to be reduced, and debt sustainability in several African countries will deteriorate (Cilliers *et al,* 2020). Countries with weak economies and social support systems have lower adaptive capacity to the adverse effects of climate change. These conditions also contribute to the continued use of dirty, cheap energy sources, which puts further pressure on natural systems as poorer communities are forced to resort to unsustainable exploitation of the very resources that support them.

On the other hand, it is becoming increasingly clear that enhancing the resilience of energy systems and economies and avoiding lock-in of unsustainable production and consumption patterns will avoid greater damage to economies in the long term, as climate change impacts become more severe on the continent and pose an even greater threat than COVID-19.

Against this backdrop, countries are planning their economic recovery from the COVID-19 pandemic under the motto of "Building Back Better" (WRI, 2020), with an emphasis on making preventative investments that improve resilience to, and so reduce the costs of, future disasters. This presents a golden opportunity for the continent to embrace recovery trajectories that set the course for a transition towards resilient and low-carbon economies. Globally, major economies such as the EU, USA, China, Japan and Korea have launched green recovery initiatives, announcing net-zero goals and/or adopting green recovery packages including investments and measures to encourage behavioural change. These green recovery strategies will pay dividends in the future through reduced exposure and increased resilience to disruptions – whether due to climate change, disease, or a confluence of these or other factors. By joining in, African economies will be able to benefit from this movement and its spill-over effects.

Fiscal stimulus measures by major African economies have been small in comparison – 1-1.5% of GDP versus 3-4% in advanced economies (McKinsey, 2020) – and there is little evidence that these constitute significant green recovery measures. To ensure resilience to both climate change and pandemics, recovery support would need to prioritise job creation through investment in resilient infrastructure and adaptation measures such as renewable energy, climate-smart agriculture and nature-based solutions; reduce support for polluting industries and fossil fuels; and facilitate a greater flow of climate finance. Section 7.6 briefly outlines specific policy recommendations for 'building back better' post-COVID.

1.5 Objectives of this study

Recognising Africa's joint needs for economic development and sustainability in the post-COVID era, the Bank and the GGGI conducted a Green Growth Readiness Assessment (GGRA) of African countries. The objective of the study was to place green growth at the centre of efforts to meet the commitments made by African countries under the SDGs and through their NDCs, and outline the benefits green growth can provide for both the economy and the environment. In parallel to the mandatory NDCs, the study also looks at the status of voluntary LT-LEDS. Most of the data collection and research for this report were carried out pre-COVID. As such, the report does not specifically examine COVID recovery measures and rather focuses on long-term climate and sustainable development policies and initiatives that remain applicable in a post-COVID world.

With the GGRA, the GGGI and the AfDB seek to track African nations' progress towards sustainability and identify specific entry points for achieving green growth on the continent. In May 2018, the two organisations entered into a partnership agreement to promote programmes, projects, research, and joint activities in support of capacity building for and the development of green growth initiatives in Africa. At that time, the Bank was halfway through the implementation period of its Ten-Year Strategy (2013-2022; AfDB, 2013), which aims to ensure Africa's transition to green growth, a goal further articulated in the High 5s development agenda, the Green Growth Framework and the Second Climate Change Action Plan 2016-2020 (AfDB, 2017b). For the GGGI, the assessment fit into its mandate to support the adoption of green growth policies and design green investments in its member and partner countries.

The assessment also contributes to long-term development objectives known as 'strategic outcomes', as indicated in GGGI's Strategy 2030 (GGGI, 2019a) and its Strategic Outcomes Guideline (GGGI, 2019b).

Recognising the similarity of their agendas, the two organisations decided to join forces to conduct the first Green Growth Readiness Assessment in Africa. The study provides a valuable opportunity to develop a shared understanding of the green growth agenda on the continent. As case studies, the study presents in-depth assessments of the green growth readiness of seven African countries that are representative of the five major geographical regions of the continent and of different stages of economic development.

The study represents one of the first attempts to assess the state of green growth readiness of African economies by providing a holistic analysis of their enabling environments and capacities for green growth policymaking and implementation. The analysis also looks at the current state of and trends in green growth in the target economies, by placing green growth in the context of NDC and SDG implementation. The study addresses the three following components:

- **State of and trends in green growth in Africa.** Using a set of indicators drawn from existing frameworks, this part of the analysis attempts to provide an overview of the state of and trends in climate vulnerability, social and economic development and the green growth transition in Africa.
- **Green growth readiness in Africa.** As noted above, African countries have recognised the importance of green growth and have initiated the design of policies and institutional frameworks to support it. However, the extent of progress in laying the groundwork for facilitating the transition and the way in which the interlinked dimensions of green growth are pursued are unknown. This study seeks to address this knowledge gap using a set of indicators in nine interrelated categories. Through a combination of desk research and stakeholder consultations, both the capacity status and conditions conducive to the transition to green growth are assessed for each dimension.
- **Good practices and ways forward to scale up green growth in Africa.** Drawing on the above analyses and additional contributions from stakeholders, this section highlights good practices and key areas for action to improve preparedness for and accelerate green growth in the focus countries and on the continent generally. In the context of the COVID-19 crisis, green recovery measures and efforts to build back better have also been assessed.

The multi-dimensional framework and insights presented in this report are expected to form an important resource for policymakers and stakeholders on the continent, for the design and implementation of holistic climate change and green growth initiatives that are sensitive to key issues such as access to finance, political economy and human capacity. AfDB and GGGI intend to use the presented frameworks, indicators, and insights to inform organisational strategy and programming going forward.

Chapter 2

Analytical framework, methodology and indicators for the study

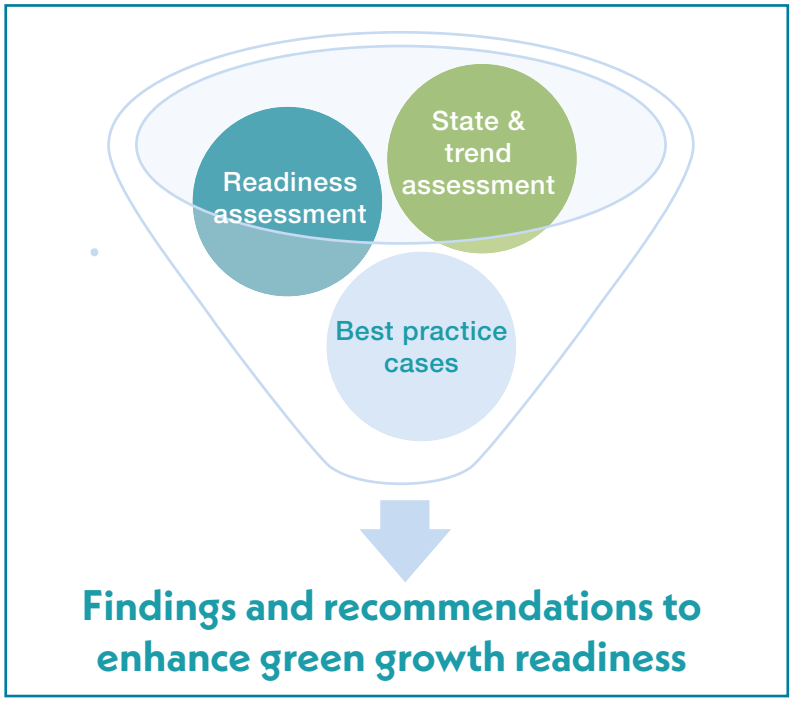

Figure 2: Key components of the Africa Green Growth Readiness Assessment

The three major components of the study, already briefly presented in the Introduction, are depicted in Figure 2. The state and trend assessment provides insights into the current state of and recent trends in efforts to achieve key green growth objectives and related drivers in seven focus countries and in Africa in general. The analysis briefly touches upon recommended actions to address identified gaps hampering green growth and sustainable development. However, it does not delve into the mechanics of how the transition to green growth and sustainable development can be accelerated. This 'how' is addressed instead in the readiness assessment section of the report, which evaluates progress, gaps, and best practices for nine interlinked readiness categories that together form an enabling environment. A number of best practice example provide further in-depth analysis and highlight how green growth readiness in the different dimensions can be successfully ensured.

Finally, the study draws upon these three components to put forward recommendations for the acceleration of green growth in Africa.

The assessments were conducted using analytical frameworks and indicators that were developed to provide a qualitative assessment of state, trends, and readiness for green growth. The state and trend assessment uses a set of numerical indicators across three categories. The readiness assessment uses a set of numerical and qualitative indicator across nine categories. These indicators and the analytical frameworks employed are described further below.

The aim of green growth is to move away from short-term and siloed sectoral approaches to development towards a long-term and multidisciplinary approach to simultaneously implementing interlinked global agendas, in particular the United Nations Sustainable Development Agenda 2030, the Paris Agreement on Climate Change, the Sendai Framework for Disaster Risk Reduction, and the Addis Ababa Action Agenda on development financing. A strong focus on implementing actions that are appropriate in the local context, maximise co-benefits, and balance any synergies and trade-offs is also key to the green growth model. The approach, analytical frameworks and indicators employed in this assessment were therefore designed to be:

- Locally relevant, by taking into account key development challenges in Africa. They capture and represent local stakeholders' perspectives;
- Holistic and multidisciplinary, by adequately covering the interlinked aspects and economic sectors relevant to green growth in Africa;
- Logically structured and quantitative (where possible), to enable systematic examination of commonalities and differences across countries, and to enable critical review, updates, and expansion to more countries in the future;
- Utilising existing, recent data, information, and perspectives.

2.1 Major phases and methodology

As depicted in Figure 3, the assessment employs a multi-phased and multi-pronged approach to collecting data and information and conducting analysis.

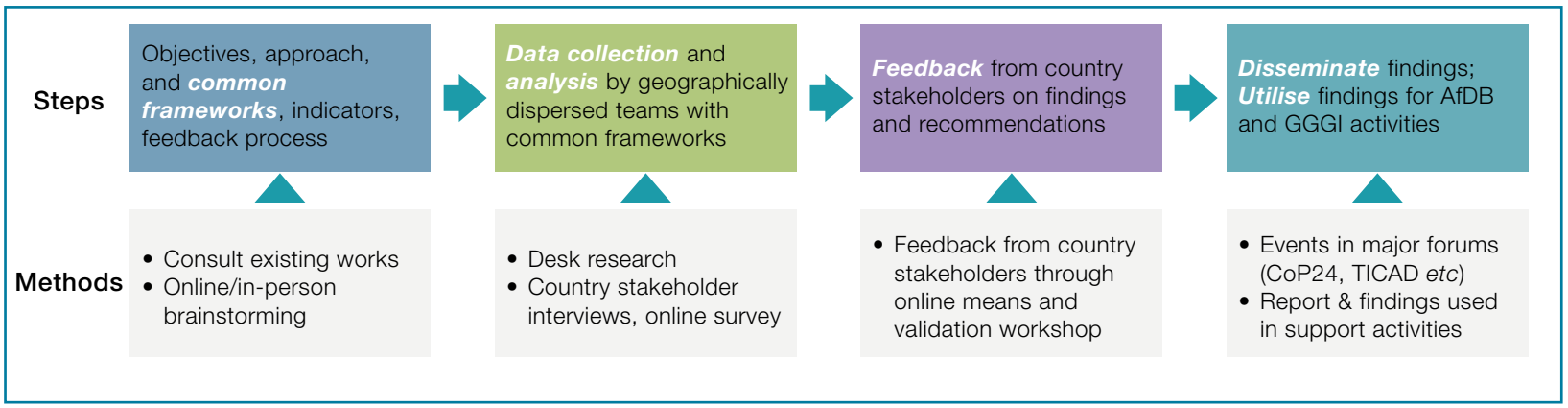

Figure 3: Study plan and methodology employed for research and dissemination of findings

The following methods were used to gather data and information:

(a) Desk research: Desk research was a major source of data and information for both the state and trend and the readiness assessments. For the state and trend analysis, a literature review of relevant indicator frameworks and databases was used to identify indicators and collect relevant data. Data and information gathered and used in the analysis are cited throughout this report.

(b) Stakeholder inputs: Methods used to gather stakeholder inputs included in-person interviews in the focus countries, an online survey of stakeholders across Africa, a consultation workshop with stakeholders from the focus countries, and email communications. Stakeholder inputs formed a key source of data and information for the in-depth country assessments on green growth readiness.

- **In-person interviews:** The study team conducted in-person interviews with relevant stakeholders in the focus countries. The interview format was flexible, but interviewers used a questionnaire to guide the conversation and gather information required, primarily related to the readiness indicators. At times, interviewees introduced new sources of information.

  The questionnaire used in the interviews was used as the basis for the online survey (see below), to ensure consistency. Stakeholders interviewed include experts and officials from government agencies, development organisations, academia, civil society, and private sector organisations involved in green growth policymaking and implementation. A total of 111 stakeholder interviews were conducted in the focus countries. The findings from the interviews and desk research are presented in Chapters 5 and 6.

- **Online survey:** An online survey was developed to supplement the data and information obtained through desk research and stakeholder interviews. The survey was circulated to stakeholders in 54 African countries. Forty-two responses were obtained from 15 African countries. Although the response rate was low, the responses provided valuable insights into stakeholders' perspectives on the state of green growth readiness in Africa in and beyond the seven focus countries in the study. The findings of the survey are presented in Chapter 4.

- **Consultation workshop and feedback from stakeholders:** To gather feedback on the draft outcomes of the assessment, GGGI and AfDB held a consultation workshop with officials and other stakeholders from the seven focus countries, on the sidelines of the Africa Green Growth Forum in Kigali, Rwanda on November 28, 2018 (Figure 4). Participating officials and stakeholders were sent draft readiness assessment reports for their respective countries and asked for written feedback.

  More than 100 stakeholders from the seven countries, drawn from the government, private sector, development agencies, academia, and NGOs, were consulted through interviews, focus workshops and online communications.

  The authors conducted case studies to assess in depth the readiness of seven countries, representing five regions of the continent. The seven focus countries were Morocco and Tunisia from North Africa, Kenya and Rwanda from East Africa, Senegal from West Africa, Gabon from Central Africa, and Mozambique from Southern Africa. The study also identified several best practices and key learnings with implications beyond the focus countries.






Figure 4: Pictures from the stakeholder consultation workshop on the sidelines of the Africa Green Growth Forum in Kigali, Rwanda.

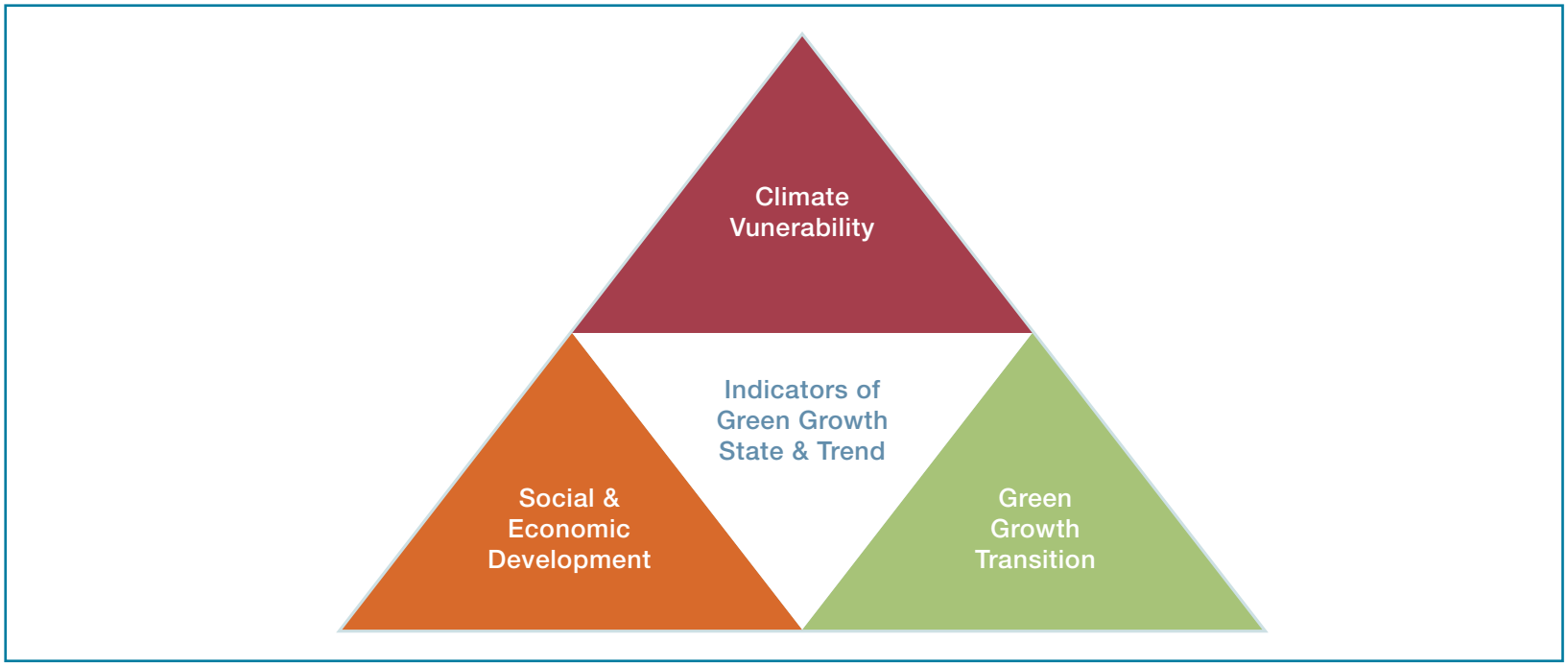

Figure 5: Green growth state and trend indicator categories used in this study

2.2 Analytical framework and indicators for the green growth state and trend assessment

The state and trend analysis included indicators covering three categories (Figure 5) – climate vulnerability, socio-economic development, and green growth transition – to assess progress of and identify gaps in the countries' green growth efforts. These categories were chosen because: 1) climate change vulnerability is a key aspect to consider in designing sustainable development approaches in Africa; 2) green growth can only be successful if it considers and integrates aspects of socio-economic development, such as education and health; and 3) the transition to green growth needs to be captured in key sectors, in terms of achievement of inclusiveness and equity in consumption and impact.

2.2.1 Criteria used for selection of indicators

The state and trend indicators for the three categories were selected using the following criteria: 1) relevance of the indicators to Africa; and 2) availability of temporal data from reputed international sources.

First, a broad set of relevant indicators was collated for each category. After investigating the availability of data, the set was narrowed down to indicators for which at least 15 years' worth of continuous data were available, including data from a recent year, and for which data were available for at least three of the seven case study countries. In addition, any closely linked or highly similar indicators were eliminated during this step.

To ensure the consistency and integrity of the data, only indicators for which public, internationally recognised data sources were available were selected. This criterion was followed even when nationally appropriate indicators of greater granularity or potentially higher quality were available (*eg* data on share of population below the poverty line from national statistical agencies).

Data aligned with or used as SDG indicators in recent multi-country NDC/SDG assessments were given preference. Thus, the social and economic indicators were selected from a larger set of indicators used in the Sustainable Development Solutions Network (SDSN) Africa SDG Index (SDSN, 2018). An initial selection of climate vulnerability and green growth transition indicators was extracted from Acosta *et al,* (2020), AfDB (2014), AfDB (2017b), GGGI (2018b), GGGI (2019a) and OECD (2014a).

TABLE 1: CLIMATE VULNERABILITY STATE AND TREND INDICATORS

DOMAIN	INDICATOR	DATA SOURCE
Climate vulnerability	Climate change-related fatalities per 100,000 inhabitants (annual average)	Germanwatch Global Climate Risk Index
	Climate change-related losses in million $ (PPP)	idem
	Climate change-related losses per unit of GDP (%)	idem
	ND-GAIN Vulnerability Index (unitless)	ND-GAIN

2.2.2 Climate vulnerability indicators

Though climate change affects all continents, Africa is particularly vulnerable to its impacts. Africa's vulnerability is due to factors such as the relative importance of rain-fed smallholder agriculture for food security, which is threatened by changes in rainfall patterns and increasingly frequent droughts and flooding. The continent is also vulnerable to sea-level rise, shoreline erosion and salt-water intrusion in urban areas along its vast coastline. In addition, it faces a potential increase in the spread and occurrence of existing tropical vector-borne diseases and the emergence of new ones, and impacts on its infrastructure due to the increasing frequency and severity of extreme weather events.

Most countries on the continent are currently poorly prepared to cope with these impacts, so that climate change threatens to halt or reverse the development gains made in past decades. Climate vulnerability and preparedness are thus important topics on the African development agenda, linked as they are to issues ranging from sustainable food and water security to human health, peace and security, and long-term prosperity growth on the continent. A green growth model fit for an African context must minimise vulnerability to climate change by increasing adaptive capacity and reducing exposure of the economy and communities to climate change impacts. Indicators in this category aim to reveal countries' relative vulnerability to climate change (see Table 1).

TABLE 2: SOCIAL AND ECONOMIC STATE AND TREND INDICATORS

DOMAIN	INDICATOR	DATA SOURCE
Cross-cutting	Human Development Index (HDI, unitless)	UNDP
	Poverty headcount at $1.9/day/pp (% of population)	World Bank
	GDP PPP per capita (2011 international million $)	World Bank
Demography, equity, and opportunity	Population (thousands)	UNDP, World Population Prospects
	Employment ratio (%)	OECD, ILO STAT
	Share of urban population in slums (%)	UN MDG, UN HABITAT
Public health	Healthy life expectancy at birth (years)	WHO
	Under-5 mortality rate (deaths per 1000 births)	UNICEF
Education	Literacy rate at 15-24 years old: both sexes (%)	UNESCO
	Lower secondary net enrolment (totals)	UNESCO
Participation of women	Literacy rate at 15-24 years old in women (%)	UNESCO
	Ratio of women to men in the labour force (%)	UN Women, UNDP, ILOSTAT
Contribution of agriculture to the economy	Value added by agriculture (% of total value added)	World Bank
Access to infrastructure	Share of people using the internet (% of population)	ITU-D
	Infrastructure score (unitless)	WEF
Public sector governance	Public sector accountability (0-100 scale; 0 = least accountable)	IIAG
	Corruption perception index (0-100 scale; 0 = very corrupt)	TI

2.2.3. Social and economic indicators

If governments are to adopt green growth as the pathway towards sustainable development, they must be able to simultaneously achieve progress towards the key socio-economic preconditions for human development, social inclusion, and economic growth. These include health, education, food and nutrition security, and availability of supporting infrastructure. A healthy and educated population, for example, is a prerequisite for economic growth.

Fortunately, green growth approaches directly support progress towards many of these preconditions. For example, affordable renewable energy and clean cooking solutions, key tools in the green growth paradigm, can directly contribute towards better healthcare and education in off-grid rural communities. In addition, renewable energy can enhance the resilience of the economy and of communities by eliminating supply disruptions and cost fluctuations inherent in conventional energy systems reliant on fossil fuel imports. Renewable energy also reduces air pollution comparative to conventional fuels such as charcoal and diesel, and directly benefits women and children's health and education (Köhlin *et al*, 2011). Expanding the deployment of renewable energy technology, whilst ensuring all of these co-benefits are delivered, requires holistic policies and programmes.

In addition to tracking indicators related to education and health, it is also important to consider indicators measuring economic opportunity and prosperity, such as population size, the share of the population below the poverty line, the share of the population employed, and the contribution of the agriculture sector to GDP (see Table 2). Agriculture is an important sector for African economies and populations, due to the continent's large rural agrarian population.

Agriculture employs 70% of the total workforce in low-income countries and accounts for about 25% of Sub-Saharan Africa's GDP (Fine *et al*, 2012). Taking into account the sector's high vulnerability to climate change, agriculture's share in the economy is an important indicator for the vulnerability of African populations and economies as a whole.

TABLE 3: GREEN GROWTH TRANSITION STATE AND TREND INDICATORS

DOMAIN	INDICATOR (UNIT)	DATA SOURCE
Greenhouse gas emissions	Share of GHG emission of total global emissions (%)	CAIT Climate Data Explorer
	Production-based CO_2e productivity (GDP per unit of energy-related CO_2e emissions)	OECD Stat
	CO_2e emissions/GDP (kg per PPP $ of GDP)	World Development Indicators
Sustainable and equitable consumption	CO_2e emissions/capita (metric tons per capita)	World Development Indicators
	Annual electricity consumption per capita (kWh per capita)	World Development Indicators
	Ecological footprint of consumption (gha per capita)[2]	Footprint Network
	Population-weighted mean annual exposure to PM2.5 ($\mu g/m^3$)	World Development Indicators
Sustainable energy mix	Renewable electricity (% of total electricity generation)	OECD Stat
	Renewable energy supply (% of total primary energy supply	OECD Stat
Access to clean energy	Share of the rural population with access to electricity (%)	World Development Indicators
	Share of the population with access to clean cooking solutions (%)	World Development Indicators
Access to drinking water and sanitation services	Share of the population with access to safely managed sanitation facilities (%)	World Development Indicators
	Share of the population with access to a drinking water source (%)	OECD Stat
Provision of ecosystem services	Forested area (% of total land area)	World Development Indicators
	Total biocapacity (gha per capita)	Footprint Network
	Ecological deficit or reserve (gha per capita)	Footprint Network
	Red list index score (unitless)	UN SDG

2.2.4. Green growth transition indicators

Green growth was borne out of the need to reduce poverty levels, while transforming current production and consumption patterns to ensure their sustainability. Thus, climate action, for both mitigation and adaptation; resource efficiency; and access to basic services for sustainable development lie at the heart of the green growth paradigm.

These issues and goals are all interlinked and yet they need to be measured with separate indicators to capture the transition from current production and consumption practices to green growth. The separate indicators (Table 3) can also highlight how green growth will reduce damage to the environment to within the carrying capacity of the planet's life-support systems and at the same time contribute to inclusive development and poverty reduction.

In Africa, providing universal access to essential services, especially electricity, clean cooking, clean water and improved sanitation, remains central to the sustainable development agenda and to delivering green growth. With growth in many African economies' dependent on a growing consumption of natural resources, decoupling development from growing ecological footprints and enhancing nations' biocapacities are critical.

Protecting Africa's unique species richness and diversity is important not only in the context of the continent's green growth, but also for the sustainability of the entire planet. Protecting and enhancing forest cover and quality is also a key priority for green growth in Africa, as forests provide key terrestrial ecosystem services and form a major source of livelihoods for rural populations.

2 "Global hectares per capita" (gha) refers to the area required for biological production and waste assimilation to support one person's consumption patterns. In 2012, there were approximately 12.2 billion global hectares of production and waste assimilation, averaging 1.7 global hectares per person. See WWF (2016).

To cover all of these important aspects, indicators measuring clean energy access, sustainability of the energy mix, access to clean water and improved sanitation, biodiversity and ecosystem services have been included.

The green growth transition must be inclusive. Equity and inclusiveness should be highlighted not only in terms of equitable access to goods and services, such as electricity, but also in terms of footprints and limiting suffering from the negative impacts of climate change, air pollution, and reduced ecosystem services.

2.3 Analytical framework and indicators for Green Growth Readiness Assessment

Taking an integrated approach, the readiness assessment covered nine interlinked strategic and operational areas considered to be important for advancing and realising green growth at the national, sub-national, and sectoral levels.

The framework and indicators were designed to capture African countries' preparedness for green growth in the context of their ability to deliver their NDC and SDG targets over the coming decades. The framework assesses the presence and quality of basic preconditions for green growth.

While efforts to develop an index to capture snapshots of progress towards green growth have been made previously, studies on readiness for green growth from an NDC and SDG implementation perspective are scarce. Notable examples of such studies include an assessment of policy coherence for the implementation of Agenda 2030 in selected OECD nations (OECD, 2016), a study on climate financing readiness for scaling up low-carbon investment (Polycarp *et al*, 2013), a green economy readiness assessment for South Africa (Nhamo, 2013), and an NDC gap analysis in Africa by the AfDB (2018c). The majority of these assessments are qualitative in nature and based on a combination of stakeholder surveys and desk research. The assessments tend to be primarily focused on preparedness in terms of policies, institutional arrangements and/or financing mechanisms. Some, such as Nhamo (2013) consider a wider set of readiness categories as stages of the green growth transition.

The specially designed, comprehensive readiness framework used in this study considers nine interlinked categories of readiness, all of strategic and operational importance to green growth. Each of these categories comprises a number of indicators to capture aspects of readiness for the achievement of not only the NDCs and SDGs but also connected frameworks such as the Addis Ababa Agenda on financing for development and the Sendai Framework for Disaster Risk Reduction.

Figure 6 shows the nine categories and their relative importance for strategic planning for and operationalisation of green growth. Annex I provides a full list of indicators considered under each of these categories, with example findings for Tunisia.

The section below briefly discusses each readiness category and its associated indicators.

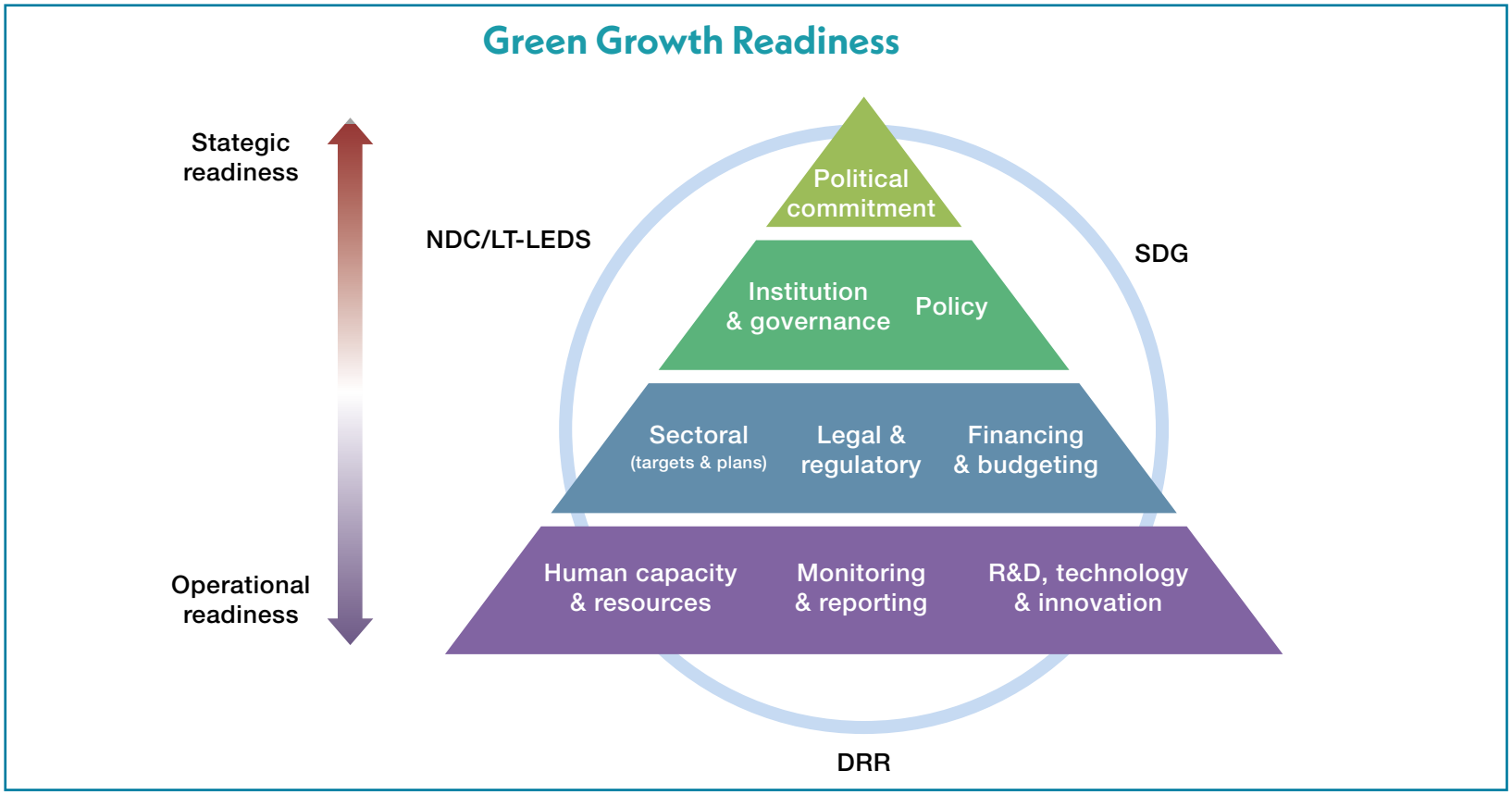

Figure 6: Categories of green growth readiness from the perspective of NDC, SDG and DRR implementation (Source: authors' illustration)

Political commitment is key to establishing the right policies and institutions for green growth (OECD, 2014b). Indicators in this readiness category examine a country's commitments to the Paris Agreement, and the extent to which green growth is championed at the highest levels of the government.

Policy and planning readiness: Appropriate institutional arrangements and human capacity are crucial for transforming the current economic structure to deliver green growth. Climate action and green economy strategies and plans, such as national green growth strategies, NDCs and LT-LEDS, lay out the long-term vision, pathways, and means to realise sustainable consumption and production in multiple economic sectors. These strategies could cover both adaptation and mitigation of climate change and specify how the low-carbon transition supports the achievement of the SDGs.

Appropriate and well-aligned policies can provide an enabling environment to realise long-term strategies. These strategies can also contain specific short-term sectoral targets that encourage greater private sector participation in the low-carbon economy. Indicators in this category attempt to capture the development and existence of climate change and green growth policies and policy alignment actions to mainstream NDCs, LT-LEDS, SDGs, and DRR into national development plans.

Institutional and governance readiness: Governments have limited resources and face competing priorities, and thus planning for action under the interlinked agendas of NDCs, SDGs, and DRR needs to be well coordinated and inter-sectoral. Inter-agency mechanisms are required for effective climate change and green growth mainstreaming and for multi-sectoral planning, implementation and monitoring. Such institutional mechanisms enable incorporation and harmonisation of diverse visions, strategies and stakeholders to deliver the balanced environmental sustainability, social inclusion and economic growth outcomes that green growth requires. Indicators in the institutional and governance readiness category attempt to capture whether such mechanisms are in place and to what extent they are effective.

Sectoral targets and plans: This category captures whether national targets, policies and strategies have been translated into sectoral ones to support important objectives, such as GHG emissions reductions. Examples of sectoral targets include a target share of renewables in the national electricity mix and a target share of the agricultural sector adopting climate-smart practices that enhance climate change resilience. The targets need to be accompanied by action plans to develop the required overarching policies and strategies as well as investment plans, which should include roadmaps and details on project pipelines to scale up implementation with private sector participation. The costing of such action plans facilitates budgeting for implementation and the development of strategies to maximise private sector participation. This category includes an indicator for climate risk zoning in urban areas to capture preparedness for climate change impacts on the most economically productive populations and areas.

Legal and regulatory readiness: To redirect fiscal support from brown to green growth products, processes, and services, restructuring of legal frameworks, such as of subsidy regimes, is often required. Incentive structures should also be aligned to provide the correct signals and support key green growth technologies and industries. These aspects are covered by the legal and regulatory readiness indicators. Additional indicators in this category look at requirements for environmental impact assessments for large projects, which are often the biggest point-source polluters, and the enforcement (not just existence) of appropriate environmental laws and regulations.

Financing and budgeting mechanisms: Insufficient finance flows to Africa and difficulties accessing finance faced by key stakeholders are major barriers to the enhanced private sector participation that is essential for accelerating the transition to a green economy. As the development of a green economy requires many new, locally relevant approaches and the adoption of new technologies and processes, innovation is essential both at the global level (*eg* renewable energy technology) and at the local level (*eg* new business models and mechanisms that can facilitate rapid uptake of renewable energy technologies). Spurring such innovation requires appropriate incentives and financing mechanisms to attract private sector investments in new, green economy-compatible sectors. It also requires mechanisms for mobilising and disbursing green development/climate finance to small- and medium-sized enterprises (SMEs), to drive local demand and innovation for green products and services (*eg* off-grid renewable energy businesses in rural areas).

It is assumed that the larger the flow of green development/climate finance to a country, the greater its readiness in this area. At the same time, efficient disbursement of limited national budgets for supporting green growth require adjustment of national budgeting structures: disbursements need to be made not in support of traditional growth goals but in support of closely aligned sectoral, sub-sectoral and sub-national NDC, SDG and DRR goals and priorities. The financing and budgeting mechanism readiness indicators are designed to capture these aspects.

Human resources and capacity/Research & development, technology and innovation: The green growth transition is largely technology-driven (*eg* in renewable energy) and requires strong, locally relevant business models to gain public acceptance for new technology solutions. In addition, many key green growth technologies provide immense potential to leapfrog traditional routes of development, often due to the rapid advancement of digital technology, including the internet. For example, people in poor, remote communities can now gain access to off-grid solar technology needing only a mobile phone and no bank account, through the use of pay-as-you-go (PAYG) models which allow customers to pay for their systems using mobile banking. Meanwhile, customers save money on fuel and avoid health impacts from the burning of dirty fuels. Adoption of these technologies requires sufficient public awareness of the various benefits they offer, to drive consumer demand and help spur local innovation in products, services, and business models. This in turn requires governments to focus on the development of human capacity, by supporting education (especially in science, technology, engineering and mathematics [STEM]), and boosting the research and development sector. The indicators in the categories of human resources and capacity and R&D, technology and innovation are designed to capture these aspects.

Monitoring and reporting: Last but not least, the monitoring and reporting category indicators have been designed to capture whether countries have appropriate frameworks and systems in place for climate impact risk mitigation (*eg* early warning systems), and assess their capacity for planning and tracking the implementation of NDCs and SDGs.

2.4 Limitations of the study and lessons for wider application

The study has a number of limitations that could be addressed in future analyses of other countries.

Due to limited availability of data and information, some indicators could not be assessed in all country readiness assessments. It should be noted that the 'scores' for some indicators are based on the perspectives of the researchers and stakeholders consulted.

The state and trend analysis and the readiness assessment both use numeric indicators but lead to conclusions that are ultimately qualitative in nature. While country characteristics can be described, the current framework could be further improved to allow for quantitative cross-country comparisons. The AfDB-GGGI Green Growth Index of African countries, which is under development, will aim to make such improvements. Finally, the study used existing data and information, the quality and currency of which varied across different indicators.

The readiness categories are interlinked in different ways in different countries. For example, a lack of access to financing may be the result of a combination of inadequate policies, a weak banking sector, and a small capital market, or of weak consumer demand and spending power. This assessment does not undertake detailed analyses of underlying factors for each readiness category, and the indicators selected may not always present a full picture of all factors relevant in a country. Sector-specific barrier analyses would be needed to address these potential gaps.

Due to the above limitations in terms of data availability and the fact that the focus on case studies and good practices could restrict the applicability of the results to other countries in Africa, further exploration of the concept of pathways to green growth is needed to allow for extrapolation of the results beyond the focus countries. These pathways should be developed based on the nine dimensions of green growth readiness and on further examination of the dynamics of the seven good practice models.

Further research can also address any potential bias in the sample of case study countries, which all benefit from either large natural resource endowments or higher-than-average levels of political commitment.

The two categories of countries which could greatly benefit from green growth, but which may not be sufficiently similar to the case study countries to apply the findings of this study directly are:

- Least developed, fragile, and landlocked countries, some of which are in the Sahel region and are the most vulnerable to climate change;
- Middle-income countries which have plateaued at an economic growth rate of 3-4%, some of which are stuck in the middle-income trap.

Chapter 3

State and trends of green growth in Africa

3.1 Africa – a continent of diversity

Before describing the state of and trends in development and green growth in Africa, it is worthwhile to note that Africa is the second-largest continent in the world, consisting of 54 independent nations with hugely diverse climates and ecosystems, human geographies, and economies. Spanning more than 30 million km^2, Africa is approximately the same size as the USA, China, India, Japan, and Europe combined. The continent comprises five sub-regions with different climatic conditions, ranging from a Mediterranean climate in the far north and south to an equatorial/tropical climate in the central and south-western regions, and arid conditions in the north, west, and south. East Africa, nearby islands and large parts of southern Africa have a subtropical climate. Due to these vast geographical and climatic variations, the continent has a unique and wide-ranging biodiversity that is crucial for supporting the livelihoods of its 1.25 billion inhabitants, and to sustain the planet's life-supporting systems.

3.2 State and trends of major socio-economic, climate vulnerability, and green growth indicators across Africa

3.2.1 State and trends of demography, population, and GDP growth

Africa currently has the highest rate of population growth of all continents at 2.5% per year, and the continent's population is projected to grow to 2.2 billion by 2050. In 2017, 60% of Africa's population was below 25 years of age. Africa is also urbanising faster than any other region in the world, at an annual rate of 3.5%. It is expected that by 2030, about 50% of Africa's people will live in cities. In the early 1990's, predictions were made that cities such as Abuja, Ouagadougou and Kigali would at least quintuple in size by 2025 and this is gradually happening due to rural-urban migration as people search for better economic opportunities. This rapid growth, if unplanned, will exacerbate the health, water, security, and climate change vulnerability of slum populations on the continent. Slum dwellers are estimated to make up 70-90% of the urban population in the ten African nations with the largest slum populations.

Economic growth in Africa has been gathering pace over the past decades. The IMF estimates that six out of the ten economies with the fastest GDP growth are in Africa. This growth trend is likely to continue. The IMF's World Economic Outlook Database (2018) indicated that 17 African economies have achieved a GDP (PPP) of $5,000 or more per capita. Equatorial Guinea, Seychelles, Mauritius, Gabon and Botswana have GDPs of $18,000-35,000 (PPP) per capita. In Sub-Saharan Africa (SSA), economies are expected to grow further due to rising international commodity prices, a stronger global economy and favourable domestic policies, though this growth has been affected by the COVID-19 pandemic. Benin, Burkina Faso, Cote d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Rwanda, Senegal, Uganda, and Tanzania are expected to continue to achieve the highest growth rates. Larger economies, such as South Africa, Angola and Nigeria, are currently growing at rates comparable to population growth, although this could change post-COVID. In order to realise the UN's zero poverty goal (SDG 1), however, economic growth rates higher than population growth rates may be necessary.

While the African growth story continues, the continent's economies are not without vulnerabilities. Risks include rising levels of public debt and fluctuations in the international commodity export prices upon which many of the continent's economies depend. AGI Brookings (2019) indicates that in 2019 a total of 14 African countries were at risk of debt distress due to rising government debt or debt servicing costs. Such risk factors can negatively impact the quality and inclusiveness of growth in Africa.

	GOAL 1	GOAL 2	GOAL 3	GOAL 4	GOAL 5	GOAL 6	GOAL 7	GOAL 8	GOAL 9	GOAL 11	GOAL 13	GOAL 14	GOAL 15	GOAL 16	GOAL 17
↑	7	0	0	1	2	6	1	2	1	1	39	0	10	1	7
↗	7	20	26	11	26	8	13	20	20	4	3	16	20	8	14
→	27	27	27	37	25	38	35	8	31	25	6	15	16	30	25
↓	9	2	0	4	0	2	3	1	1	4	5	0	8	3	5
–	4	5	1	1	1	0	2	23	1	20	1	23	0	12	3

Note: Goals 10 and 12 are excluded due to lack of time-series data for trend analysis. Green arrows indicate being on track to achieve the specific SDG. Yellow arrows indicate progress above 50% of the required growth rate, but below the necessary rate to achieve the goal. Orange arrows indicate stagnation or an increase at a rate below 50% of the growth rate required to achieve the goal. Red arrows indicate movement in the wrong direction.

Figure 7: Summary of trends towards the achievement of 15 (out of 17) SDGs in 54 countries of Africa (SDGCA and SDSN, 2019). The numbers in the table indicate the number of African countries that are on track or otherwise towards achieving each of the SDGs.

Quantitative model-based estimates of the impact of COVID-19 project that African economies will lose between $22.1 billion, in the base-case scenario, and $88.3 billion in the worst-case scenario, equivalent to a contraction of projected GDP growth for 2020 of between 0.7 and 2.8 percentage points (AfDB, 2020).

3.2.2 State and trend of poverty and human development

The UN SDGs form a comprehensive framework for assessing sustainable development progress. Analysis by SDGCA & SDSN (2019) shows that the progress towards the SDGs is mixed across the continent and major challenges remain (see Figure 7). North Africa was shown to be the best performing region, with Tunisia, Algeria, Morocco, Cape Verde and (outlier) Mauritius making the most progress, whereas Central Africa was lagging furthest behind across the SDGs. Only one country, Algeria, is on track to achieve the zero poverty goal (SDG 1) and another six countries were making sufficient progress to be able to achieve it by 2030. Tackling existing and rising inequality is one of the key policy priorities for achieving SDG 1 and sustainable development. Although most African economies have experienced strong economic growth in the past decade, this has not resulted in equal opportunities for all. Even in countries with high GDP per capita, such as Botswana, Namibia, and South Africa, inequality remains stubbornly high.

The Human Development Index (HDI), which measures average long-term progress for three building blocks of development – a long and healthy life, access to education, and a decent standard of living for all – is strongly correlated with GDP (PPP) per capita in most countries. Better health and education lead to higher productivity and GDP per capita, and a higher GDP can lead to higher-quality, more widely accessible services, including healthcare and education. The UN Human Development Report 2019 (which uses 2017 data; UNDP, 2019) shows that the HDI of the majority of African nations has steadily increased over the past decades, although with large variations in the pace of progress across the continent. Twenty-one countries (39%) have a medium or high HDI, while more than half of African countries are still classified as countries with low human development. Even in the highest-ranked countries in Africa, such as Seychelles, Tunisia, and Gabon, there is still considerable room for improvement when compared to the best performers globally.

The COVID-19 crisis poses a real challenge to the achievement of SDG 1. The different scenarios developed by experts show that the current crisis could increase the population under the poverty line by 14 to 22 million people worldwide, mainly in Sub-Saharan Africa (Vos *et al*, 2020). ILO further estimated that there would be between 9 and 35 million new working poor in developing countries by the end of 2020 (ILO, 2020).

3.2.3 State and trends of health and education

SDGCA & SDSN (2019) indicate that about 80% of African countries have not made adequate progress towards SDG 3 (good health and wellbeing). The countries that are faring best include Algeria, Libya, Mauritius, Morocco, and Tunisia (SDGCA & SDSN, 2019). While life expectancy at birth is steadily increasing across the continent (in 2017, it was 62 years in Central Africa and 65 years in Southern Africa), in most countries healthy life expectancy is not increasing at the same pace. For example, Sub-Saharan Africa has overcome the devastating AIDS epidemic that ravaged the region from the 1990s until the mid-2000s, and life expectancy at birth has increased by more than nine years in the past three decades. However, 14% of total life expectancy has been found to be spent in poor health. Women are found to have more poor-health years than men (GBD, 2018). Unsurprisingly, a high number of unhealthy life-years is linked to higher income inequality (even if a country has a high average GDP per capita). Indeed, when adjustments were made for the effects of inequality, HDI values were significantly reduced in high-GDP per capita countries with high income inequality, such as Angola, Namibia, and South Africa (UN Data, 2019). In addition, inequality in access to education was frequently found to contribute even more towards reduced HDI outcomes than health and income inequality.

The extent of gender inequality in education varies widely on the continent, with North Africa performing better and Sub-Saharan Africa requiring the greatest improvements. According to the UNESCO Institute of Statistics (UIS, 2019), 13 out of 15 countries in the world with more than 30% of primary school-age girls not in school are in Sub-Saharan Africa. South Sudan (67% of primary school-age girls out of school), Equatorial Guinea (55%) and Eritrea (49%) rank most poorly and show worsening trends. UIS Factsheet 48, from 2018, shows that in Sub-Saharan Africa, 35.1% of girls and 29.6% boys of primary, lower secondary and upper secondary school-age are not in school (UIS, 2018).

Africa's population is getting younger, which means that the continent's labour force will continue growing faster than that of any other continent. However, taking advantage of this youth dividend requires improvement of education systems, both at primary and secondary levels, to equip youths with the necessary skills and capacity to contribute to green growth. Africa's youth (15-24 years) literacy rate is steadily increasing, but greater progress is required in Sub-Saharan Africa, where it is just 75% (2016) compared with the global average of 91%. The adult illiteracy rate in Africa is 36% (UIS, 2018). North Africa performs best, with a literacy rate of 90% (in 2016).

While enrolment rates are rising on the continent, the average education score as measured by the Ibrahim Index of African Governance shows a decline since 2013 in 27 countries, indicating that the quality of education is not meeting the needs of the economy (AGI Brookings, 2019). UIS Factsheet 48 shows that in Sub-Saharan Africa, a large majority of children (76.5% of girls and 81.9% of boys) attend primary school. Fewer children attend lower secondary school (61.2% of girls and 65.5% of boys) and less than half of all children continue to upper secondary school (38.7% of girls and 45.7% of boys; UIS, 2019). As the population of school-age children grows, the demand for teachers is rising fast. To achieve universal primary and secondary education by 2030, Sub-Saharan Africa will need 7.6 million new teachers (UIS, 2019).

As of March 16, 2021, the number of confirmed COVID-19 cases in Africa amounted to around 3,000,000 (WHO, 2021). South Africa was the most severely affected country. To counter the pandemic's effect on public health and health systems, governments, including in Africa, have attempted to counter the pandemic's effect on public health and health systems by developing new public health policies, with varying degrees of success.

Tunisia's public health strategy during the first wave of the COVID-19 pandemic was exemplary, and the country succeeded in containing the virus better than many of its neighbours, mainly thanks to its existing hard and soft infrastructures (GIZ, 2021). However, as of January 9, 2021, a total of 157,514 confirmed cases in Tunisia (which makes it the third most affected country in Africa; GIZ, 2021), attest to the fact that the Tunisian authorities have been less successful in coping with the new COVID-19 wave, addressing its economic effects and alleviating the pressure on its health system.

In addition, concerning education, various African countries have responded to the COVID-19 crisis by closing schools. As schools are in lockdown, children living in poverty without the technology to access e-learning programmes are deprived of an education. Children in unstable homes are also more exposed to neglect, violence, exploitation, and abuse (UNDP, 2020).

In Tunisia, the education of millions of students has been severely disrupted by the COVID-19 crisis, as teachers' unions have refused to provide distance learning, which has led the authorities to proclaim the end of the school year (GIZ, 2021). However, Tunisia has demonstrated its adaptability throughout the COVID-19 crisis, accelerating its digitalisation processes, including in education. These changes may have implications for the country's energy consumption which cannot yet be quantified.

3.2.4 State and trends of access to drinking water and improved sanitation

Along with SDG 7 (access to affordable energy) and access to quality social infrastructure, achieving SDG 6 (universal access to safely managed drinking water and improved sanitation) is recognised as a key precondition for improved health, education, and economic growth. Currently, about 300 million Africans lack access to safe water for drinking and 700 million lack access to adequate sanitation facilities.

With the exception of parts of northern and southern Africa, water access on the continent is limited primarily due to economic reasons (accessing water is either time consuming or expensive) rather than due to physical water scarcity. A lack of granular data makes it difficult to assess progress made in expanding access to safe drinking water sources. According to the UN (2015), in North Africa more than 90% of the population now have safe drinking water. Challenges persist in Sub-Saharan Africa, where access rates remain at around 60%.

In the past decades, notable advancements in expanding access to improved water sources and sanitation have been seen in Ethiopia, Senegal, Rwanda, and South Africa. Girls and women in rural households in Africa still collectively spend millions of hours every year searching for and collecting water for drinking and cooking; time which could otherwise be spent on productive activities, contributing to better health and higher economic productivity in their communities. In addition, various other water-related challenges, including water-borne diseases, are estimated to cost the continent about 5% of its GDP per year.

It has been found that inadequate access to water and sanitation increases COVID-19 infection rates. Therefore, the issue of water management and sanitation is crucial to reducing the spread of COVID-19 and the transmission of infectious diseases more generally. Furthermore, COVID-19 mitigation measures require access to clean water and sanitation, especially for handwashing. Thus, the COVID-19 crisis has once again underlined that universal access to water and sanitation should be a key public health priority.

3.2.5 State and trends of climate action and greenhouse gas emissions

The analysis by SDGCA & SDSN (2019) shows good progress towards SDG 13 (climate action) in Africa. Since the SDG 13 indicators capture outcomes and not policies and measures themselves, SDG 13 results are closely linked to progress made towards related goals, such as SDG 7 (affordable and clean energy) and SDG 15 (protecting and restoring land resources and ecosystems). The continent remains a low emitter, generating just 2-3% of global GHG emissions from energy and industry. Per capita GHG emissions in most African countries also remain well below the global average of ~5 tonnes (in 2014). If greener growth approaches are not pursued, the emissions of most of Africa's countries are likely to rise rapidly as urbanisation continues and their populations and economies grow.

As a result of the COVID-19 crisis, GHG emissions are forecast to have decreased 8% in 2020 compared to 2019 (GGGI, 2020). This decrease is mainly due to a drastic reduction in industrial activity and mobility, particularly air traffic. However, lessons learnt from the 2008-2009 global financial crisis show that economic recoveries are generally associated with an increase in emissions, offsetting the initial reduction.

3.2.6 State and trends of climate change vulnerability

Despite generating just 2-3% of global GHG emissions, Africa is already, and will continue to be, disproportionately impacted by the negative impacts of climate change. The Notre Dame-Global Adaptation Index (ND-GAIN) shows that most nations in Africa remain highly vulnerable to climate change and lack sufficient capacity to respond and adapt. A severe lack of data has hampered understanding of these impacts and the preparation of communities for adaptation. Without adequate adaptation action, climate change impacts can nullify the development gains made over the past decades and halt much-needed progress in the future. Most analyses of climate change impacts in Africa currently use downscaled global models to derive regional estimates, and there is a lack of local-level understanding of the impacts and of communities' capacity to adapt (Pereira, 2017).

Analysis by the Climate Action Tracker (2018) shows that, even if all commitments made in current NDCs submitted by the world's nations are met, the average global temperature would still rise by more than 3.5°C by the end of the century. Temperatures in Africa are already rising, and the increase in mean annual temperature is projected to exceed 2ºC by 2100 (Niang *et al*, 2014). Furthermore, the sea level is projected to rise 10% more in Africa than the global average by 2100. Egypt, Mozambique, Nigeria, Guinea-Bissau, and Gambia are expected to be most severely affected, as large shares of their populations are at risk of annual flooding (see Figure 8). Even if the temperature rise is limited to 2ºC, more frequent, larger tropical storm surges are projected to impact Tunisia, Tanzania, and Mozambique more than any other developing nations in the world (UNECA/ACPC, 2014).

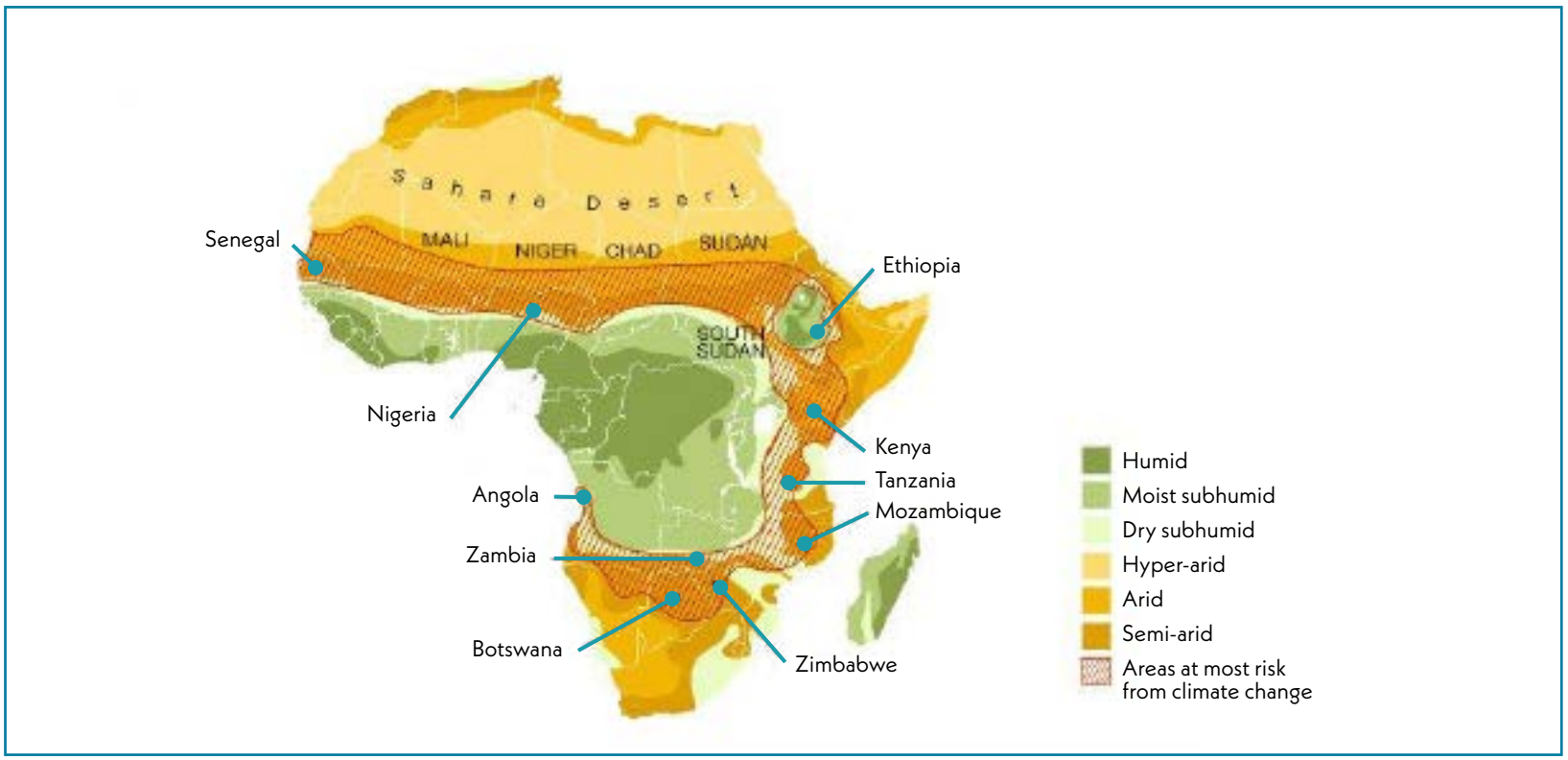

Figure 8: Areas most at risk from climate change in Africa

Increasingly frequent extreme heat events caused by climate change are also likely to impact (agricultural) productivity and economic growth. In a world that is 2ºC warmer, 45% of Africa's land area is projected to experience unusual extreme heat events. Central Africa has already seen rising temperatures and Southern Africa could see a considerable increase in the number of dry days and a 20% decrease in precipitation. The IPCC Africa Report (Niang *et al,* 2014) projected that between 75 and 250 million people on the continent will face severe water stress by 2020, and this number will increase to 350-600 million by 2050. Even if rainfall patterns remain unchanged, temperature rises will still cause amplified heat stress, especially in drier regions. Lake Chad, which supports the agricultural livelihoods of more than 30 million people in Cameroon, Chad, Niger, and Nigeria, has already shrunk by 90% from its original size due to the impacts of climate change, unsustainable water use, and desertification (Pham-Duc *et al*, 2020).

If temperatures were to rise by 3ºC, farming of currently used varieties of cereal crops such as maize, millet, and sorghum could become impossible in areas across the continent. Maize production in southern Africa is projected to be particularly vulnerable to climate change. However, farmers could benefit from the promotion of smart agricultural practices such as multiple-cropping systems and the cultivation of non-cereal crops such as cassava, which is resistant to high temperatures and infrequent rainfall.

The high climate change vulnerability of the African agriculture sector is due to the fact that most agriculture is rain-fed and underdeveloped. The majority of farmers are small-scale subsistence farmers (mainly women) with limited access to financial resources, infrastructure, and information (Pereira, 2017). Climate change impacts such as drought, desertification, and growing resource scarcity are likely to exacerbate existing problems in already fragile parts of the continent, such as the Sahel region, where agriculture supports a vast population across several countries.

Livestock farming also needs to adapt to protect incomes, health, and food and nutrition security in poor rural households in many African countries. On average, income from livestock constitutes over 35% of total household income on the continent, and accounts for up to 85% of income in communities such as the Maasai. About 80% of poorer African households keep animals, and oftentimes livestock is the primary type of asset these households own (Hererro *et al*, 2014). The sector offers great potential to create jobs and provide decent incomes as demand for milk, meat, and eggs grows due to rapid urbanisation. Smallholder mixed crop-livestock systems are projected to remain dominant until 2050 and are likely to be relatively resilient to climate change as they often involve the keeping of heat-tolerant animals such as sheep and goats. Such livestock can also increase households' resilience by providing backup income when crops fail. On the other hand, large farms holding less heat-tolerant animals, such as cattle, are likely to be impacted more (Rust & Rust, 2013).

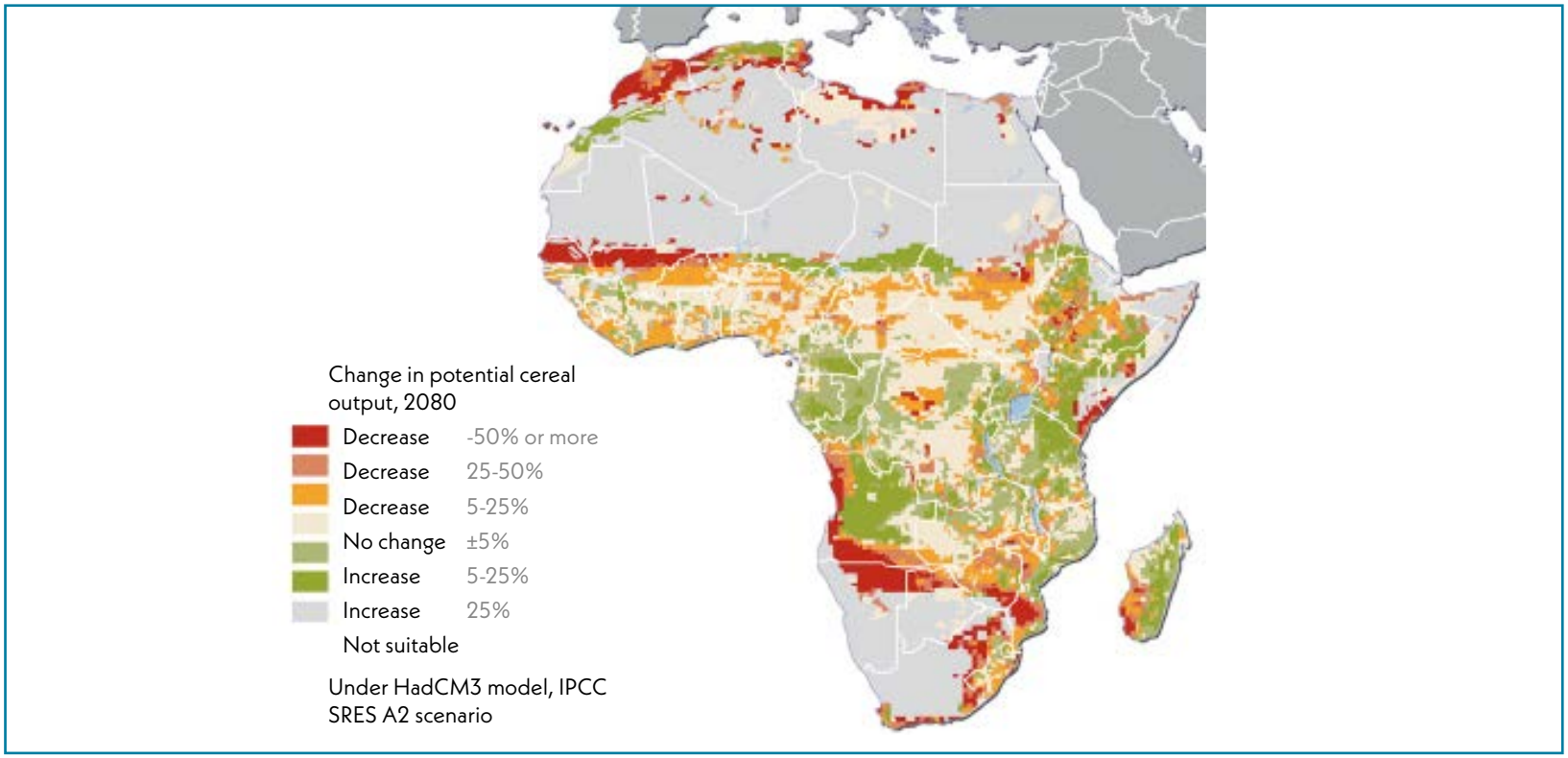

Figure 9: Climate change impact on cereal production in Africa by 2080 (Source: UNEP, 2009)

3.2.7 State and trends of agricultural productivity

Agriculture has long been and will remain an important sector for Africa's development. Between 1975 and 2013, the sector's share of GDP (2005 prices) remained relatively constant at 12-15%, whereas in Asia, for example, its share plummeted from 20% to ~8% due to industrialisation (FAO, 2015). Agriculture accounts for about a quarter of Africa's GDP, employs 60-70% of the labour force, and supports the livelihoods of 90% of population in the continent (AfDB, 2017a).

Agriculture has the potential to be a significant driver of wealth creation, improved food and nutrition security, and economic growth. In Africa, just a 1% increase in crop productivity can reduce the share of people living in poverty by 0.72% (compared with 0.48% in Asia; ThirtleLin and Piesse, 2003). Between 40% and 70% of the value of foods sold in urban Africa is added in the post-farm gate segments of the supply chain. This points to a significant opportunity for youth employment in agricultural value addition (AGRA, 2017).

Total factor productivity, a measure that captures labour and land productivity as well as the use of inputs such as irrigation water and fertiliser, remained flat in Africa until the mid-1980s, after which time it steadily increased until 2012 (Benin, 2016). Still, Africa's agricultural production systems have not grown sufficiently to keep up with the growing demand, and an increasingly large share of consumed food is imported. In Sub-Saharan Africa, food imports from outside the region rose from $4 billion to $45 billion between 2001 and 2014 (ILO, 2017). Climate change is likely to severely affect agricultural production on the continent, through impacts such as loss of fertile land, shorter growing seasons, erratic rainfall patterns and greater ambient heat (see Figure 9).

3.2.8 State and trends of natural ecosystems and biodiversity

Biodiversity, both terrestrial and aquatic, is part of a nation's natural capital. The protection and enhancement of natural capital is key for rural development and climate change adaptation, as ecosystems provide invaluable services that support the livelihoods, cultures, and customs of rural communities. A country's ecological footprint is a measure of its consumption of natural capital expressed in terms of the land area required to produce food, fibre, and timber for its population, absorb its waste, and to provide space for its infrastructure. Increasing HDI while maintaining a small ecological footprint is central to decoupling economic growth from environmental damage, and to achieving sustainable development. While Africa's per capita ecological footprint has remained stable over the past four decades, at about one global hectare (gha)/capita (compared to ~4 gha/capita for Europe), its total footprint has been steadily increasing with the growth of its population (Lin *et al*, 2018).

Forests play a key role in supporting terrestrial biodiversity and in providing rural communities with food, medicinal plants, and other livelihood supplies. Forests generate 6% of the continent's GDP, almost three times the global average, and 18 African countries, including Cameroon and Ghana, rely on forests for more than 10% of their GDP. Congo is among the countries with the largest forested areas in the world. Avoiding the destruction of Africa's tropical forests and making efforts towards reforestation can contribute to establishing microclimates that can support agriculture, preserve biodiversity, protect water sources, and mitigate climate change by sequestering carbon.

During the period 2000-2015, African forest cover decreased at a rate of 2.8 million ha per year, higher than in Latin America, where 2.0 million ha of forest is lost annually. Natural forest cover decreased by 0.54% a year. In 2015, forests covered approximately 624 million ha in Africa, equivalent to an above- and below-ground biomass of 60 Gt of carbon. Forests in western and central Africa (along with South America) have been found to store the highest densities of carbon in living biomass anywhere (about 120 tonnes/ha *vs* the global average of 74 tonnes/ha). Eastern and southern Africa saw the largest decline in forest biomass and carbon stock between 1990 and 2015, averaging about 100 million tonnes a year, although these loss rates are currently declining (FAO, 2016). The primary reasons for deforestation and carbon stock destruction have been the conversion of forests into agricultural land (sometimes for high-value crops such as palm oil), the destruction of forest to make room for new settlements, illegal logging and degradation of forest land. In Gabon and Congo, illegal logging is estimated to account for at least 60% of total logging activity.

Human pressure on natural ecosystems and biodiversity, especially through land-use change and wildlife exploitation, increases the risk of infectious diseases by bringing people and animal populations into close contact. Diseases transmitted from other animals to humans represent approximately 60% of all infectious diseases and 75% of emerging infectious diseases in humans (Taylor *et al,* 2001). These zoonotic diseases include Ebola, SARS, MERS, *etc*, and most probably also the SARS-COV-2 virus that causes COVID-19 (Zhang *et al*, 2020).

3.2.9 State and trends of access to energy and sustainability of the energy mix

Access to clean energy, particularly access to electricity and clean cooking fuels, is a key building block of sustainable development due to its intrinsic links to other drivers, such as education, health, and productivity. Clean cooking solutions directly improve the health of women and children and free up productive hours for girls and women in rural areas which would otherwise be spent collecting fuel wood.

SDGCA & SDSN (2019) indicate that about 85% of African countries are lagging significantly behind in their efforts to achieve SDG 7 (access to clean and affordable energy) by 2030. Energy access rates remain stubbornly low, particularly in Sub-Saharan Africa, where about 600 million people lack electricity access and 890 million are forced to use traditional biomass or highly polluting fuel such as kerosene for cooking (IEA, 2018). Thirteen countries in Sub-Saharan Africa have electricity access rates lower than 25%. In rural areas, electricity access rates are often much lower than national averages. Also, where there is access to electricity, the supply can be unreliable and of poor quality.

Electricity consumption per capita varies widely across African countries and generally grows with expanding electricity access. For this reason, per capita consumption is typically highest in northern and southern African countries. In general, across the world, countries with high HDI scores have electricity consumption rates above 4,000 kWh per capita. In 2014, the average annual consumption of electricity in Sub-Saharan Africa was about 490 kWh/capita (including high-income countries), which is considerably lower than that of other developing economies such as India or Brazil (IEA, 2014).

The IEA estimates that while the number of people without access to electricity on the continent has shrunk slightly in the past years, this could soon be offset by population growth in the region, especially in off-grid areas. East Africa was responsible for 80% of the decrease in the total population without access since 2012, due to aggressive grid expansion supported by better policies and more investment (mainly in Kenya and Ethiopia, which are projected to achieve universal access by 2030), and expansion of off-grid solar power solutions (primarily in Kenya, Tanzania, Ethiopia, and Uganda).

In western and central Africa, where ~50% of Sub-Saharan Africa's population lacking energy access live, progress has been slow except for in Ghana (where access rates increased from 45% to 84% between 2000 and 2016), Senegal (increase from 30% to 64%), and Gabon (31% to 90%), where access expansion was primarily driven by grid electrification. By 2030, Sub-Saharan Africa is projected to become the last frontier in the battle for universal energy access, as it is home to 80% and 40% of the world's populations without access to electricity and clean cooking solutions, respectively.

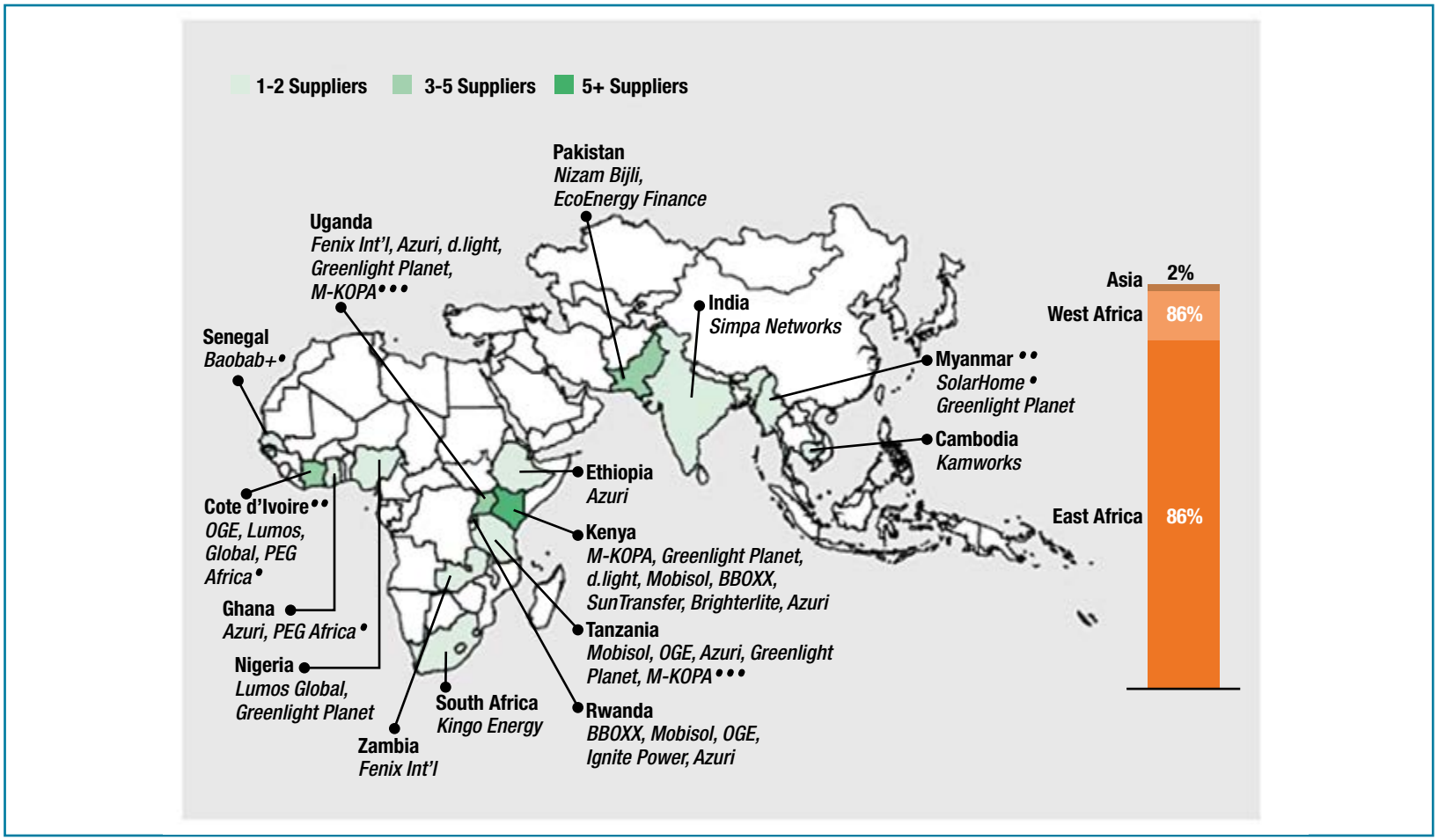

Figure 10val PAYG off-grid solar power solution players by country (2013-17) and geographic share of PAYG market (% cumulative unit sales) (Source: GOGLA, 2018).

While on-grid electrification remains central in the pursuit of universal energy access in Sub-Saharan Africa, support and new business models for off-grid electrification solutions are rapidly expanding.

Studies show that off-grid solar power solutions could be a cheap complementary means to achieving universal electrification without increasing GHG emissions and air pollution. While grid connection

costs vary across countries, a McKinsey study estimated that the cost of a single new connection to an urban grid in Sub-Saharan Africa costs about $750, while a similar connection in a rural area could cost as much as $2300 (this study used Tanzania as benchmark; McKinsey, 2015). In comparison, the deployment of a typical solar home system in the region would cost at most $200, and pico solar lights are now available for as little as $10. Such low-cost solutions are making a visible difference with their widespread use in roadside stalls and markets in rural areas. Solar home systems, though their share in the off-grid solar power market is still small, are spreading fast in Sub-Saharan Africa, an expansion facilitated by mobile phone-based pay-as-you-go (PAYG) systems. Currently, more than 98% of the world's PAYG off-grid solar unit sales are made in East and West Africa (see Figure 10). These off-grid solutions also contribute to the greening of Africa's electricity mix, without which air pollution and GHG emissions would grow dramatically as the economies of the region grow, urbanise, and industrialise.

Africa has immense potential for renewable energy generation. Taking into account topography; distances between national grids and load centres; transport infrastructure; and protected areas, the potential for economically viable renewable energy generation in 21 countries in the so-called 'Africa Clean Energy Corridors' (Figure 11) is estimated to be more than 3.8 TW for wind, 15 TW for solar PV and 5 TW for solar CSP (Wu *et al*, 2015). West Africa alone is estimated to have a technical potential of 128 GW for on-grid wind, 171 GW for off-grid wind, 1451 GW for on-grid solar PV and 1830 GW for off-grid solar PV (IRENA, 2016).

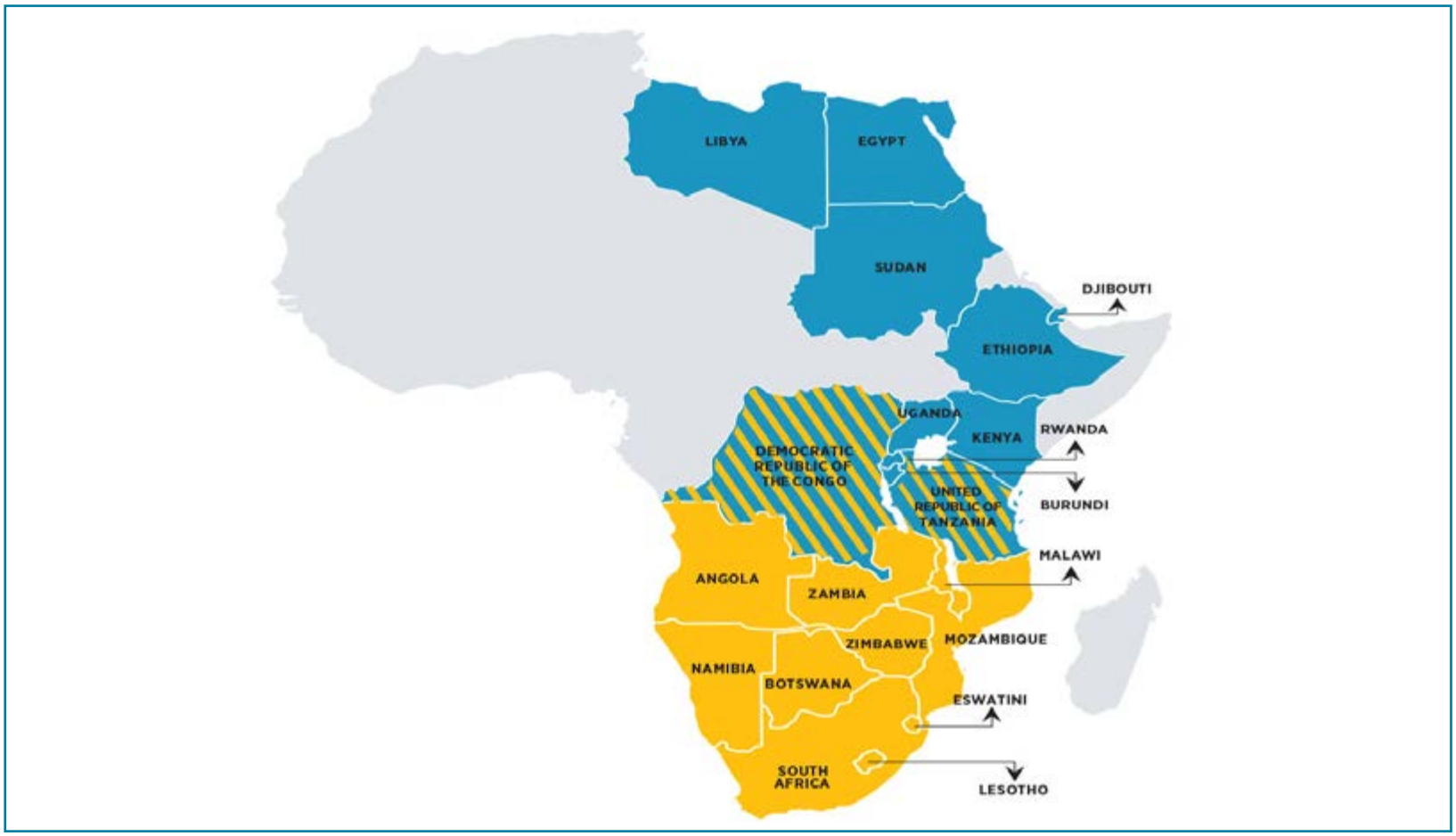

Figure 11: Africa Clean Energy Corridors

Countries in these regions are gradually beginning to recognise the huge potential of renewable energy to meet their targets under SDG 7 and SDG 13. Out of 53 NDCs submitted to the UNFCCC by African nations, 45 contain quantified renewable energy targets (IEA, 2018). However, the current renewable energy generation capacity on the continent remains low at 42 GW. The IEA estimates that half of total electricity demand in 2030 could be met by 310 GW of renewable energy capacity. Achieving this will require an annual investment of $70 billion by 2030 and would result in emissions reductions of 310 $mtCO_2e$ per year. It would also create jobs, including for women: an IEA gender survey conducted in 2018 revealed that women held 32% of jobs in the renewable energy sector compared to 28% in the oil and gas sector (IRENA, 2019).

Putting Africa's renewable energy potential to work to meet the target of achieving universal energy access by 2030 would require the factoring in of off-grid electrification into countries' energy access plans, particularly in Sub-Saharan Africa, to take the advantage of the potential for leapfrogging in this sector. The off-grid energy sector can play an important role particularly at a time when many of Sub-Saharan Africa's state-owned utilities are in a bad financial state, often due to on-grid electrification programmes that cannot be expanded or sustained under existing revenue models. A World Bank survey indicated that fewer than half of Sub-Saharan African utilities are able to cover their operating expenditures with existing revenues, and many are losing over $0.25 for every kWh sold (Engineering News, 2019). For example, South Africa's biggest utility company has debts of 500 billion Rand ($35 billion), which are threatening the entire national economy (Gulf News, 2019).

3.2.10 State and trends of the access to infrastructure

Expanding access to digital infrastructure such as the internet and mobile connectivity is increasingly essential for countries to narrow the 'digital divide' and deploy various leapfrogging and climate-resilient solutions. These solutions include solar home systems paid off through mobile banking, early warning systems, and weather/market information and insurance products that enhance the bargaining power and climate adaptability of subsistence farmers. Internet access is also a key enabler of productivity growth and of the knowledge/information flows required for innovation.

Access to mobile phones in Africa is steadily expanding and already more than 80% of the population own a phone (compared with 131% in Europe and 96% in Asia-Pacific; WeAreSocial & Hootsuite, 2017). However, access to the internet lags behind at just 29% of the population (compared to a global average of 50%). There is significant variation among countries as well as between rural and urban areas. In South Africa, internet access exceeds 50%, while in central Africa it is just 10%. Eritrea (1%), Niger (2%) and Chad (3%) are among nine African countries identified as the least connected in the world, which indicates that significant support is required in this area (WeAreSocial & Hootsuite, 2017).

Access to modern road and railway transport infrastructure is a key enabler of sustainable and equitable growth. Poor-quality roads have severely impacted the cost of travel and transport, as 80-90% of passenger and freight traffic travels by road in Africa. As a result of poor infrastructure, transport costs were found to account for up to 20% of the value of imports for least developed and land-locked economies. (AfDB, 2014). According to the UN Special Advisor on Africa, approximately 60% of the African population lack access to modern road and railway infrastructure, isolating communities and hindering access to markets, healthcare, education, and jobs (Exim Bank India, 2018). Africa has an average of 204 km of roads per 1,000 km^2 of land area, whereas the global average is 944 km/ 1,000 km^2. Only 25% of roads are paved and the quality of roads tends to be poor.

Lack of adequate transport infrastructure also forms an impediment to intra-continental trade and integration. This is reflected in data on intra-regional exports, which accounted for ~18% of total exports in 2016 (a small increase from ~12% in 1996), compared with ~70% in Europe and ~60% in Asia (Exim Bank India, 2018). Finally, inadequate transport infrastructure can impede the growth of important markets for green technology, such as the market for off-grid renewables, by increasing transport costs and hampering regular maintenance and repairs.

Africa's rail network is 82,000 km long with ~84% of tracks operational (AfDB, 2015). However, improvement and expansion are required, as many existing networks were constructed during colonial times. Six African countries in northern and southern Africa, namely Morocco, Tunisia, Egypt, Namibia, South Africa, and Eswatini, are currently estimated to have a better railway network than the global average.

3.2.11 State and trends of women's empowerment

Women play a central role in African households, particularly in poorer communities. There, the majority of household tasks, including collecting firewood and water, cooking, and taking care of children, fall on the shoulders of girls and women, who spend many hours daily on these activities. The empowerment of women, central to the 'leave no one behind' principle of the UN SDGs, can be achieved partly by freeing up more of women's and girls' time, which will have positive impacts on innovation, agricultural productivity, economic growth, and overall human development of the continent.

Women's empowerment is a complex, abstract, and comprehensive concept that is difficult to quantify (Ewerling *et al*, 2017). Empowerment is defined by the World Bank as the "process of enhancing an individual's or group's capacity to make purposive choices and to transform those choices into desired actions and outcomes" (World Bank, 2006). Women's empowerment can be achieved through processes such as the realisation of gender equality in areas such as representation, wage, power and autonomy, and by helping women envisage a life in which they are able and entitled to make critical decisions at home and for society. Studies on Sub-Saharan Africa and Asia have shown that gender equality has direct positive impacts on children's survival, health, and development (Ewerling *et al*, 2017).

The current status of gender equality in Africa varies from country to country. Economic progress represented by growth of GDP or GDP per capita is not always correlated with more gender equality. The World Economic Forum's Gender Gap Index ranks seven African countries, namely Rwanda, Namibia, South Africa, Burundi, Uganda, Zimbabwe, and Mozambique, in the top 50 nations with the smallest gender gap, with Rwanda and Namibia securing top-ten spots (WEF, 2018). Namibia and Rwanda are the highest performers of all countries in the upper-middle-income and low-income categories, respectively. The index consists of 14 indicators in four categories. In Africa, the top-ranked countries score highly in the categories of economic participation and opportunity (*eg* ratio of men and women in the labour force and wage equality) and political empowerment (*eg* representation in parliament). In Sub-Saharan Africa, the large differences between countries are mainly driven by varying and generally low scores in the categories of educational attainment and health and survival (except for Namibia, which is ranked number one in the world in the health category). Overall, Sub-Saharan Africa ranks higher than South Asia and MENA in the Gender Gap Index and just below the global average. The IMF (2016) has shown that in Africa, gender equality in education, such as in secondary school enrolment, increased steadily from 1980-1984 before plateauing in 2010-2014.

Epidemics are known to disproportionately impact women's health, livelihoods and safety, and COVID-19 has been no exception. Women are highly represented in the informal sector in Africa and are therefore at high risk of losing their livelihoods. Furthermore, women typically care for children and sick family members in their households, which puts them at greater risk of infection themselves. In addition, many women have needed to find ways to complement household incomes as jobs have disappeared or breadwinners have fallen ill. In the absence of social protection measures, the dual burden of income generation and domestic responsibilities tends to fall solely on women.

3.3 State and trends in the seven focus countries

This section gives an overview of green growth state and trends in the seven focus countries for this study: Morocco, Tunisia, Kenya, Rwanda, Senegal, Gabon, and Mozambique.

3.3.1 Climate vulnerability indicators

The ND-GAIN vulnerability index captures countries' exposure, sensitivity, and adaptive capacity to climate change impacts across six sectors, including food, water, health, and infrastructure. While vulnerability is decreasing for all seven countries, all except Morocco and Tunisia are still considered highly vulnerable. When the index is adjusted for GDP, all seven countries perform better, with Morocco and Tunisia ranked 4th and 22nd least vulnerable globally in 2017.

The Germanwatch Global Climate Risk Index shows that globally, the countries most impacted by extreme weather events were primarily affected by tropical cyclones. No clear trends in terms of impacts are discernible in any of the seven countries for the period of 2010-2016 (see Figure 12). Mozambique, Morocco, and Tunisia suffered large losses to GDP, and Rwanda suffered the highest number of fatalities per 1,000 people in 2010-2016.

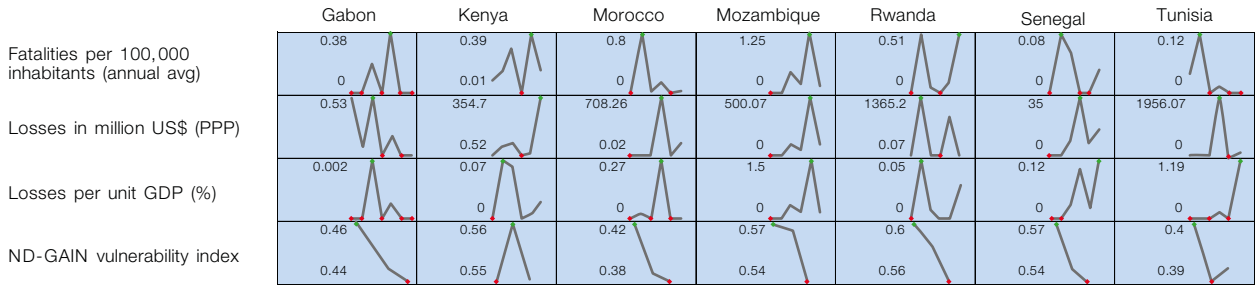

Figure 12: Climate vulnerability state and trend indicators in the seven focus countries during 2010-16 (x-axis)

3.3.2 Social and economic indicators

Similar to the Africa-wide trend, the seven countries show decreasing poverty rates and increasing HDI scores (Figure 13). In line with their high GDP per capita, Tunisia, Morocco, and Gabon now have poverty rates under 5%, compared to 30-60% in the other four countries. However, the picture looks rather different when national rather than global poverty lines are used. For example, in Gabon, using the national poverty line classifies a significant share of the population as poor, as a result of high inequality and unemployment, despite Gabon's relatively high GDP. This situation is reflected in the large slum populations in Gabon. Slum populations remain large in all other countries too, except for Tunisia and Morocco (Figure 14).

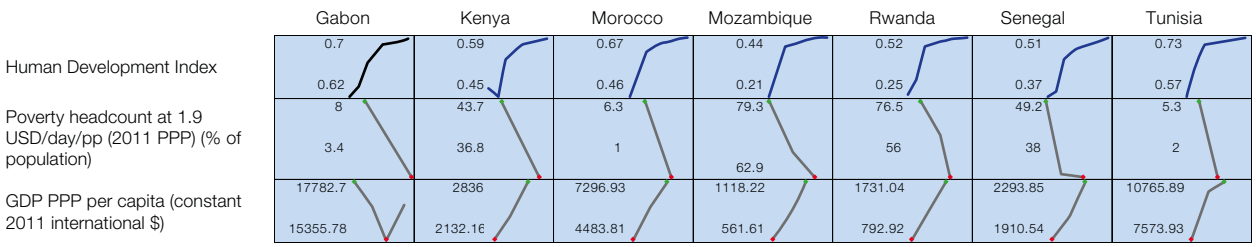

Figure 13: HDI, poverty and GDP state and trends in the seven focus countries during 2010-16 (x-axis)

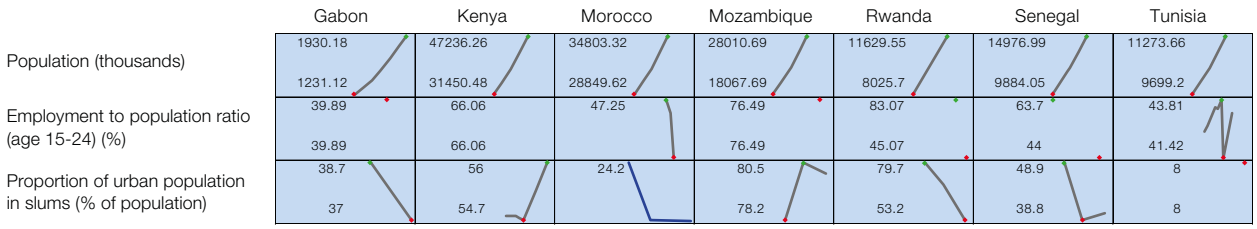

Figure 14: Population and employment state and trends in the seven focus countries during 2010-16 (x-axis)

As reflected by their HDI scores, healthy life expectancy at birth increased steadily in all seven countries from 2010-2016 (Figure 15). The under-five mortality rate also rapidly decreased in these countries, although it remained much higher in Gabon, Kenya, Mozambique, Rwanda, and Senegal than in Tunisia and Morocco. The most recent data show that five out of seven countries have achieved a women's literacy rate of over 85%, while Senegal and Mozambique lag behind.

Progress on the abovementioned indicators is necessary for women's empowerment but may not directly lead to enhanced women's participation in the economy, as demonstrated by the cases of Mozambique (where the female labour participation rate is high despite the low literacy rate), Rwanda (with high female labour participation and high literacy rates) and Tunisia and Morocco (with low female labour participation despite high literacy and low mortality rates). This highlights the importance of considering cultural factors when designing activities to enhance women's empowerment.

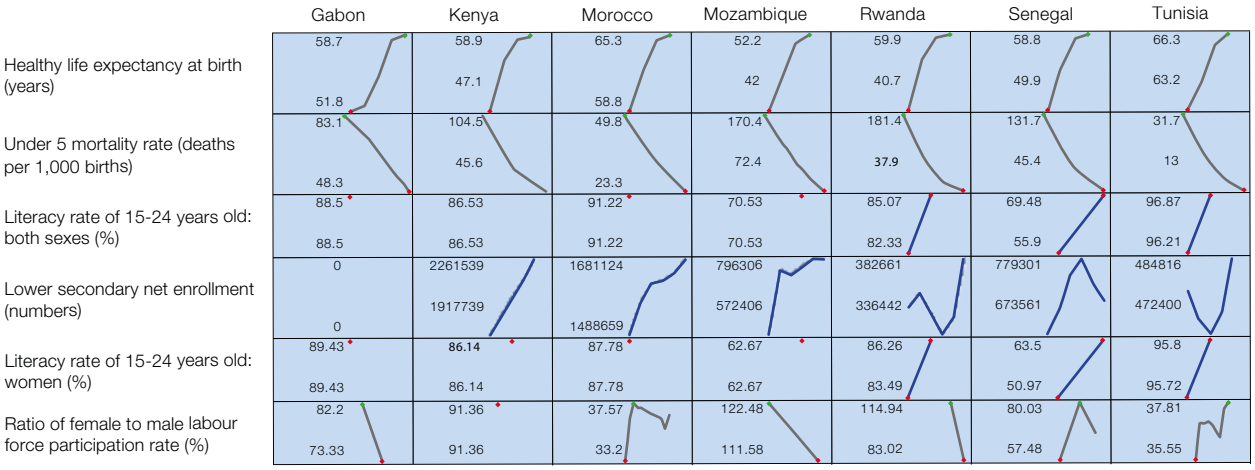

Figure 15: Health, education and labour force participation state and trends in the seven focus countries during 2010-16 (x-axis)

Despite rapid growth in recent years, internet access rates remain low in the seven focus countries. Rwanda, Kenya, and Senegal reported the lowest access rates, around 50 percentage points lower than Morocco, Senegal, and Gabon. The picture, however, looks different if one considers the quality of infrastructure (extensiveness and condition). For example, Tunisia, considered one of the successes of the Arab Spring, scored highly for utility infrastructure compared with its neighbours (Figure 16). However, the 2011 revolution delayed investment in Tunisia's infrastructure, especially in transport, which affected other sectors of the economy, too. Since 2011, the country has begun to modernise its road network and to expand its highway network from ~600 km to 1,000 km by 2020 (Oxford Business Group, 2019).

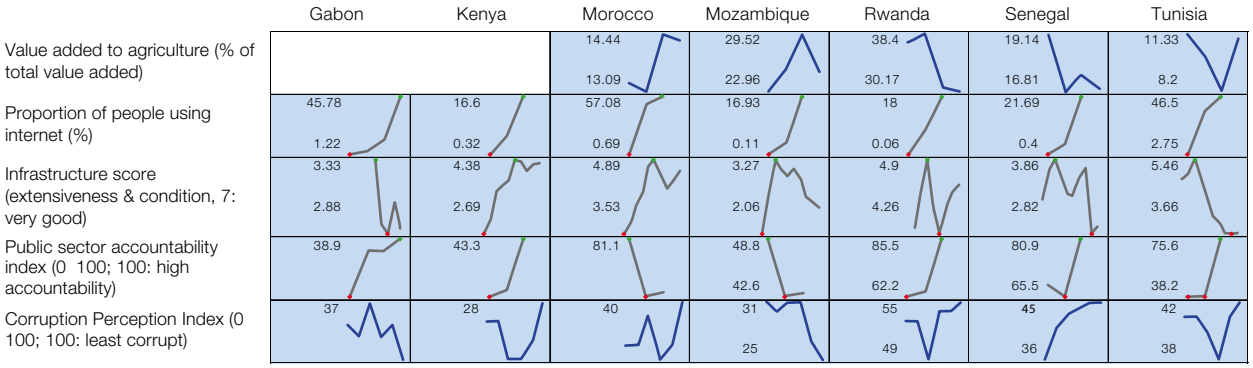

Figure 16: Agriculture, infrastructure and accountability state and trends in the seven focus countries during 2010-16 (x-axis)

Morocco is another emerging success story, despite being a lower-middle-income country. It boasts 1,800 km of motorways (second largest network in Africa after South Africa) and ranks highly for infrastructure quality. This has been achieved through strong public investment in combination with high personal and corporate savings rates and the government's effectiveness in raising revenue from its investments, attracting foreign financing, and developing 'bankable' projects.

A third noteworthy example is Kenya, the logistics hub of East Africa. Efforts including comprehensive policy, institutional and legal reforms in the transport sector, starting in 2007; the establishment of private-public partnerships; the leveraging of concessional financing; a roads investment programme; and a corridor planning programme have led to rapid improvement and expansion of Kenya's road network. The improved road network has contributed directly to economic growth in the past decades.

3.3.3 Green growth transition indicators

The individual focus countries' shares of global GHG emissions remain low, as is the case for most African economies (see Figure 17). Emissions per capita in these countries also remain well below the global average of ~5 tonnes/capita. Nevertheless, total and per capita emissions grew during 2010-2016 in all focus countries apart from Gabon, where per capita emissions have decreased (although total emissions rose due to population growth). Gabon's per capita emissions are the highest of all seven countries because its economy is dominated by the extractive industry (the oil industry accounted for approximately 45% of Gabon's GDP and 80% of exports; World Bank, 2021). However, despite this, the country is currently a large carbon sink as a result of its land use and forestry sector, which sequestered 86.9 $MtCO_2e$ in 2014 (WRI, 2021).

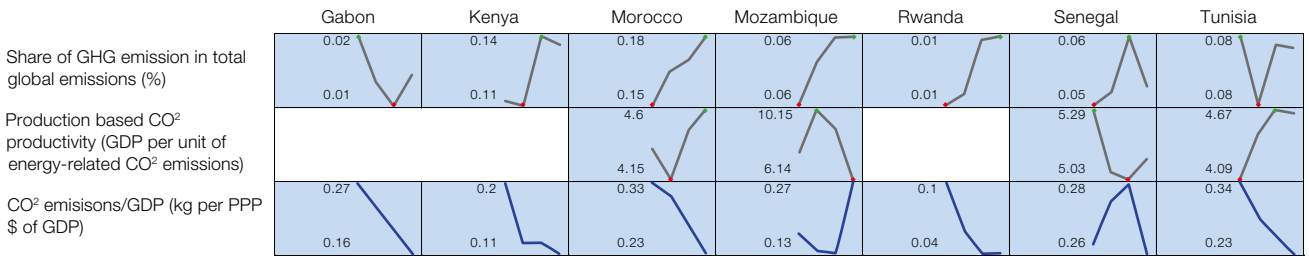

Figure 17: GHG emissions state and trends in the seven focus countries during 2010-16 (x-axis)

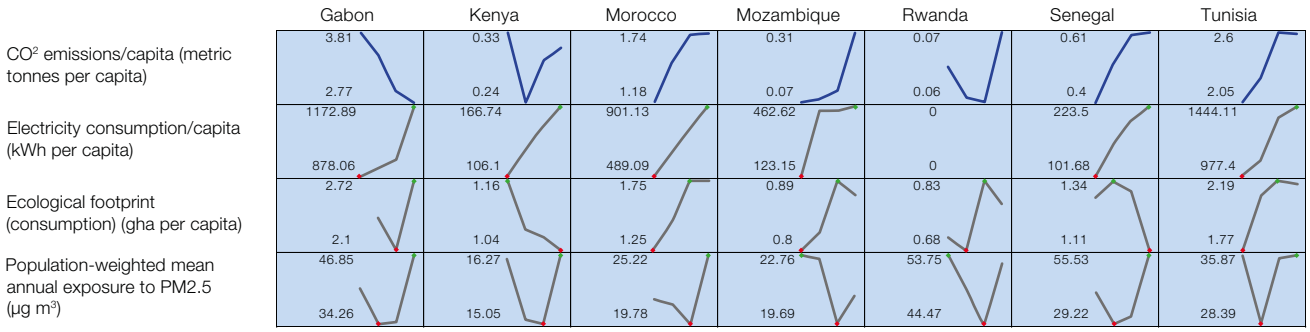

Figure 18: Consumption and environmental impact per capita state and trends in the seven focus countries during 2010-16 (x-axis)

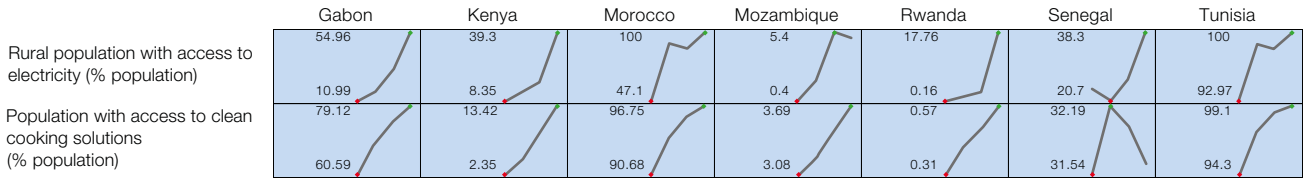

Figure 19: Access to clean energy state and trends in the seven focus countries

Tunisia and Morocco have achieved 100% access to electricity, which is reflected by their relatively high per capita electricity consumption (Figure 18). Though electricity consumption tends to grow with GDP growth, the correlation is not always linear: Morocco's GDP per capita is ~70% of Tunisia's, but its per capita electricity consumption is 60% lower than that of Tunisia. Gabon also has relatively high electricity consumption per capita, likely driven by affluent urban consumers, as more than 40% of the rural population of the country currently has no access to electricity. With the exception of Tunisia and Morocco, rural electrification rates vary widely across the focus countries and significant efforts will be required to achieve universal electricity access (Figure 19).

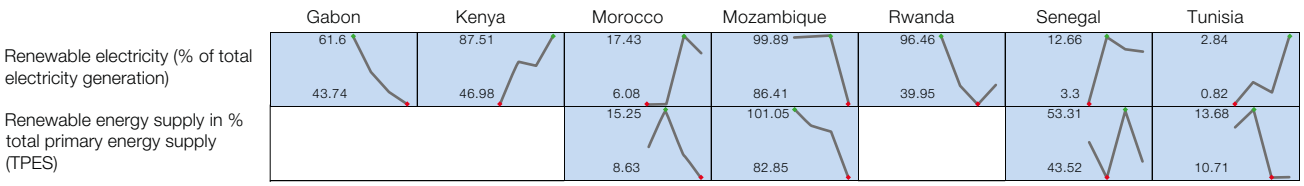

Figure 20: Renewable energy state and trends in the seven focus countries

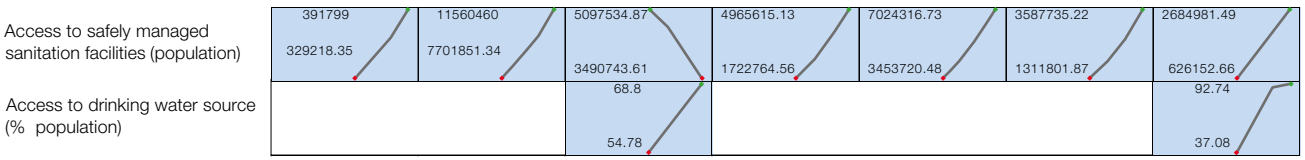

Figure 21: Access to sanitation and drinking water state and trends in the seven focus countries during 2010-16 (x-axis)

Gabon, Kenya, Mozambique, and Rwanda have achieved high shares of renewables in electricity generation (Figure 20). This is primarily due to the dominance of hydropower in their electricity mix (ranging from 60% to more than 90%), which has been one of the key factors contributing to these countries' low per-capita GHG emissions.

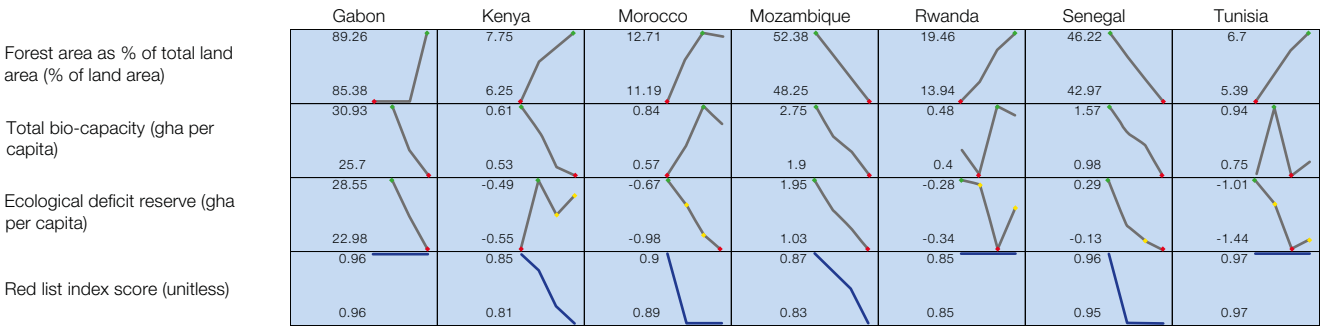

Figure 22: Natural ecosystems state and trends in the seven focus countries during 2010-16 (x-axis)

Gabon, Mozambique, and Senegal were all found to have ecological reserves (rather than deficits) in 2016, although these were shrinking (see Figure 22). The ecological reserve is the difference between biocapacity (per capita) and ecological footprint (per capita). Gabon has the largest biocapacity and ecological reserve among the seven countries, due to its vast forests and small population. However, as its population grows, its per capita biocapacity is shrinking fast (from above 80 gha/capita in 1960 to ~30 in 2016).

Kenya and Senegal are in a similar situation, despite their shrinking ecological footprint per capita and efforts to increase biocapacity, including by expanding forest cover. In Senegal and Mozambique, biocapacity has declined due to the loss of 675,000 km^2 (1990-2005) and 370,000 km^2 (since 1980) of forests, respectively, as a result of a combination of factors such as illegal logging, unsustainable agricultural practices, and clearing for fuel wood and charcoal production. Morocco, the only one among the seven countries with growing bio-capacity, is also experiencing a growing ecological deficit.

3.4 Summary

Overall, the countries in North Africa are making the most progress towards achieving the SDGs, and the countries in Central Africa require the greatest support. With the exception of Tunisia and Morocco, the greatest challenges the focus countries faced were related to access to sustainable services, such as energy and sanitation. Expanding access to digital and physical infrastructure such as the internet and quality roads is key to achieving sustainable growth and development on the continent and will require greater support. Women's empowerment and participation in the economy, crucial drivers for sustainable development, require dedicated, culturally appropriate efforts, as improving access to healthcare and education alone may not deliver the desired results.

Africa remains a continent of low GHG emissions both in per capita and absolute terms. If this is to remain the case, countries need to pursue a high share of renewable generation in their electricity mixes. Sub-Saharan Africa will remain a focal point for realising sustainable development on the continent due to its low clean energy access rates, high vulnerability, and low resilience to climate change impacts. To achieve universal energy access, countries no longer need to choose between grid or off-grid electrification, but instead should pursue the two strategies simultaneously. Renewable energy-based solutions can contribute to achieving universal access while providing climate resilience and mitigation benefits. The protection and enhancement of the continent's valuable natural capital is crucial to maintain the provision of important ecosystem services and protect the livelihoods and resilience of rural and agriculture-based communities.

Chapter 4

Online stakeholder survey on perceptions of green growth readiness

4.1 Overview of survey respondents

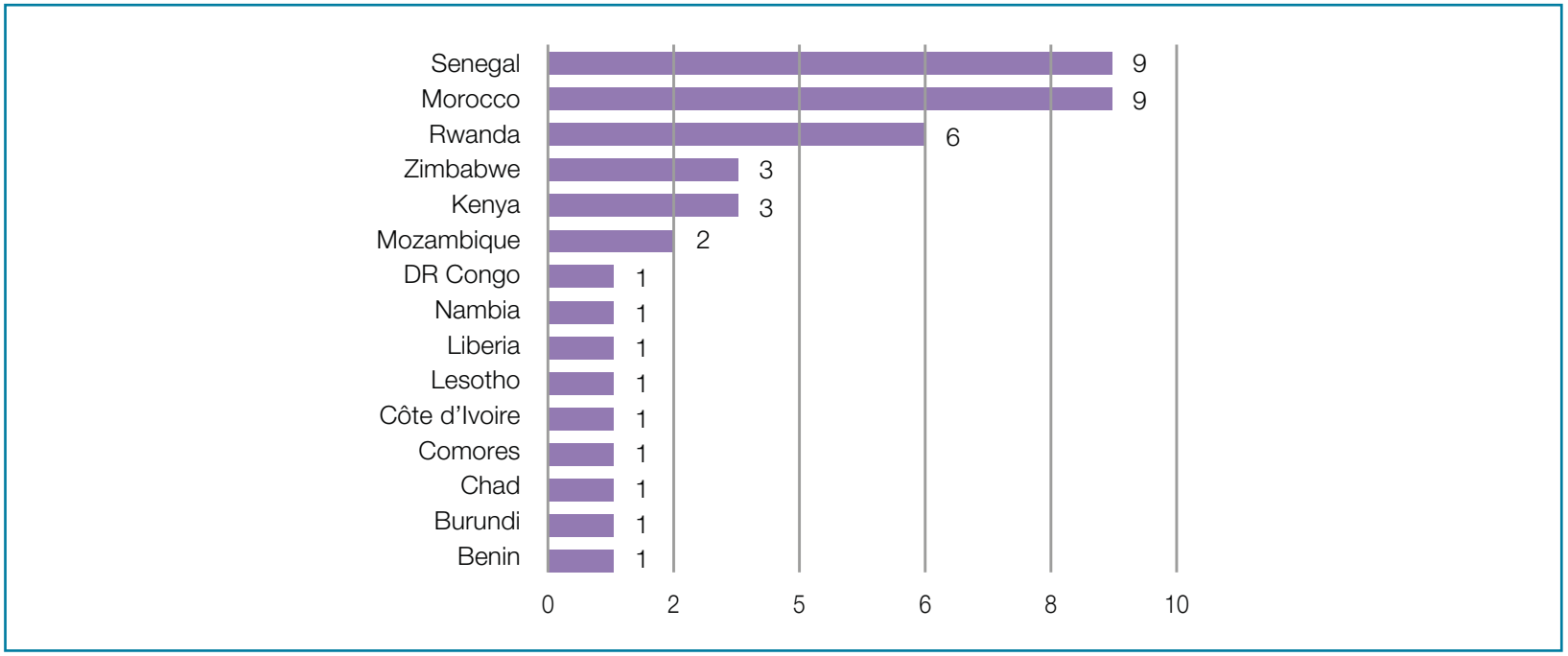

Figure 23: Number of respondents per country

Based on the Green Growth Readiness categories used in this study (see Chapter 2 for details), a questionnaire was prepared to obtain experts' perceptions of their countries' readiness levels in each category. The questions were largely aligned to the indicators defined for each category (in Annex I).

The questionnaire, available in Annex II, was disseminated through an online survey to stakeholders, primarily UNFCCC focal persons, government officials and intergovernmental organisation experts, in all 54 African countries. The questionnaire contained multiple choice questions, the majority using a Likert-type scale, and requested narrative details where necessary.

Response rates to the online survey were low: only 42 responses were received from 15 countries, as indicated in Figure 23. The most responses were received from the case study countries Senegal (9), Morocco (9), and Rwanda (6). The high response rate from case study countries is the result of direct contact between the study team and green growth experts in those countries.

Since the number of responses from each country was different, the survey data was weighted to accurately reflect and identify trends in African countries. For example, each respondent from Senegal counts as only 0.11 (1/9) respondents, whereas the respondent from Chad is counted as 1 respondent.

Due to the low response rate, the results of the survey were considered as indicative and not as conclusive evidence. These indicative results were taken into consideration in preparing country assessments of green growth readiness.

The section below provides a summary of selected responses from the survey.

4.2 Findings

4.2.1 Political commitment

Country-level political vision for and commitment to green growth was assessed through the question of whether or not "Government at executive level has committed itself to the green growth agenda including implementation of NDCs and SDGs (*eg* pronouncements of Head of State, Head of Government or member of Cabinet)". Follow-up questions asked respondents whether they agreed with the statements: "Champions are actively pushing the implementation of NDC of the country (*eg* convening high-level awareness-raising and debate at summit level and national platforms)" and "There is strong stakeholder buy-in for NDC implementation, indicated through interactions in summits or national forums". Respondents were asked to provide evidence of high-level political commitment in the form of publications and websites that featured speeches of heads of state and government in which they expressed support for the NDC and SDG agendas.

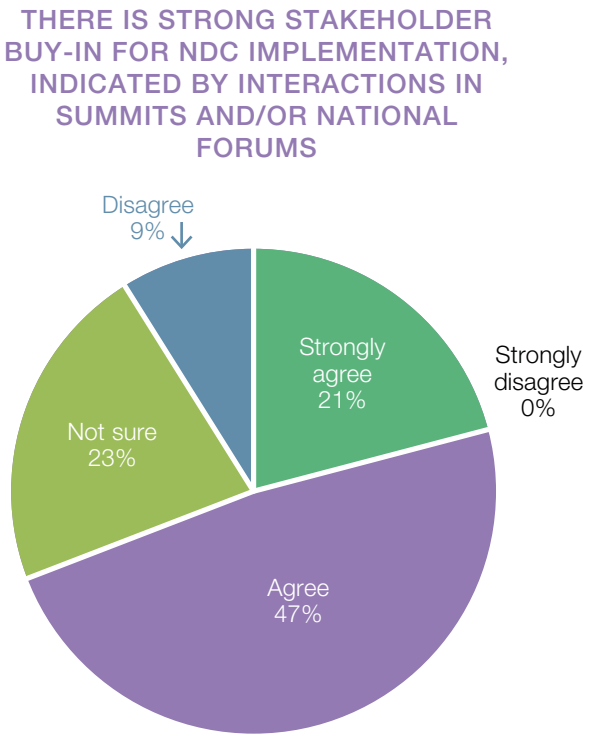

Figure 24: Perception of stakeholder buy-in for NDC & SDG implementation

The majority of respondents indicated that there is strong stakeholder buy-in for NDC implementation (see Figure 24), and that governments and other actors actively championed the implementation of NDCs and SDGs. Respondents provided examples of NDC and SDG implementation champions, primarily government institutions, UN agencies, international development agencies and multilateral development finance institutions (World Bank and AfDB).

4.2.2 Institutional and governance readiness

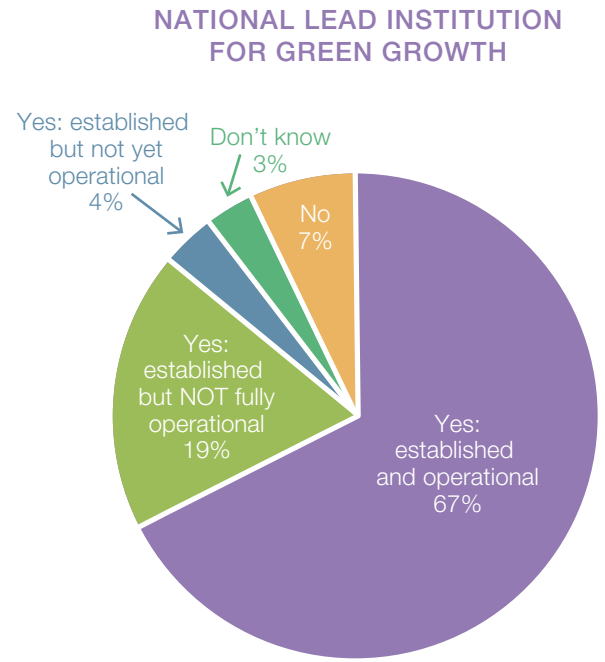

Figure 25: Existence and functionality of national lead institutions responsible for (a) Green Growth, (b) NDC implementation, and (c) SDG implementation

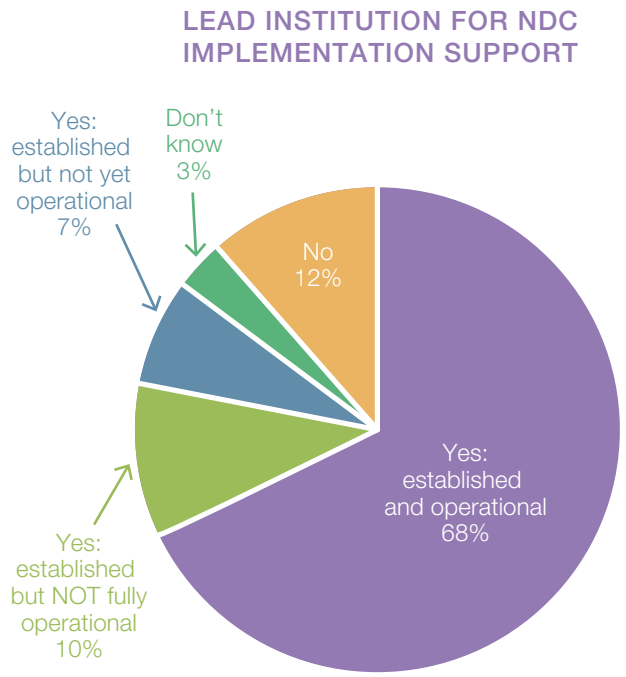

Figure 26: Existence and functionality of inter-ministerial coordination for the implementation of NDCs and SDGs

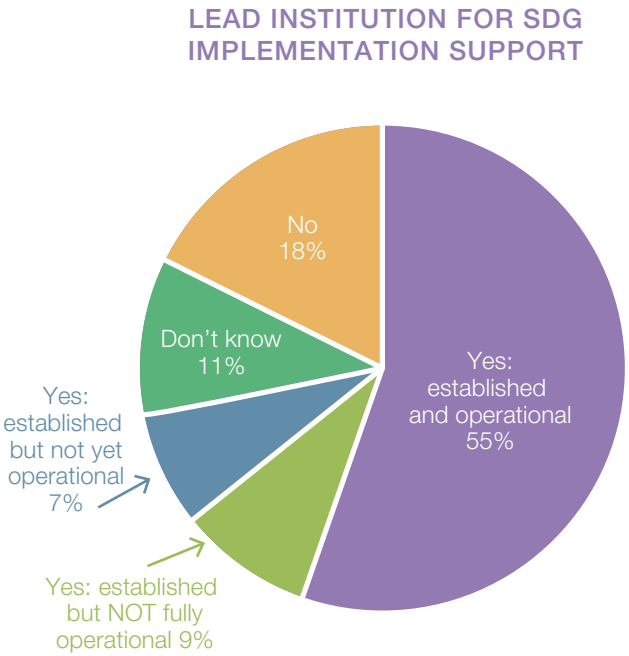

Figure 27: Existence of multi-stakeholder feedback platforms for NDC and SDG implementation

The majority of respondents (67%) indicated that national lead institutions responsible for green growth had been established and were operational. An additional 23% indicated that such institutions had been established but were not yet operational (Figure 25). Respondents cited lead institutions including agencies in charge of environment and climate change, institutions for environmental regulation and natural resources management, development/ investment promotion agencies, national green funds, private sector umbrella bodies, and multilateral development banks.

Lead institutions for the implementation of NDCs were also in place and operational according to the majority of respondents (68%), and another 17% of respondents indicated these had been established but were not yet (fully) operational (Figure 26).

Though 55% of respondents indicated that their countries had officially mandated an institution to support the implementation of SDGs, which was operational, 16% of respondents stated that these institutions were not yet operational, and 29% indicated that no lead institution had been designated or that they did not know (Figure 27). In each case bar one, respondents indicated that the institutions responsible for SDG implementation were national statistics bureaus or similar institutions.

Most respondents indicated that inter-ministerial coordination took place in their country for the implementation of NDCs and SDGs (48%), only for NDCs (20%), or only for SDGs (8%). Respondents provided examples of coordination bodies that included dedicated national committees on climate change or sustainable development, ministries responsible for environment and climate change, high-level steering committees, and executive offices (*eg* office of the president or prime minister). The majority of respondents (58%) could identify operational multi-stakeholder feedback platforms for the implementation of NDCs and SDGs, including websites featuring forums, mostly managed by the inter-ministerial coordination bodies.

4.2.3 Policy and planning readiness

Country-level policy readiness for NDC and SDG implementation was assessed by investigating the existence of national policies and action plans on green growth, and alignment of NDCs with national development plans. Almost half of respondents indicated that national green growth strategies (40%) and action plans (43%) were available (Figure 28a, b). Similar numbers of respondents indicated that NDCs were well aligned with national development plans (Figure 28c) and that action plans for implementation were in place (Figure 28d).

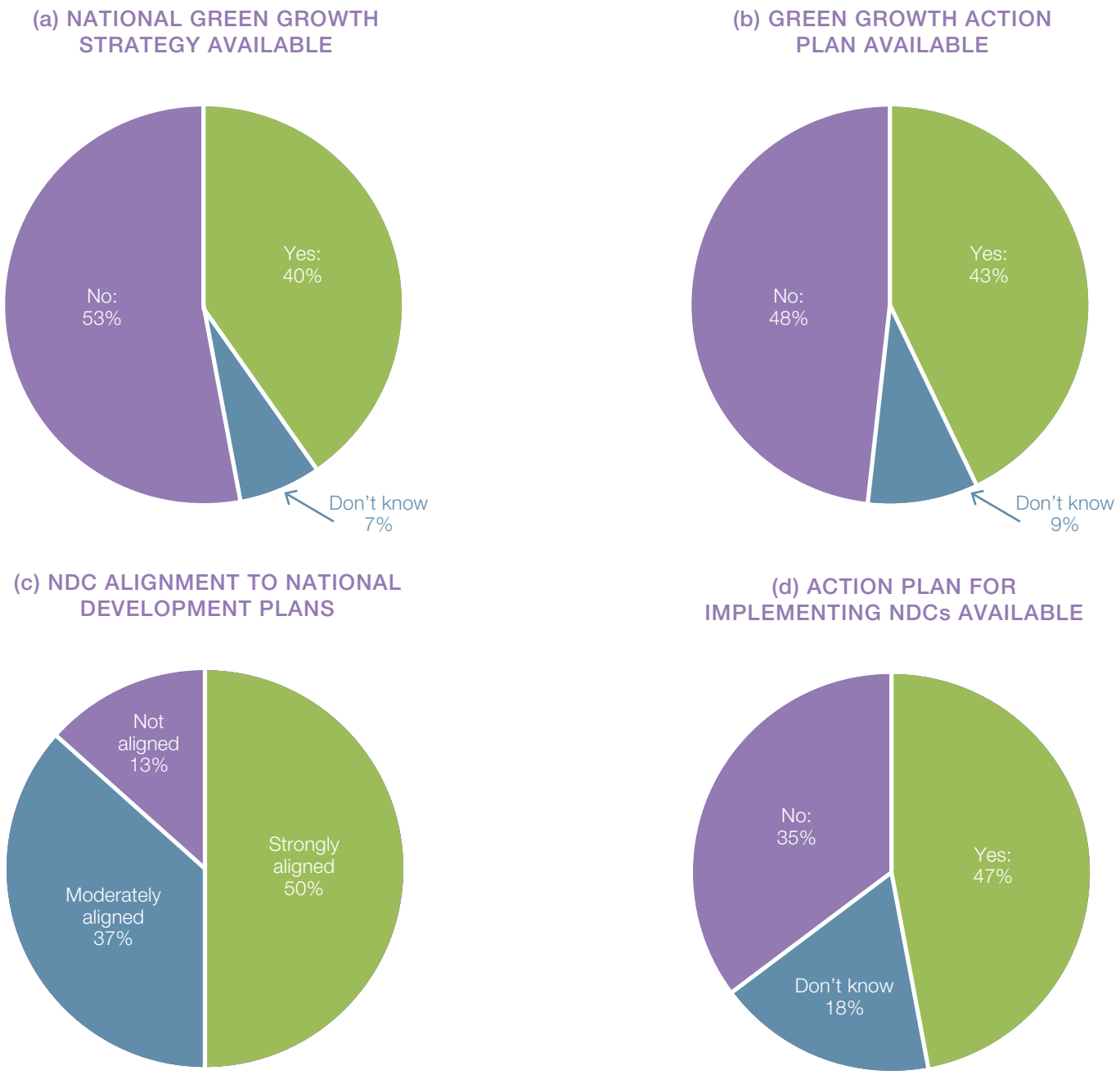

Figure 28: Policy readiness indicators for NDC implementation (a) National Green Growth Strategy available; (b) Green Growth Action Plan available; (c) NDC alignment to national development plans; (d) Action Plan for Implementing NDCs available

4.2.4 Sectoral readiness

Sectoral readiness for country-level implementation of NDCs and SDGs was assessed by looking at the availability of green investment plans and effective incentives. Close to half of the respondents (40%) said that state and private sector green investment plans existed and provided examples of investment plans, particularly for renewable energy and resource-efficient manufacturing. The other respondents said no such plans were in place or they did not know (Figure 29).

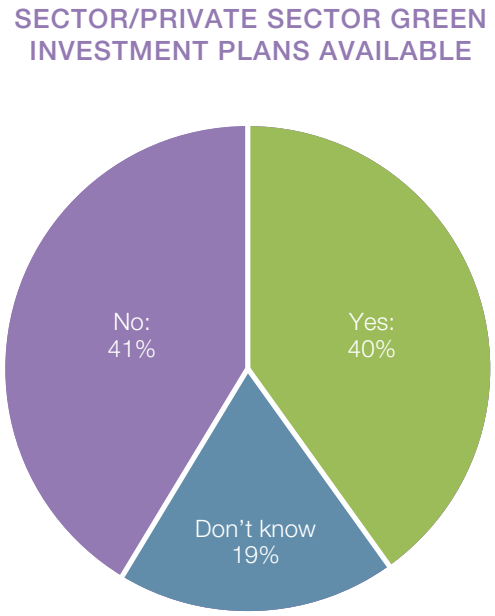

Figure 29: State and private sector green investment plan availability

Respondents were also asked if priority climate change mitigation, adaptation, and resource-efficient technologies for selected sectors had been identified, to which the majority (76%) responded positively.

4.2.5 Legal and regulatory readiness

The existence of key green growth regulations and/or incentive frameworks for promoting the implementation of NDCs and SDGs, including subsidies for sustainable transport and clear regulation of off-grid renewables and green buildings, was used as an indicator to assess country-level legal readiness for green growth.

Regarding incentives, only 36% of respondents agreed or strongly agreed that appropriate incentive frameworks for implementing NDCs were in place in their countries. The other respondents either disagreed (34%) or were not sure (30%), as shown in Figure 30.

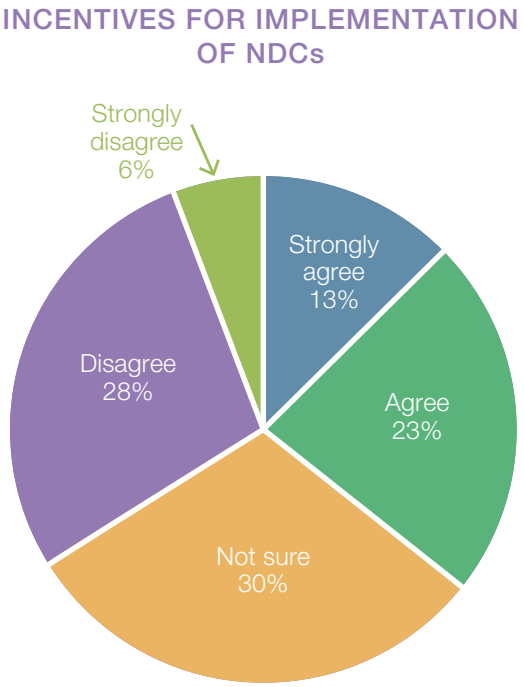

Figure 30: Availability of incentives for implementing NDCs

4.2.6 Financing and budgeting readiness

Country-level financing readiness was assessed by looking at mechanisms available to governments for financing NDCs and SDGs, as well as national mechanisms (*eg* national green funds) for mobilising and disbursing climate finance, and the existence and functioning of entities accredited for direct access to climate funds. A relatively small share (36%) of the respondents said that a government financing mechanism was in place in their country; while 60% of respondents said there was none (Figure 31).

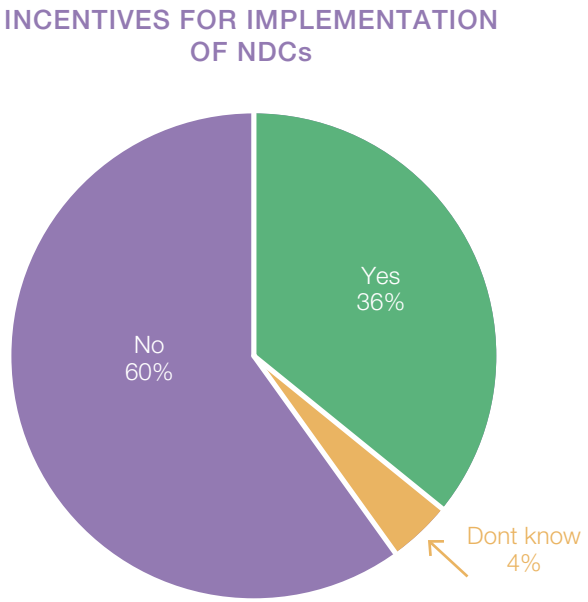

Figure 31: Availability of government mechanisms for financing NDCs and SDGs

The online survey results provided a generally positive outlook, with many respondents indicating that national green funds had been established and were operational (45%); has been established but were not yet operational (10%); or had not yet been established but were planned (43%; Figure 32). Good progress was also reported in terms of accreditation for direct access to international climate funds, with 31% of respondents indicating that accredited entities were operational and 34% indicating that entities had been accredited but were not yet operational. A further 23% of the respondents indicated that accreditation was in process (Figure 32).

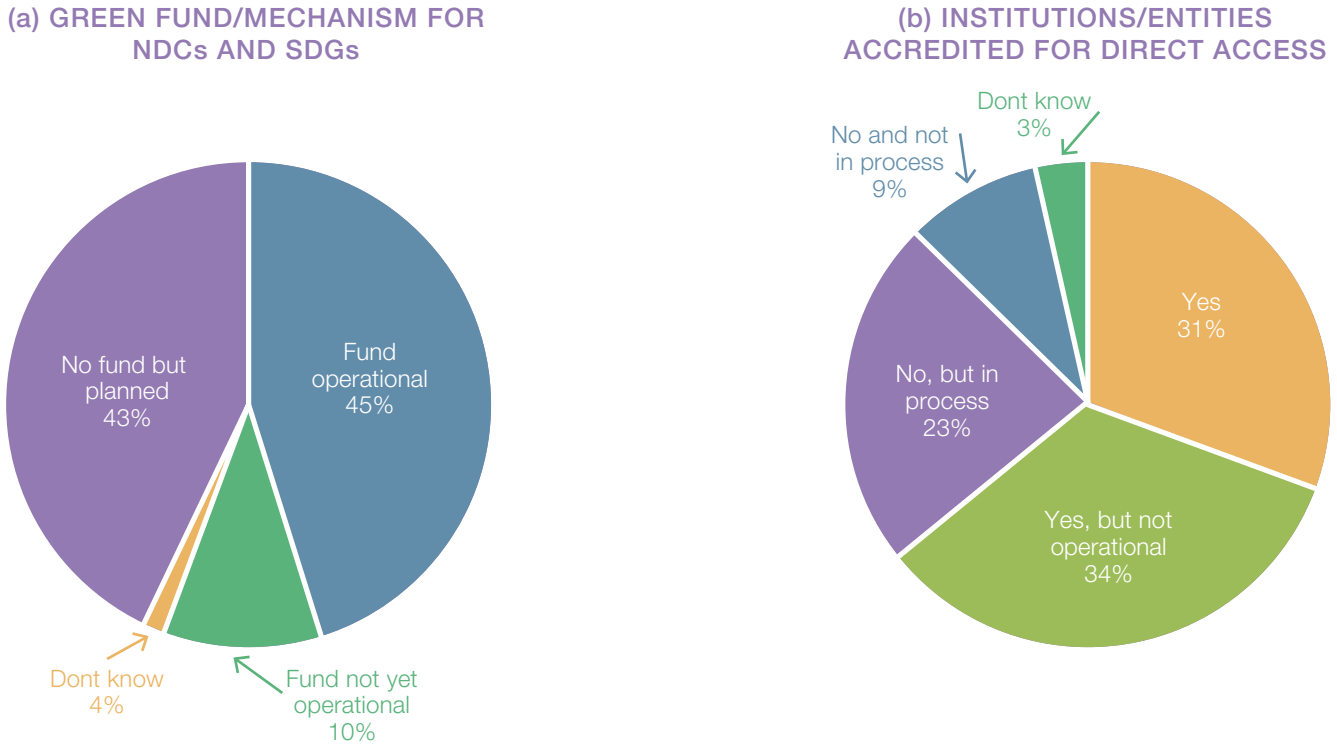

Figure 32: Existence and operationalisation of (a) national green funds and (b) entities accredited for direct access to climate funds

4.2.7 Human resources and capacity readiness

Human resources and capacity readiness was measured by the availability of green growth-related courses in technical, vocational, and educational training (TVET) institutions and universities. A small majority of respondents (43%) indicated that such courses were offered in higher education (Figure 33).

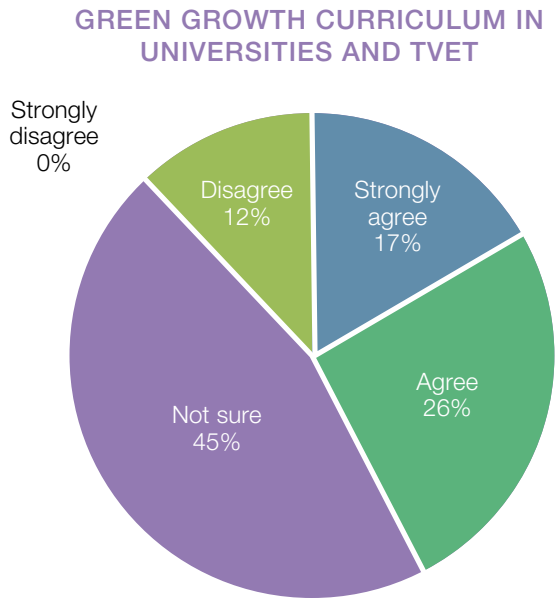

Figure 33: Availability of green growth courses

4.2.8 Monitoring and reporting readiness

Monitoring and reporting readiness was assessed through the question of whether or not monitoring, reporting, and verification (MRV) of progress towards NDCs or SDGs was already or would in the future be integrated into national implementation plans. Approximately half of the respondents said that MRV systems were under development or in place. Respondents pointed to the National Communication modality, the reporting and communication mechanism under the UNFCCC, and most stated that mechanisms were under development for NDC monitoring and evaluation. The monitoring and evaluation of SDG implementation was said to be managed by institutions responsible for national statistics, with support from UN agencies. Challenges cited include a lack of technical capacity and financing support for the development and implementation of tracking systems for NDC and SDG implementation (Figure 34).

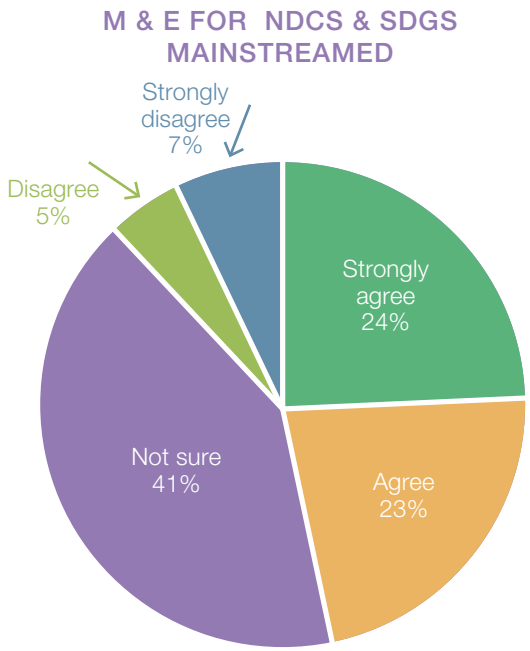

Figure 34: Availability of operational MRV systems for NDCs and SDGs

Chapter 5

Key findings and high-level recommendations of the Green Growth Readiness Assessment

This chapter presents an overview of important findings from the in-depth Green Growth Readiness Assessments of the seven focus countries. An indicative summary of these findings can be found in Table 4. A full list of the indicators used in each readiness category is included in Annex I, illustrated with sample results from Tunisia.

TABLE 4: MATRIX OF INDICATIVE AND RELATIVE COUNTRY READINESS ACROSS THE NINE DIMENSIONS

READINESS CATEGORY	KENYA	TUNISIA	MOZAMBIQUE	GABON	SENEGAL	RWANDA	MOROCCO
Political commitment							
Institutional & governance							
Policy & planning							
Sectoral (targets and plans)							
Legal & regulatory							
Financing & budgeting							
R&D and innovation							
Human resources & capacity							
Monitoring & reporting							

5.1 Political commitment

A country's political vision for and commitment to green growth can be assessed in several ways, including by looking at who in the government champions the green growth agenda, the existence of approved policy documents on green growth and climate change, the submission of and ambitions demonstrated in the country's NDC and LT-LEDS, and the budgetary commitment made for the execution of green growth and climate change initiatives.

Many African states have demonstrated a high level of political commitment and vision. In Kenya, for example, the National Climate Change Council (NCCC) is chaired by the President. In the kingdom of Morocco, the King is at the forefront of green growth initiatives and champions the transition of the kingdom towards a low-carbon and climate-resilient economy. Kenya, Morocco, and Tunisia have enshrined fundamentals of green growth, including the right to a clean and safe environment and citizens' right to consultation, in their constitutions. The governments of Rwanda, Kenya, Morocco, Senegal, and Mozambique have adopted green growth and climate-resilient economy strategies.

Although the case study countries do not explicitly report on climate- and green growth-related expenditure, they have earmarked budgets for greening actions and/or established green funds. For instance, the government of Kenya earmarked about 2% of the national budget for greening initiatives, while Rwanda makes annual contributions to its national green fund. The government of Mozambique is one of the contributors to its rural energy access fund, which is primarily focused on funding off-grid renewable energy installations. Similarly, Morocco and Tunisia have started initiatives for public green investments that are aligned with development goals. In Tunisia, the government will carry out energy audits on 350 towns, insulate 65,000 homes, install solar panels on the

roofs of government buildings and mosques, replace 400,000 old refrigerators and 4 million incandescent bulbs, and equip 450,000 public lighting points with LEDs.

While the abovementioned signs of high-level commitment to green growth are promising, the perception among stakeholders is that such high-level announcements and strategies are not always followed up with effective action plans and projects. This is partly due to a lack of effective mainstreaming of climate change and green growth into nations' development plans and to non-approval or non-translation of strategies into concrete action plans. Achieving broader stakeholder support for climate action and green growth actions also remains an issue, as stakeholders are not always aware of the cost of inaction, available solutions, and the benefits of green growth for their own sector. It is important that the links between climate action, green growth, and SDGs are better articulated by governments to boost stakeholder buy-in.

Recognising the need for green growth championship at the highest level and for enhanced support for green growth mainstreaming from a wide range of stakeholders, the authors put forward the following recommendations:

1) Support activities that demonstrate continued political commitment for green growth at the highest level of government, such as high-level forums and the development of government-endorsed green growth visions, with inputs from diverse stakeholders.

2) Support activities that increase awareness of the benefits of, and best practices by sector for, the pursuit of climate action and green growth, and their links to achieving national development goals. Awareness raising is necessary at all levels of government, in local communities and in the private sector (particularly among SMEs).

5.2 Institutional and governance readiness

Inclusive green growth by its very nature requires multi-sectoral and multi-stakeholder approaches. The institutional and governance dimension of green growth readiness assesses a country's preparedness by looking at whether institutions responsible for leading green growth, SDG and NDC action have been designated or established, the existence of coordination mechanisms for designing and implementing effective government-led climate action and green growth approaches, and the extent of dependence on external (donor) support to implement these activities.

The seven case study countries have each designated a national authority for climate and green growth coordination.

Institutional arrangements for green growth are required at three levels; 1) umbrella inter-sectoral and multi-stakeholder coordination at the national level; 2) technical cross- and intra-sectoral coordination; 3) coordination at sub-national levels. Countries manage national-level coordination in different ways. For instance, Kenya, Senegal, Rwanda, and Mozambique have established national inter-ministerial and multi-stakeholder coordination bodies, while Tunisia, Morocco, and Gabon have each tasked a single ministry with coordinating green growth and climate change issues.

The coordinating ministry for climate change and/or green growth action is generally the ministry in charge of environment and sustainable development: in Kenya, it is the Ministry of Environment and Forestry; in Senegal, the Ministry of Environment and Sustainable Development; in Mozambique, the Ministry of Rural Development and Environment; in Morocco, the Ministry of Energy, Mines, and Sustainable Development; and in Tunisia, the Ministry of Local Affairs and Environment.

Multi-stakeholder engagement processes for climate action and green growth are conducted through various platforms that gather representatives of the government, the private sector, CSOs, and academia. Notable platforms in the case study countries include the Rwandan High-Level Dialogue on Green Growth, the Climate Change Competency Centre of Morocco (4C Morocco), and the Kenyan National Climate Change Council. To facilitate cross-sectoral coordination at the national and sub-national levels, Senegal has established one National and 14 Regional Climate Change Coordination Committees focused on adaptation.

These inter-ministerial/inter-agency platforms meet at different intervals depending on the country. To include diverse voices while promoting climate action and green growth, the focus countries have also been increasingly active in hosting high-profile international policy forums and excellence centres, such as COP22 in Morocco, the Global Green Growth Forum in Kenya, and the Africa Green Growth Forum and the Sustainable Development Goals Centre for Africa in Rwanda.

The effectiveness of these coordination processes in incorporating multi-agency perspectives and diverse stakeholder views needs further assessment. For example, in Kenya, stakeholders view the government as highly receptive to outside inputs for policy, while in Senegal stakeholders reported a lack of effective participation of the private sector in the development of the national green growth agenda.

In view of the above findings, the authors put forward the following recommendations for countries to enhance institutional coordination for the combined implementation of the NDC, SDG and the DRR agendas:

1) Establish a high-level coordination committee for green growth implementation, with members representing all ministries and major local authorities. Participation of development partners, the private sector, academia, national think tanks, and civil society should also be ensured. The committee should be chaired by a high-level government representative, and its work should be supported by sectoral technical working groups with participation of sector experts. Where NDC and SDG implementation are pursued separately, the coordination committee should ensure coherence.

2) Institute processes that strengthen horizontal as well as vertical coordination among processes at the national and local levels. Such coordination allows for an appropriate representation of local issues at national forums, as well as the adequate and efficient translation of national goals to the provincial/ municipal level.

5.3 Policy and planning readiness

The policy readiness dimension assesses a country's green growth policy ecosystem, to evaluate the quality of the country's enabling environment for green growth and the extent to which its policies are aligned with the commitments made in its NDC as well as the broader SDGs. The dimension also assesses the strategic approaches the countries have adopted for mainstreaming NDCs/SDGs into their national development planning frameworks.

The assessment suggests that most African nations have developed some sort of green growth policy and have made an effort to create an enabling policy environment for green growth. However, the structure and functionality of countries' green growth policy ecosystems vary widely. The outcomes of the assessment reveal three primary approaches for green growth policy: approach 1) standalone climate change and/or green growth strategies and action plans (Kenya, Rwanda, Morocco, Mozambique); approach 2) broader sustainable development strategies and action plans, which also seek to address climate change and different environmental issues (Gabon, Senegal); and approach 3) a sector-focused approach (Tunisia, focusing on energy, and Mozambique, focusing on energy and forestry).

While many countries initially pursued the first approach of developing climate action and green growth plans separate to the national development planning process, more and more countries are now taking the second approach. Also, as the environmental sustainability and climate change agenda has gained traction in international and national development discourses, countries are increasingly integrating existing green growth strategies and action plans – developed under the first approach – into their national development plans to ensure systematic implementation. For example: Kenya's green growth strategy has been integrated into its Vision 2030; Rwanda's has contributed to and been integrated into its National Strategy for Transformation 2018-2024; and Morocco has integrated its green growth action plan into its National Sustainable Development Strategy 2030. In some cases, these green growth strategies – developed prior to 2015 – also formed the basis for the NDCs submitted to the UNFCCC in 2015, *eg* Ethiopia's Climate Resilience Green Economy (CRGE) strategy formed the basis for its first NDC.

Different approaches to mainstreaming green growth strategies into sector policies, strategies, and programmes were observed. Most countries present a list of policies, strategies, and programmes that are compatible with green growth or that contribute to the fulfilment of objectives in green growth and climate change action plans. For instance, Kenya, Rwanda, and Morocco provide a list of existing green growth-compatible sectoral policies and strategies, and also have green growth and climate change action plans that include sections on different sectors and cross-sectoral activities. Other countries still lack a green growth blueprint but do have sector strategies and policies in place to support green growth efforts. For instance, Tunisia and Senegal do not have general green growth strategies, but in Senegal, the National Strategy for Economic and Social Development (2013-2017) calls for the promotion of sustainable production and consumption methods, and Tunisia also has a Strategy for Sustainable Production and Consumption.

Long-term visions and plans can assist countries in planning for the low-carbon transition in a holistic way. LT-LEDS, which outline multi-sectoral deep decarbonisation and systemic change pathways for economies to meet the Paris 1.5°C goal, can engage diverse stakeholders in the process and help governments flesh out the cross-sectoral synergies and trade-offs involved in the transition. The submission of an LT-LEDS to the UNFCCC also highlights a country's ambition and commitment to the efforts of the international community. As of August 2020, only 17 Parties have communicated an LT-LEDS to the UNFCCC. Some additional Parties may still intend to submit a LT-LEDS to the UNFCCC in 2020 or ahead of COP26 (November 2021). Benin is the sole African country that has communicated its LT-LEDS to the Secretariat, although its timeframe is not fully compliant (République de Benin, 2016). Other African countries are communicating on their long-term strategies on adaptation (*eg* Burkina Faso's 'Long-Term National Adaptation Plan').[3] In 2021-22, GGGI will be supporting Burkina Faso and Ethiopia to develop LT-LEDS for submission to UNFCCC.

3 For details on 17 LT-LEDS, visit https://unfccc.int/process/the-paris-agreement/long-term-strategies.

As demonstrated above, most countries have adopted broad policies endorsing green growth as a pathway to sustainable development and poverty reduction. Nevertheless, the assessment also revealed that policy implementation is a major challenge. In Tunisia, a lack of officially approved key strategies to consolidate efforts to transition to a green economy and pursue the SDGs, as well as the limited integration of green growth into the National Development Plan, were cited as major gaps. Moreover, it has been reported that some countries' policies fail to address the issues faced by domestic industries, and therefore, domestic industries are likely to miss out on the opportunities presented by green growth investment. For example, the perception prevails in Senegal that renewable energy value chains are dominated by foreign companies that are "killing" national industries.

In summary, countries are pursuing a range of approaches to green growth policy alignment and green growth mainstreaming into national development planning. In many countries, despite the presence of multiple sectoral policies and strategies that contribute to green growth, there is no concrete evidence that these are fully aligned with general green growth policies and strategies. The exceptions are strategies, for the renewable energy and forestry sectors, which are generally developed first, perhaps due to these sectors' importance for development and livelihoods. Most sectoral policies, strategies and programmes have been ascribed green growth impacts, rather than having been critically reviewed and realigned to a green growth vision. Only a few African countries – Benin, Ethiopia, and Burkina Faso – are pursuing LT-LEDS, an essential tool for gaining multi-sectoral buy-in and facilitating holistic planning for low-carbon green growth that maximises co-benefits such as job creation and pollution prevention, and is fully aligned to the Paris Climate Agreement and the SDGs.

In light of the above, the authors put forward the following recommendations for enhancing policy readiness:

1) Develop and plan the national green growth strategy specifically around key sectoral pillars and actions. Take into account existing sectoral visions and plans when formulating new national visions and plans, including NDCs and SDG strategies if these precede the green growth plan.

2) Institute processes to mainstream climate resilient green growth approaches into national development planning and align budgeting processes to facilitate implementation. This can be achieved, for example, by making interagency consultations mandatory for major policy and regulatory formulation exercises, to ensure policy coherence and mainstreaming of green growth.

2) Pursue development of LT-LEDS aligned to the 1.5°C goal of the Paris Agreement and country SDGs.

5.4 Sectoral readiness

Sectoral readiness for green growth is evaluated by assessing the availability of sector-specific analyses of business-as-usual *vs* green growth scenarios, sectoral green growth strategies, roadmaps, and investment plans. Sectoral readiness is essential for translating national goals and strategies into sectoral implementation targets and plans that can attract private sector investment.

The assessment suggests that progress towards sector readiness in the focus countries and across Africa in general is mixed. Various approaches are used to translate national green growth policies and strategies into plans for key economic sectors. One approach identified is the inclusion of sector and cross-sector pillars in national green growth/climate change action plans. These action plans usually contain cost estimates for the achievement of sectoral targets for, for example, GHG emissions reductions. Countries adopting this approach make an effort to integrate green growth into planning in all economic and social sectors, overseen by a single ministry, such as the ministry of environment. While this results in holistic views of, and approaches to, green growth and its associated investment needs, it also risks leading to a lack of ownership by sectoral agencies and ministries. These may view the strategy as an external document, unless they are adequately consulted and engaged during the formulation of national strategies and plans.

Thus, the integration of green growth into sectoral strategies, policies and programmes is key to ensuring ownership and implementation by relevant agencies or ministries. An example of such a sectoral approach is the Green Growth and Climate Resilience Strategy of Rwanda, which aims to mainstream green growth in an integrated way in all major sectors. To achieve this, the Strategy incorporated inputs form different ministries, which resulted in the development of 14 action programmes, including programmes to achieve integrated water resource management, a low-carbon energy mix, green industry and private sector investment, and green urbanisation. Similarly, the Kenyan strategies and action plans for green growth and climate change outline sectoral and cross-sectoral priorities, and also provide an estimate of the financing required ($40 billion up to 2030).

The second approach for translating national green growth strategies into sectoral targets is to focus on sectors with high green growth potential and importance to key SDGs. For instance, the Green Morocco Plan set up public-private partnership programmes to support the National Irrigation Water-Saving Programme and a National Energy Strategy. In most countries, the energy (infrastructure) and forestry sectors are designated priority sectors for green growth financing. Countries also generally aim to build on existing good practices and climate compatibility in priority sectors (as seen in Mozambique, Gabon, Senegal, and Tunisia). For example, in Senegal, renewable energy, agriculture, and transport were focus sectors when the Emerging Senegal Plan was launched in 2014, and Tunisia was the first African country to establish a specialised agency for energy conservation in 1985.

In summary, sectoral alignment and mainstreaming of green growth (and climate change/NDCs) is still a work in progress in the focus countries and elsewhere in Africa. For example, in the focus countries, the NDCs are yet to be translated into costed sectoral investment plans.

The authors recommend the following measures to enhance sector readiness:

1) Translate national green growth strategies and climate change plans (NDCs) into sectoral and local targets and costed investment plans. If green growth strategies are not available, consider developing these for key sectors and demonstrating how the plans meet important climate change mitigation and adaptation, development, disaster risk reduction, and economic growth/diversification goals.

2) Improve plans for sectors with significant green growth potential, such as climate-smart agriculture, renewable energy, energy efficiency, green infrastructure, climate-smart cities, sustainable transport, integrated water resource management, and the blue economy.

5.5 Legal and regulatory readiness

The green growth transition requires legal and regulatory reforms to establish an enabling environment. It is widely recognised that appropriate regulations and incentives can provide the required impetus for green growth actions and motivate behavioural changes.

The assessment reveals that African countries have started adopting a range of regulatory measures and incentives to advance green growth and climate action, including targeted financial incentives for compliance with green growth measures and standards. For instance, Rwanda, Kenya, Morocco, and Tunisia have passed duty and VAT exemptions for renewable energy equipment and energy efficiency-related investments. Feed-in-tariffs, power purchase agreements (PPAs) and auctions are important mechanisms to drive the expansion of renewable power generation capacity. Ghana, Mauritius, Uganda, South Africa, and Zambia have run such auctions, and at least 15 other Sub-Saharan African countries are developing similar programmes (IRENA, 2018).

Morocco's Water Law requires the sustainable use of groundwater for farming and household activities, in response to increasing water scarcity in the country due to climate change. Kenya and Morocco both removed subsidies on petroleum products, and Mozambique is gradually abolishing fossil fuel subsidies and increasing electricity prices to reflect commercial realities in the sector. Tunisia is working to phase out its high fossil fuel subsidies, and recently received a $500 million World Bank loan to support key reforms, including the shift of resources from fossil fuel subsidies to renewable energy development. Senegal has established a legal framework for the sustainable development of renewable energy, mainly to ensure a diversified energy mix, energy security, and a lower reliance on fossil fuels. The successful application of the above mentioned instruments suggests that the untapped potential of fully aligning legal and regulatory measures to drive green growth and climate action is enormous. However, and as mentioned before, countries have limited institutional and human resource capacity for regulatory reform and enforcement, a barrier that needs to be addressed.

While the focus countries have gained experience in the formulation and implementation of legislative and regulatory reforms for green growth, thus far the majority of regulations adopted have been aimed at creating incentives for green growth actions or motivating behavioural changes, and few have employed taxes, mandatory standards, and similar compulsory measures. It is too early to comment on the effectiveness of new regulations, but countries should begin exchanging good practices for drafting, approval, and enforcement processes. The assessment found that existing legislation such as laws requiring EIAs and SEAs, as well as voluntary practices such as CSR, can play an important role in facilitating green growth. However, countries need to address incoherencies among regulations.

The authors put forward the following recommendations to adopt and improve regulatory instruments that support the implementation of green growth strategies and plans:

1) Accelerate the adoption and implementation of legal and regulatory reforms and market mechanisms in key sectors to accelerate the shift of behaviours, investments, and innovations from brown to green production and consumption practices. Shift subsidies from fossil fuel-based production to greener alternatives.

2) Consider mandatory instruments that force a quicker transition in key sectors, such as environmental taxes and mandatory energy efficiency standards.

3) Conduct comprehensive regulatory reviews to identify incoherencies in regulations governing key green growth sectors that address key development issues, such as off-grid renewable energy, which supports rural electricity access and can improve agricultural livelihoods, education, and health in rural areas.

5.6 Financing and budgeting readiness

Green growth financing readiness is measured by assessing the availability of adequate financing to implement green growth strategies, and countries' ability to mobilise and channel finance from local and international sources through various means, including national climate and sustainability-oriented funds. Achieving financing readiness also entails the development of policies and systems to boost the required private sector participation for local innovation, job creation, and scale-up of the transition. The green growth transition requires substantial investment, as clearly indicated in most African NDCs. A study by the African Development Bank suggests that the implementation of 44 African NDCs will cost approximately $2.35 trillion (AfDB, 2018b). Many countries have made their NDC commitments contingent upon substantial financial, technological, and capacity building support from international sources. For instance, Kenya estimated it would need $40 billion in international support by 2030 to implement its climate change and green growth action plan.

A lack of access to finance is a major barrier to scaling up climate action across the continent. Most countries have underdeveloped financial sectors, which results in high transaction costs, high-risk premiums and high collateral requirements for the private sector (KfW, 2019). IFC has indicated that there are at least 44 million formal MSMEs in Sub-Saharan Africa, of which 51% struggle to access the financing they need to grow (IFC, 2018). At the consumer level, a large majority of rural populations and informal workers lack bank accounts, which makes it difficult for firms to assess their customers' creditworthiness. Mobile money and other financial technology solutions are contributing to closing this gap. In addition, governments experience capacity limits that hamper their access to international climate finance. For example, government representatives have indicated that they have struggled to complete the rigorous accreditation process required for national entities that wish to receive funding from the Green Climate Fund (GCF; Green, 2018), a process that can take more than 500 days, according to recent analysis by the GCF itself (GCF, 2020).

Positive efforts are emerging throughout the region to overcome this access to finance challenge, including in Kenya, Rwanda, and Mozambique. Kenya and Rwanda have established dedicated climate change/green growth funds to mobilise domestic and international financing and channel it into public and private projects. The government of Rwanda has recently formalised that country's green fund and capitalised it with over $160 million. The governments of Kenya and Rwanda contribute to these funds from their national budgets. The effectiveness of these mechanisms varies. Kenya's fund is yet to be fully developed, while Rwanda's green fund (FONERWA) is operational and has mobilised and disbursed more than $100 million to various climate projects, supporting local entrepreneurship and job creation in the process. While such dedicated national financial mechanisms have proven useful, other effective strategies for accessing international climate funding exist. For example, Morocco does not have a dedicated national climate fund. However, two national entities, the Agency for Agricultural Development (ADA) and CDG Capital SA, are accredited to the GCF, the world's largest climate fund. By 2016, Morocco had received $960 million for 29 projects, in the form of loans and loan/grant combinations from various multilateral and bilateral sources. The Moroccan government also invested $2.45 billion of public money in emerging areas such as renewable energy. Similarly, Senegal has not yet established a national green/climate fund, but its Centre for Ecological Monitoring (CSE), accredited to the GCF and the Adaptation Fund (AF), is working on green growth/adaptation projects at national and sub-national level in the country and other countries in the region as well. Tunisia has also made arrangements to financially support climate action and green growth projects. For example, its Energy Transition Fund, Pollution Reduction Fund, Competitiveness Development Fund, and National Upgrade Programme are all financial mechanisms that support green growth projects in specific sectors or addressing specific issues.

There are other examples of mechanisms to mobilise climate finance from domestic and international sources, including market-based instruments such as taxes, green bonds, investment funds, and guarantee instruments. Morocco has initiated the creation of a domestic carbon market. Under an initiative named SUNREF East Africa, implemented in Kenya, Uganda, and Tanzania, the French Development Agency (AFD) seeks to increase the availability of renewable energy and energy efficiency project financing and green credit under favourable conditions (low interest rates, long tenor, grace period) in collaboration with local banks. In Tunisia, international banks play a prominent role in the financing of large renewable energy projects. A green bond market is also emerging in Africa, primarily in South Africa, Morocco, Nigeria, and Kenya. South Africa, Morocco, and Nigeria have advanced programmes with national networks and bold initiatives. These bonds target sectors important to green economy, such as buildings, transport and energy, and waste. Nigeria has launched a climate-certified sovereign

green bond. South Africa was the first among emerging nations to issue green bonds and has issued several municipal bonds (SSFC, 2020).

The authors recommend the following actions to boost financing for green growth:

1) Strengthen existing national climate funds and promote the creation of new ones. These funds could focus on key sectors such as renewable energy, especially where best practice examples from other African countries are available.

2) Provide regulatory incentives for private sector participation and investments in green growth projects. Design planning processes to involve the private sector from the beginning of the process rather than at the implementation stage.

3) Support MSMEs and sectors that enable job creation for women and youth.

5.7 Research & development and innovation readiness

Local innovation and entrepreneurship are drivers of economic and social progress. According to the UNFCCC (2018), "by generating new products, services, businesses, organisational models and behavioural changes, innovation speeds up and scales up national efforts to address climate change". Innovation is thus essential for the transition to and maintenance of green growth. A favourable regulatory ecosystem is a key enabler for effective innovation. Besides providing access to affordable finance, governments should protect intellectual property rights to boost research and development (R&D), the availability of and access to mitigation and adaptation technologies, and innovation.

Green growth-related science and technology innovation is still in its infancy in Africa, partly due to insufficient resources. Institutional capacity for R&D is still under development, and the network density of intra-African science and technology research and innovation communities is low. Private sector engagement in R&D and innovation is also rather limited. The number of academic publications in Africa as a whole is growing faster than the global average, and the continent's share of global publications has increased to 3.2% in 2016, from just 1.5% in 2005. However, only a handful of countries – South Africa, Egypt, Tunisia, Morocco, and Algeria – are responsible for the majority of these publications. Patent activity in Africa accounted for only 0.5% of the global total in 2016. The dominant fields of research in Africa are agriculture and health (tropical medicine and infectious diseases). Physical sciences and STEM must be further promoted to facilitate an innovation and technology-driven green growth transition (African Union, 2019).

It is important to note that most of the countries covered by this study have developed Technology Needs Assessments (TNAs) under the UNFCCC. TNAs provide the broad strokes of technology needs for climate change adaptation and mitigation, based on available technologies and their applicability at the time of the assessment. As most countries formulated their TNAs over a decade ago, they need updating as technologies, costs, and other relevant factors have changed significantly over the past decade.

Countries such as Kenya and Rwanda have also formulated national science, technology, and innovation policies, and established specialised bodies to support the implementation of these policies. Environment and climate change are broadly addressed in these science, technology, and innovation policies, although greater coherence with NDC goals and emerging green growth visions is required.

Countries have different institutional arrangements for science, technology, and innovation (STI). In Rwanda, for example, specialised research organisations for green growth include the Centre of Excellence in Biodiversity and Natural Resources Management, the Global Climate Observatory, and the National Industrial Research and Development Agency. The Rwanda Environment Management Authority (REMA) reported in 2018 that 47 green companies in the country (up from 39 in 2016) have implemented 274 green technologies and practices (REMA, 2021). Meanwhile, STI has been designated one of the pillars of the Green Morocco Plan, and the Moroccan Institute for Research in Solar Energy and New Energies is cited as the country's main research organisation focusing on green growth issues. Senegal does not have an STI policy, but it did establish a National Fund for Research and Innovation (FNRI) in 2015.

Intellectual property protection, too, is organised in different ways in different countries. For instance, Kenya has a specialised intellectual property office, while Senegal, Morocco, and Tunisia have assigned the responsibility for intellectual property issues to existing offices. In Senegal, the Agency for Industrial Property and Technological Information acts as the national intellectual property office.

Countries promote innovation to varying degrees. In Kenya, the Innovation Agency, the National Council on Science and Technology, and the National Intellectual Property Office are the primary national-level entities promoting innovation, while the country's climate innovation centres also play an important role. In Tunisia, about 0.6% of the national budget is allocated to R&D annually. The Tunisian Start-up Act of 2018 specifically aims to establish an attractive legal environment for innovative companies. Despite these encouraging trends, the innovation ecosystem in Africa is overall far from satisfactory. Weak institutions, poor science and technology infrastructure, and financial constraints are among the key barriers to innovation.

However, it should be noted that innovation for green growth does not always require cutting-edge science and technology. Better, more efficient ways of operating could be pursued with no or low-cost technology and utilising local indigenous knowledge. In fact, the use of local knowledge is key to ensure that solutions promoted are appropriate for the local climate, customs, and preferences. However, currently, few or no incentives exist for documenting, codifying, and deploying indigenous knowledge and technologies.

International research collaborations are invaluable for catalysing knowledge transfer and innovation. During the assessment, a number of climate change research collaboration initiatives were identified. Senegal has been collaborating with the Climate Change Centre of South Korea; Rwanda with the Massachusetts Institute of Technology (MIT) in the USA; and Kenya with the Stockholm Environmental Institute of Sweden. However, intra-Africa and Africa-global collaborations are in general still underdeveloped. African research institutes are highly dependent on international collaboration and funds for research, and as a result, intra-African collaborations constitute a meagre 2% of all published research (African Union, 2019).

The authors put forward the following recommendations to improve R&D and innovation for green growth:

1) Support initiatives to mainstream green growth education and research in formal education systems and in research programmes.

2) Provide incentives to document, research, and promote the use of scientific local and indigenous knowledge for green growth innovation.

3) Promote intra-African and South-South-North triangular research collaborations on green growth science, technology, and innovation.

5.8 Human resources and capacity readiness

While green growth is expected to create significant numbers of new jobs, such as in renewable energy, it can reduce employment in other sectors, such as the fossil fuel sector and resource-intensive industries. However, an adequately planned green growth transition can be expected to have a positive effect on employment overall. ILO (2018a) estimates that the transition to renewable energy systems will lead to global job losses of around 6 million, while creating about 24 million new jobs. The green transition is increasingly seen as an important vehicle to expand employment opportunities for the growing youth population across Africa. Significant numbers of additional green job opportunities are projected to be created in sectors such as energy, agriculture, nature-based tourism, and waste management. A country's efforts to enhance its human resource capacity readiness, therefore, need to take into account opportunities and shifts in employment patterns to fully realise the benefits of green investment. To capture this net additional employment opportunity, people need to be given the opportunity to acquire skills that fit the job requirements and market needs. The transition to green growth will require skilled human resources in different spheres, from policy formulation and financing to design and implementation of green growth solutions, involving new (if not necessarily highly complex) technologies.

The assessment evaluated human capacity readiness by considering a number of related indicators: the number of green jobs as a share of total employment at country level; the proportion of STEM graduates; whether or not environmental science is integrated into primary and secondary education curricula; the existence of national environmental awareness campaigns or public mobilisation activities; and whether or not a substantial number of NGOs are working in the area of climate change and environmental sustainability. Environmental awareness is emphasised since the green growth transition in Africa can likely be expedited by raising awareness at various levels and thereby broadening the buy-in for the green growth agenda at the highest levels of political leadership as well as in the civil service, scientific, and business communities, and among the general public. The premise is that a conscious and aware society can make informed decisions on sustainable lifestyles and also demand public accountability, which in turn promotes green growth.

The assessment suggests that considerable additional effort is needed to advance human capacity readiness in African countries. For example, low human capacity is cited as a critical challenge for the implementation of NDCs and SDGs in Mozambique, especially for scaling up private sector involvement in, among others, the renewable energy sector. Rwanda reported capacity gaps such as inadequate expertise for the mobilisation of finance. Kenya reported a lack of green growth-related skills in the civil service.

Green job creation forms a key part of most countries' green growth agenda. Kenya, Morocco, Tunisia, and Rwanda have reported significant increases in the number of job opportunities in the energy, agriculture, nature-based tourism, and waste management sectors. In Morocco, the Green Morocco Plan (2008-2020) aims to create 1.5 million jobs in agricultural value addition, 13,300 in the renewable energy sector, and 36,800 in the energy efficiency sector by 2020. In Rwanda, the FONERWA green fund (2018) reported that about 137,500 green jobs had been created through its financing. According to reports, Tunisia has thus far created 120,000 green jobs, and is forecasted to create a further 78,000: about 8,000 in the waste sector, 30,000 in green energy and energy efficiency, and about 40,000 in organic agriculture. In total, Tunisia's green growth strategy is expected to create about 272,000 green jobs by 2030. The greening of the informal economy, which accounts for 83% of employment, is recognised as an important imperative in countries like Kenya. It should be noted that stakeholders have reported that foreign companies have monopolised some green growth opportunities, harming local companies, for example, in the renewable energy sector. This needs to be taken into account when planning job creation efforts.

Many countries are making an effort to build society-wide awareness of the benefits of green growth. Rwanda mainstreamed sustainable development into its school curricula. Kenya, Rwanda, Tunisia, and Morocco reported public awareness programmes. Despite these efforts, there is much room for enhancing green growth awareness at all levels in Africa.

The authors put forward the following recommendations to enhance human capacity with an aim to boost employment creation:

1) Assess how many jobs are likely to be created in the medium- to long-term to support NDC and SDG implementation, and which skills gaps must be filled to meet the needs of those jobs.

2) Initiate programmes to close the skills gaps of the workforce, starting with civil servants and TVET professions in high-potential sectors. Local training institutions and regional centres of excellence can contribute to this objective.

3) Mainstream green growth curricula in formal education systems, with a focus on STEM courses.

5.9 Monitoring and reporting readiness

This category assesses whether a country has operational GHG emissions and climate action measurement, reporting, and verification (MRV) systems. It evaluates whether relevant efforts are underway to mainstream environmental monitoring into national statistical systems to support effective MRV, such as by examining whether the national statistical agency reports on environmental indicators. A practice of periodic government reporting on SDG implementation progress is also considered a positive signal for monitoring and reporting systems readiness.

A lack of monitoring and reporting capacity forms a major barrier to the pursuit of green growth, as it prevents learning, effective planning, resourcing, and execution, and impacts public accountability. A functional greenhouse gas MRV system is particularly essential not only to plan and track NDC/climate action for reporting to the UNFCCC under the Paris Agreement, but also to attract international climate finance by demonstrating the effectiveness and integrity of mitigation and adaptation actions.

Many African countries either completely lack MRV systems or have systems that are too limited in scope, and this is an area in which support is urgently needed. However, many countries have started to integrate environmental indicators into their national statistical systems. For example, Rwanda's national statistical system includes a thematic report on environment and natural resources. It reports on environmental indicators such as population growth and the environment; human settlement and waste management; energy resources; water resources; land management and agricultural practices; economic dimensions of the environment and natural resources sector; and health problems related to the environment. In Morocco, the High Commission for Planning (HCP) has been mandated to report on the environment, including on domesticated SDG indicators. Morocco is also working to increase its capacity for MRV. Mozambique is in the process of establishing a National Climate Change Monitoring and Evaluation System. Tunisia has established a 'state of the environment' reporting process and is developing a greenhouse gas MRV system.

The assessment suggests that African countries' tracking and reporting systems at national and sub-national levels are generally weak. The link between high-quality MRV systems and the attraction of international climate finance for NDC implementation is not well grasped by many stakeholders. One of the barriers preventing the establishment of robust MRV systems is a lack of technical capacity in government and a lack of enforcement of regulations on data collection.

In view of the above, the authors put forward the following recommendations to strengthen environmental and green growth-related MRV systems:

1) Link MRV requirements and the development of MRV systems in national green growth/SDG policy formulation and implementation processes, by allocating appropriate human and financial resources and by strengthening national statistical agencies.

2) Review the availability and quality of existing datasets held by different agencies and institutions, including academia and the private sector, to identify alignment with global indices, redundancies, and areas where support is needed. Identify ways to fill data gaps by working with academia and by instituting voluntary guidelines and regulatory directives (*eg* for the private sector to provide critical data in the energy sector). Consider alternative cost-effective data collection and analysis methods, including innovative ICT solutions using sensors, big data, and remote sensing.

3) Invest in awareness raising and capacity development of government officials, to teach them about the requirements and advantages of MRV systems.

Chapter 6

Green growth good practices in Africa

The Green Growth Best Practice Initiative's report 'Green Growth in Practice, Lessons from Country Experiences' (GGBP, 2014) notes that those seeking to develop effective practices for green growth should undertake the following:

1) Employ well-designed planning and coordination processes;
2) Prioritize measures and technologies and construct credible pathways towards formulated targets;
3) Design portfolios of policies to address near-term development and longer-term green growth transformation goals and respond to specific market failures and political economy challenges;
4) Design public finance instruments to overcome barriers to mobilizing private investment into green growth sectors;
5) Pursue mutually reinforcing action across subnational and national levels of government; and
6) Build and maintain robust green growth monitoring and evaluation systems.

Keeping in mind the above, this chapter highlights good practice cases and lessons identified through this assessment. Given the limited scope of the report, not all good practices can be covered here and many more good practices can in all likelihood be found across the continent. It is expected that the lessons and good practices identified can be shared among the African nations, to further their efforts towards the green growth transition.

The best practices discussed below demonstrate that optimal green growth pathways and critical measures differ to a very large extent based on the characteristics of each individual country, including its economic, institutional, scientific, and technical capacity, and its endowment with environmental resources. Countries should seek to exploit their comparative advantages by focusing their efforts on the sectors that offer a high chance of success at relatively low costs and institutional capacity requirements, while minimising trade-offs.

The best practices covered here are from Kenya, Rwanda, Ethiopia, Tunisia, Mozambique, and Gabon. Five of these countries are focus countries in this study. The six best practices examples are expected to provide a good overview of the diversity of critical success factors and measures necessary to realise green growth objectives on the continent. For instance, Kenya's green growth leadership and inclusive platforms exemplify an effective institutional arrangement for green growth coordination. Rwanda has demonstrated that green growth financing can be boosted through an innovative national climate finance mechanism. Ethiopia's experiences suggest that green growth success depends, among other factors, on the adoption of and compliance with a structured and inclusive planning process that is locally rooted. In Ethiopia's case, success was achieved by applying a green growth value chain approach. In Tunisia, an innovative financing mechanism produced good results in scaling-up the solar water heater sector, through a programme titled PROSOL. Mozambique provides a good example of efforts made by the government to combat deforestation, which is critical for ensuring green growth in the country. Forests cover more than half of Mozambique's land area and the forestry sector generates 80% of the country's total GHG emissions. And finally, Gabon has demonstrated how a special economic zone with its own infrastructure, services and regulations can improve the efficiency of the forestry sector and lead to significant reductions in carbon emissions. The cancelling of 1.3 million hectares' worth of logging concessions in sanctuaries and national parks and the ban on the export of unprocessed wood led to a 50% drop in logging and significantly reduced forest degradation. More information on each case is presented below.

6.1 Kenya: Green growth leadership and an inclusive coordination platform

Green growth is a multi-sector, multi-stakeholder, multi-disciplinary and transformational process that requires comprehensive, well-designed planning and execution cycles. Countries need sound and inclusive institutional arrangements to transition to and sustain a green growth development pathway.

Kenya has made significant progress in the development of climate change and green growth policies and has established an exemplary institutional mechanism for coordination. Policies including the National Climate Change Act, the Climate Action Plan, and the Green Growth Implementation Strategy, complemented by sectoral policies and strategies for energy, transport, and other sectors, form a framework steering Kenya's green growth and national priorities. In addition, green growth is enshrined in Kenya's Constitution of 2010. Article 42 of the constitution, for example, recognises the right to a clean and healthy environment and calls for sustainable exploitation, utilisation, management, and conservation of the environment and natural resources.

Kenya also has a clear institutional structure for the coordination of green growth. The Climate Change Act (2016) aims to strengthen climate change governance and coordination structures and outlines the key climate change-related duties of public and private sector entities. The Act established a multi-tier approach to institutional arrangement for green growth coordination. The National Climate Change Council, chaired by the President, coordinates green growth affairs at the highest levels of government, and the National Environmental Management Authority is a technical agency that coordinates day-to-day climate change affairs among the ministries and other national stakeholders. Intra-sectoral activities are coordinated through climate change units in all ministries, counties, departments, and agencies. The Act obliges the national and county governments to mainstream climate change into their activities across all sectors of the economy.

The Climate Change Act defines the roles and responsibilities of three focal institutions, as follows: 1) the Ministry of Environment and Natural Resources, through its Directorate of Climate Change, has been assigned the role of lead agency and focal point for the coordination of the implementation of all climate change actions in Kenya; 2) the National Treasury is the National Designated Authority for the GCF and focal point for climate finance; and 3) the Ministry of Devolution and Planning has been charged with supporting mainstreaming of climate change and SDG targets into sectoral plans.

The National Climate Change Council is composed of representatives from key sector ministries, the private sector, CSOs and academia. The Council serves as an overarching national climate change coordination mechanism, and its tasks include ensuring the mainstreaming of climate change into all activities of the national and county governments; approving and overseeing implementation of the National Climate Change Action Plan; and advising the national and county governments on legislative, policy, and other measures necessary for Kenya's response to climate change and its attainment of low-carbon climate change-resilient development.

A representative sample of stakeholders consulted have affirmed that Kenya's coordination structure has facilitated stakeholder engagement, collaboration among actors, accessibility of information and concrete action. For instance, two key private sector organisations, the Kenyan Private Sector Alliance and the Kenyan Association of Manufacturers, have internalised the national vision on green growth and climate change and initiated several activities in its support.

6.2 Rwanda: The role of national mechanisms in climate finance mobilisation and channelling

In Rwanda, climate change manifests itself in increasingly extreme weather conditions that are causing droughts and floods in different parts of the country and underlining the country's vulnerability. In response, Rwanda made a political decision to pursue green growth through its Green Growth and Climate Resilience Strategy of 2011. Following the adoption of this strategy, the government of Rwanda established a national financing mechanism and later transformed it from a project into a public institution by statute. The fund is commonly known as FONERWA.

FONERWA has been operating since 2012, with a vision "to respond to Rwanda's current and future financing needs for environment, climate change, and green growth to accelerate goals of national sustainable economic development" (FONERWA, 2021). FONERWA uses innovation grants and a line of credit financing mechanisms to facilitate access to funds for innovative entrepreneurs as well as for public and private institutions.

FONERWA mobilises resources from a variety of domestic and international sources. Domestic capitalisation sources include contributions from the government's budget, regulatory proceeds such as environmental fines and fees, EIA fees, proceeds from forestry and water funds and other environmental revenue, and seed financing from domestic stakeholders. FONERWA's external capitalisation sources include contributions from bilateral and multilateral development partners and international environment and climate funds. In 2015, FONERWA received GCF accreditation as a national implementing entity.

The fund has mobilised close to $160 million in climate finance from different institutions, including the GCF, since 2012. The government of Rwanda has made capitalisation commitments of $6 million. Thus far, FONERWA has financed over 36 projects for climate change adaptation/resilience and mitigation. The majority of projects funded are implemented by public agencies. However, the fund aims to attain parity between private sector and public sector financing during the implementation period of the current National Strategy for Transformation (2017-2024).

As a national green financing mechanism, FONERWA has made considerable contributions to green growth progress since its establishment. For instance, although green job creation is not systematically tracked at the national level, FONERWA reported in 2020 that an estimated 144,858 green jobs had been created through its financing. Moreover, FONERWA interventions have enabled the protection of 21,798 ha of land against erosion; created 42,344 ha of forest and agro-forest coverage; connected 71,546 families to off-grid clean energy; and restored 27,092 ha of watersheds and water bodies.

6.3 Ethiopia: A green growth value chain approach to planning

The green growth value chain is primarily a high-level process, which involves green growth planning, starting with a diagnosis of developmental issues in the context of green growth; followed by a comprehensive assessment of green growth opportunities at macro and sectoral levels; the prioritisation and sequencing of a series of implementation actions; the building of institutional and human capacity for implementation; and finally, progress monitoring, learning, and evaluation. The Global Green Growth Institute has adopted this value chain approach to guide all of its technical assistance and investment support activities to member and partner countries. The green growth value chain approach, when locally rooted and applied with consideration for the conditions in the country concerned, will result in an effective, logical process for green growth planning while enhancing stakeholder engagement; will lead to a realistic sequence of actions; and will facilitate execution by assisting a smooth phase-in of the green growth strategy. The application of the green growth value chain approach to the Climate Resilient Green Economy Strategy (CRGE) of Ethiopia provides a good case study. The approach enabled detailed sectoral analysis and GHG emissions target-setting. On the basis of the assessments and targets set out in the CRGE, Ethiopia has committed to reducing GHG emissions by 64% below business as usual by 2030 in its first NDC. Ethiopia's NDC is one of the few rated by the Climate Action Tracker as "2°C compatible". This rating indicates that Ethiopia's climate plans are within the range of what is considered a fair share of the global effort.

The CRGE guides Ethiopia's response to climate change over several decades. It is a manifestation of the firm determination of the government of Ethiopia to reverse the impacts of climate change and embark on a new green growth trajectory to ensure a more sustainable future for its people.

The development of the CRGE followed the green growth value chain approach and consisted of two simultaneous planning processes: one for greening the economy, which focused on low-emission development; and the other for building resilience in priority sectors. Both planning processes included structured stakeholder engagement, including national stakeholders and development partners, through a national inter-ministerial committee and sector working groups. The sector working groups are key vehicles for planning, composed of national sector experts and international advisors.

Besides the value chain approach, one of the critical factors contributing to the success of the CRGE was the fact that it was built on existing good practices in the country. Following the value chain approach, the green economy planning component identified about 60 green growth entry points and options in different sectors, and developed business as usual *vs* green growth scenarios, with associated abatement costs. The resilience planning component took a similar approach. The green economy component of the CRGE is based on four pillars, which are locally rooted and build on existing good practices: 1) improving crop cultivation and livestock farming practices; 2) protecting and re-establishing forests; 3) expanding renewable electricity generation; and 4) leapfrogging to modern and energy-efficient technologies in transport, industry, and buildings.

Simultaneous to the planning process, the government of Ethiopia designed and established a CRGE financial mechanism, known as the CRGE Facility. The government also formalised the coordination structure of the CRGE and integrated the strategy into the county's medium-term Growth and Transformation Plan (GTP).

Since launching the CRGE in 2011, Ethiopia has made significant progress towards achieving the triple goals of the Ethiopian Vision 2025: middle-income status, and a green and climate-resilient economy. Areas in which progress has been made, in line with the four pillars of the CRGE green economy component, include greening energy, transport, and agriculture; ecological restoration; and green industrialisation.

Ethiopia's energy sector transformation targets include boosting generation capacity; diversification of the energy mix by expanding renewable energy generation; expansion of transmission and distribution capacity; expansion of access to modern energy; and enhanced regional connectivity. In 2017, the country had a total installed capacity of about 4.3 GW, with an 88.5% share of hydropower. Projects are underway to double Ethiopia's generation capacity to 8.9 GW, and by 2025, Ethiopia aims to achieve universal access to electricity in rural and urban areas. The government has also opened up the energy sector for private sector participation, further tapping into private capital and management capacity.

Leapfrogging to a low-carbon transport system and avoiding lock-in of carbon-intensive infrastructure is another key part of the CRGE strategy. Ethiopia aims to build about 5,000 km of railways powered by renewable energy. At the time of writing, the Addis Ababa-Djibouti corridor has been commissioned, and railways on the routes of Mekele-Hara-Gebeya (Weldiya) (268 km), Hara-Gebeya-Semera-Assayita (229 km) and Awash-Kombolcha-Hara Gebeya (Weldiya) are under construction. The 34-km Addis Ababa Light Rail Transit system is operational.

The government of Ethiopia is expanding its efforts to build ecosystem-based resilience and remove more GHG from the atmosphere, by enhancing carbon sinks through sustainable land management practices and the efficient use of biomass. Ambitious actions have been undertaken to increase land productivity and boost ecosystem services, including soil and water conservation works servicing 16,285,000 ha of land and the enhancement of soil fertility of 1,926,000 ha of land.

As a result of sustainable land management practices, forest cover increased from 5% in 2010 to 13-15% in 2013. An average of 26 million people spends an average of 30 days annually participating in watershed rehabilitation and water and soil conservation activities. In monetary terms, this contribution can be valued at 27.8 billion Ethiopian Birrs ($640 million) per year.

Efforts to lay the foundation for green industrialisation through the development of an eco-industrial park and industrial zones are well on track. The government has made significant investments in, issued new laws to regulate, and established support institutions for industrial zone development. Ethiopia aims to establish itself as a manufacturing hub during and beyond GTP II (2015-20). Industrial zone developments in Addis Ababa, Hawassa, Dire Dawa and Kombolcha, Mekele, Adama, and Jima are now operational. GTPII has also prioritised the construction of Integrated Agro-Industrial Parks and four such parks are under development. These parks will constitute rural transformation centres to facilitate vertical integration in agricultural value chains. Powered by green electricity, industrial zones and industry parks provide common waste management facilities, coordinated logistics, and infrastructure for greening practices. Industrial parks form a key part of the government's strategy to support private sector and SME growth to boost economic growth and job creation, including by attracting foreign investment and operations.

In summary, most of the achievements of the CRGE to date were facilitated by an integrated planning approach by the government that builds on existing good practices. The CRGE strategy is planned and pursued with consideration for local realities and takes step-by-step actions along the green growth value chain. This approach facilitates a smooth translation of strategies and plans into action on the ground, boosting the chance of success and minimising and managing trade-offs.

6.4 Tunisia: Innovative financing mechanism to scale up the solar water heater sector – PROSOL programme

PROSOL (2005) was a programme designed to incentivise the installation of solar water heaters (SWHs) in Tunisia. During its early years, sales of SWHs for the residential sector grew by 80% annually. The market stabilised at about 64,000 m^2 of installed heaters per year in 2016, down from a peak of 81,000 m^2 of installations (Epp, 2017). In total, PROSOL led to the installation of more than 119,000 SWH units in Tunisia (Trabacchi *et al*, 2012).

The PROSOL programme has been widely acclaimed as a best-case example of a well-designed and successful policy instrument. PROSOL consisted of three phases: PROSOL I (2005-06), PROSOL II (2007-12) and PROSOL III (2012+). While PROSOL I introduced subsidies for SWHs and set the goal to reduce energy demand by 8% (by 2007), PROSOL II expanded subsidies for solar panels and reaffirmed direct fiscal benefits for SWHs. PROSOL's success was the result of the combination of a suitable and affordable finance and incentive mechanism, a simplified bureaucratic procedure to access financing, and a quality verification system. The key innovation that led to its success was a guarantee mechanism to mitigate risk for banks, thus incentivising them to finance residential SWHs. Loans were repaid via clients' electricity bills through the state-owned utility, STEG. In case of delayed payment or default, STEG could suspend the electricity supply and thus take on the role of debt repayment enforcer and loan guarantor (Trabacchi *et al*, 2012). This set-up provided enough guarantees for banks to extend the loan term to five years from the usual three and apply an interest rate reduction. Loans were provided by the Attijari Bank, Amen Bank and UBCI, which had been awarded licenses through a competitive bidding process. Amen Bank, and Tunisian Bank UBCI together extended loans worth $7.3 million during PROSOL I; Attijari Bank made loans for $52.5 million in PROSOL II (Trabacchi *et al*, 2012). Jobs were created by the 42 officially registered technology suppliers and in at least 1,000 companies that installed the systems.

Biome Solar Industry (BSI) is one of the companies that benefited from PROSOL. It started with a capital investment of 400,000 Tunisian dinars (around $50,000) and produces SWH for households, hotels, hospitals, and stadiums. The firm is registered as a private company, although it was established through a strategic partnership between public and private entities, including the National Agency for Energy Conservation, STEG, and the Professional Association of Renewable Energy, and with support from international partners (KBB, from Germany, and CEDRIS, from France). BSI's SWHs meet international standards, which has facilitated the company's access to international markets. The market opportunities for SWH in Tunisia are enhanced by supporting mechanisms, such as subsidies and loans provided to end users by conventional commercial banks. Other drivers for industry development included Tunisia's year-round sunny weather and high electricity and gas prices. BSI began producing SWHs in 2007. By 2011 it had conquered a local market share of 17%, and the company had expanded through exports to Morocco and France. BSI supported the greening of industries in various ways. It created 45 jobs directly, and another 130 indirectly. The company installed around 36,000 m^2 of solar collectors, thereby contributing to a reduction in emissions of about 7,000 tCO_2e. In total, the company installed 12,000 SWHs in Tunisia, contributing to reducing the energy bills of households and public and private organisations. Finally, PROSOL and BSI helped to reduce Tunisia's reliance on imported energy and enhanced the national SWH market.

6.5 Mozambique: Combating deforestation, a critical intervention for green growth

According to a recent government document, more than half of Mozambique's land area (40.6 million hectares) is covered by forest. However, this critical resource is shrinking at an alarming rate: approximately 220,000 ha of forest disappears every year. At this deforestation rate, GHG emissions from deforestation represent 80% of the Mozambique's total emissions.

Deforestation in Mozambique is driven by the expansion of commercial agriculture, shifting agriculture practices, the extraction of timber products, the production of firewood and charcoal, urban expansion, mining, and livestock farming. Shifting agriculture (slash-and-burn agriculture, often resulting in uncontrolled spreading of fires) was the primary cause of 65% of total deforestation in Mozambique between 2000 and 2012. Land-use change, forestry, agriculture, and energy are the largest contributors to GHG emissions in Mozambique (Climatelinks, 2017). Mozambican households use forest resources for 85% of their energy needs, and only 5.7% of the rural population has access to electricity (Energypedia, 2020).

Consequently, deforestation and forest degradation have become grave concerns for the government of Mozambique. Encouraged by global and regional efforts to reduce emissions from deforestation and forest degradation, Mozambique adopted a national REDD+ strategy and developed various initiatives and regulatory measures. A new forest logging regulation protects certain tree species, and legal instruments have been adopted to support the enforcement of the REDD+ Decree and the National REDD+ Strategy 2016, to institutionalise Mozambique's forest conservation and sustainable utilisation efforts. Moreover, given the critical role accorded to the forestry sector in Mozambique's greening strategy, the country's REDD+ Strategy is considered an essential driver of the implementation of its NDC and the achievement of its climate-resilient green growth objectives.

To implement the REDD+ Strategy, the government has outlined a Forest Investment Plan with the following components:

Enabling environment and governance reform: legal and institutional reform, strengthening governance, improvement of enabling environment for private sector participation, and organisation of consultations and outreach activities at the district level.

Sustainable agriculture and livelihoods: promotion of conservation agriculture and key sustainable forest- and agriculture based supply chains, spatial planning, and participatory micro-zoning.

Sustainable biomass energy: reduction of biomass energy use, improvement of biomass energy production, and promotion of alternatives.

New multi-use forests: sustainable forest management (by the private sector and community-based) and restoration.

Stakeholders interviewed indicated that several additional legal and regulatory instruments are in place or under preparation to support the implementation of NDC and SDG actions related to forestry.

Mozambique's REDD+ Strategy and Forest Investment Plan are being implemented with financial support from several development partners, including through the Forest Investment Project (MozFIP), the Dedicated Grant Mechanism for local communities (MozDGM), and the Mozambique Conservation Areas for Biodiversity and Development Project (MozBio) of the World Bank Group; and the Forest Carbon Partnership Facility's Carbon Fund Project. On February 1, 2019, Mozambique signed an Emissions Reductions Payment Agreement, under which the country receives performance-based payments of up to $50 million for successfully cutting carbon emissions and reducing deforestation. The World Bank aims to provide capacity building, technical assistance, and financing to increase community participation in sustainable forest management and enhance the livelihoods and living conditions of these communities.

The government of Mozambique has also stated that its REDD+ strategy will enable the country to meet the commitments in its NDC, and to contribute to the international goals of the Bonn Challenge, which is a global effort to restore 150 million hectares of cleared and degraded land around the world by 2020. In addition, measures such as adaptation actions to ensure the protection of threatened species, to promote tree-planting and development of the local forestry sector will contribute to the achievement of SDG 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

6.6 Gabon: Sustainable forest management and industrialisation – the "Wood Industry Special Economic Zone" model

The Nkok Special Economic Zone (SEZ) was developed by Olam[4] and the Republic of Gabon in a public-private partnership (PPP), in accordance with the 'Green Gabon' and 'Industrial Gabon' strategies. These strategies form two of the three pillars of the Emerging Gabon Strategic Plan (PSGE).

The Nkok SEZ was launched in 2011 and is regarded as an innovation in the wood industry in Central Africa. It aims to enhance the valorisation of raw materials through innovative industrial methods, and thereby to demonstrate improved management techniques and develop the skills of Gabonese loggers and industries.

The Nkok SEZ offers a set of incentives to attract enterprises, including: 1) an exclusive cash desk; 2) simplified administrative requirements; 3) common services and shared infrastructure for logistics (rail and port access) and preferential energy supply (50% reduction on electricity tariffs); and 4) various tax incentives.

Motivated by these incentives, about 70 timber companies had moved into the SEZ by March 2018. The total industrial capacity of the economic zone exceeded 1 million m^3 of processed logs per year. In addition, about fifteen investors specialised in the drying of wood, the production of furniture and industrial investments in wood are considering moving into the SEZ.

The factories established within the economic zone initiated the valorisation of lower-quality wood, which facilitated more sustainable, controlled logging. For example, under business as usual, the company Rougier Gabon collected only quality 'A' Okoumé wood at its 'Haut Abanga' concession in its first rotation, resulting in yields of 6 m^3 logs/ha. In the second rotation, under improved management, low-grade Okoumé wood was also collected and delivered to the Nkok SEZ. This has significantly improved resource efficiency.

The international market for finished wooden furniture products has grown rapidly, at more than 5% annually in the last five years. This growth has directly created more than 2,150 jobs in Gabon in eight years, of which 70% were taken by Gabonese nationals and 30% by foreigners.

In 2018, the government decided that all forest concessions in Gabon would require Forest Stewardship Council (FSC) certification[5] by 2022. The FSC certification process is gradually taking root in Gabon's forestry sector, including among major companies. Three out of 40 major companies have thus far achieved FSC certification: Rougier Gabon, with 688,262 ha (representing 55% of the total certified area); CBG with 402,143 ha (32% of the total certified area); and Precious Woods with 166,400 ha (13% of the total certified area).

In addition, Gabon has achieved significant reductions in carbon emissions through ambitious policies and measures, such as Law No. 003/2007 on national parks, adopted in 2007. The enforcement of this law led to the cancellation of 1.3 million ha of forest concessions in national parks. Gabon's national parks protect close to 2.5 million ha of primary forests. In 2010, a ban on the export of unprocessed wood led to a 50% reduction in wood harvests, which helped to reduce forest degradation associated with logging. Log production volumes shrank by 1.5 million m^3, which led to reductions in greenhouse gas emissions of 11.53 million tCO_2e/year, or 69.15 million tCO_2e over six years, as a result of decreased logging and closure of access roads (World Bank, 2019). As forest degradation is the main contributor to Gabon's GHG emissions, this reduction in logging will contribute towards meeting the commitments in the country's NDC.

Gabon's Nkok SEZ and supportive regulatory measures are furthering sustainable forest management, ensuring increased resource efficiency, sound environmental and social impact management, and reduction/avoidance of GHG emissions from deforestation and forest degradation. This successful, innovative approach serves as a practical example for how to promote green economy strategies in the forestry/wood sector. It could be replicated in the other Congo basin forest countries, adapted to national contexts.

4 Olam is a multinational food and agri-business company with more than $30 billion in annual revenue. It is the largest private-sector employer in Gabon. Refer to: https://www.olamgroup.com/locations/africa/gabon.html.

5 FSC is an international certification scheme advocating for socially equitable, environmentally sustainable, and economically viable forest management.

Chapter 7

Summary and conclusion

7.1 Africa's green growth challenges

Africa is a vast continent of 54 nations, with immense diversity in climates, cultures, and development progress. It is poised to become the economic growth frontier of the world; currently, six of the top ten fastest growing economies in the world are in Africa. Africa's population is young (60% under 25 years old) and expected to grow to 2.2 billion by 2030. By that time, 50% of the continent's population will live in cities. This young, growing, urbanising population can be a driver for economic growth, with the potential to pull millions of people out of poverty and provide them with basic access to services such as clean drinking water, improved sanitation, electricity, and clean cooking. However, it is clear that this growth needs to happen along a pathway that enhances the environmental sustainability of consumption and production, climate resilience, equality, and social inclusion. For this reason, the green growth model is gaining traction in Africa and across the world.

Furthering green growth requires an understanding of the current state of and ways to enhance African countries' readiness for the green growth transition. In an attempt to create that understanding, this study assessed the state of, trends in, and readiness for green growth in Africa, and carried out an in-depth analysis of seven focus countries.

The assessment is based on the premise that climate action and sustainable development in Africa are inextricably linked, and green growth provides countries with a pathway to meet their NDC commitments and achieve the SDGs in a just and inclusive manner. The aim of the assessment is not to score or rank countries, but rather to highlight positive steps being taken and good practices being implemented by countries in the region, and thereby encourage further ambitious action and national/international support for the pursuit of the green economic growth model. The assessment and recommendations assume that governments must take an active and leading role in preparing their economies for the uptake of green growth technologies and approaches, in order to fully exploit the opportunities green growth presents. These opportunities, which include green job creation, are described using existing evidence.

7.2 Green growth state and trends – summary of findings

The state and trend assessment found that climate change is already impacting African countries and will disproportionately affect vulnerable populations through its impacts on key livelihood-supporting sectors, such as agriculture, forestry, and fisheries. Meanwhile, Sub-Saharan Africa will remain at the forefront of development challenges including poverty reduction, access to energy, access to quality infrastructure, and protection of natural ecosystems. Green growth approaches can directly and simultaneously enhance climate change resilience, deliver sustainable development, and further mitigation efforts. Green growth approaches need to consider and address existing gender and income inequalities, the digital divide, and the energy, drinking water, and sanitation access gaps.

Widespread, deep inequalities within and among countries in Africa hamper human development despite rapid economic growth. Even in the highest-income countries of the continent, inequalities in terms of access to education and healthy life expectancy are hindering further socio-economic development and are likely to exacerbate the negative impacts of climate change. Green growth has the potential to address these inequalities through the creation of decent jobs, better provision of basic services, improvement of air quality, and enhancement of climate resilience.

7.3 Green growth readiness – Summary of findings

7.3.1 High-level support for green growth is growing across Africa

The level of preparedness for the green growth transition varies across the continent and among the seven case study countries. High-level political vision and commitment, more than a high GDP, was found to be a crucial driver for setting in motion the green growth transition and attracting national and international support. Political commitment to green growth appears to be growing in all seven countries. Despite this, broader stakeholder buy-in and participation are required to formulate and implement inclusive, locally relevant policies and solutions. In Rwanda, Kenya, and Morocco, heads of state and government are actively championing the implementation of NDCs and SDGs. This support at the highest level was found to be a key catalyst for advancing the agenda towards mainstreaming and implementation.

7.3.2 Green growth strategies that link climate action, SDGs, and DRR are required

Green growth strategies developed with broad ministry and stakeholder involvement were found to be effective at highlighting the benefits of climate action and green growth and setting in motion the mainstreaming of green growth into major development agendas. Countries such as Ethiopia, Uganda, and Mozambique have developed such strategies. Many African countries have also been translating strategies into policies and action plans in alignment with their national development plans. For example, Gabon has a 'Green Gabon Plan' as part of its 'Emerging Gabon Strategic Plan'.

7.3.3 Strategies are often not translated into suitable policies and actionable plans to attract investors and realise implementation on the ground

While all target study countries have national and/or sectoral climate change and/or green growth-related strategies, these are not always accompanied by sectoral targets, action plans and/or appropriate policies to realise actions on the ground. Economy-wide and sectoral targets, such as targets for GHG emissions reductions, expansion of public transportation, and renewable energy generation, can help attract financing from international development financiers and the private sector. Another key reason for the lack of effective implementation of green growth strategies is that linked goals are pursued separately under climate change (NDC and LT-LEDS), SDG, and other national development plans. Inter-ministerial initiatives require effective coordination for efficiency and to minimise duplication of efforts. Without such coordination, sectoral policies are not always fully aligned.

7.3.4 Interagency coordination mechanisms can be effective for mainstreaming climate change and facilitating joint implementation of NDC, SDG, and DRR agendas

Legally established interagency mechanisms were found to be effective in engaging and gaining the buy-in of broader groups of stakeholders, to enhance integrated planning and implementation. Such mechanisms promote closer coordination and policy coherence across interlinked NDC, SDG, and DRR agendas that often fall under the jurisdiction of different ministries.

In Rwanda, an inter-ministerial coordination mechanism is facilitating the combined implementation of these linked agendas. Kenya's inter-ministerial coordination mechanism, the National Climate Change Council, which is chaired by the President, oversees implementation of the National Climate Change Action Plan. To facilitate climate change mainstreaming and implementation, Kenya has established a climate change unit in each key ministry. Though effective, existing mechanisms were found to focus primarily on horizontal coordination (*eg* among federal ministries), and vertical coordination between national and sub-national levels is still lacking. It therefore remains a challenge to bring in stakeholders from and translate actions to the sub-national level.

7.3.5 To attract greater private sector participation, the private sector must be engaged in the policy development process from the beginning, and coherent regulations and incentives need to be put in place

A lack of access to financing is an oft-cited barrier to the implementation of climate change and green growth visions and strategies. As traditional development and climate finance alone will not be sufficient to realise the green growth transition, private sector participation in and finance for green growth will be crucial. This fact was recognised by all consulted stakeholders. While governments are increasingly successful in engaging the private sector, private sector stakeholders were involved only in the middle or at the end of planning processes.

Inadequacy and incoherence of regulatory frameworks were found to be key issues that discourage private sector investment in green growth. Regulatory coherence and financial incentives are particularly important for the small and medium enterprises that are the drivers of innovation and job creation in developing countries. Effective incentives and innovative financing could be game changing in driving the uptake of low-carbon technologies and, in the process, speeding up local innovation to drive down costs. Promising examples of this can already be found in Africa, including Tunisia's PROSOL programme, which deployed effective incentives and was able to scale up the market for residential solar water heating (SWH) and create jobs in MSMEs.

7.3.6 National climate funds could support local innovation and job creation by providing MSMEs with affordable financing

Another mechanism to improve access to finance and enhance local innovation and job creation is the establishment of green/climate funds that can mobilise and disburse domestic and international funds to eligible projects/initiatives under attractive terms. Rwanda's FONERWA green fund, with capitalisation of more than $100 million, is a successful example of such a fund. Mozambique was one of the first countries to set up a rural energy fund, FUNAE, which supports renewable energy access. However, relatively few other examples of such funds exist on the continent. The success of these funds in overcoming challenges in attracting private sector capital and scaling up green growth tends to depend on the robustness of their financial feasibility/sustainability criteria and competitive processes followed in the project selection and implementation processes. These challenges persist in Mozambique's FUNAE despite its more than 20 years of experience funding rural energy access.

7.3.7 Few examples exist of private sector-oriented green investment plans and sectoral funds that can spur private sector participation in green sectors

Other ways to encourage private sector participation include the development of green investment plans and innovative funding mechanisms focused on important sectors such as energy. For example, Senegal has put in place a $200 million Renewable Energy and Energy Efficiency Fund (REEF) that provides incentives to private sector-led pilot projects. Tunisia's PROSOL programme focused on the residential solar water heating sector. However, despite their potential, such green investment plans exist in only a few countries. As a result, awareness of the costs and benefits of existing green growth approaches for key sectors was found to be limited among stakeholders in the studied countries.

7.3.8 There is no evidence that national budgeting structures are aligned to support NDC and SDG implementation

There was no evidence that any of the studied countries had re-evaluated their budgeting structures in view of the paradigm shift needed for the joint implementation of NDCs and SDGs at sectoral and sub-national levels. However, on a related note, there are positive signs in several countries of progress towards the phasing out of market-distorting fossil fuel subsidies.

7.3.9 Technology Needs Assessments and skills development programmes in key sectors require greater support

To advance human capital readiness for the green growth transition, green growth curricula in technical, vocational education and training (TVET) institutions and universities have been developed, and capacity development support mechanisms established in several countries. Morocco's Climate Change Competency Centre (4C Morocco) for capacity building for climate action is one such example. While there have been some instances of ad-hoc research collaborations with institutes in advanced economies and the establishment of centres of excellence relevant to green growth topics, efforts to support relevant research and development were found to be far from adequate in the seven focus countries and on the continent in general. In cases where green technologies have been identified and documented at the national level, including in Technology Needs Assessments (TNAs) and in various strategic and action plan documents, these need to be revised in view of the rapidly evolving technology solutions and changing (often decreasing) costs of climate change mitigation, adaptation, and resource efficiency technologies.

7.3.10 Most countries lack adequate MRV systems, which hinders various aspects of green growth planning and implementation

The lack of Monitoring, Reporting, and Verification (MRV) systems for climate action and green growth has been identified as a key barrier hampering the green growth transition. Challenges cited by respondents included a lack of technical capacity and a lack of financial support for the development and implementation of such tracking systems.


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7.4 Key learnings for extrapolation to the wider African context

Through the seven in-depth case studies, the authors were able to gain an overview of how the nine readiness dimensions can accelerate green growth in these countries and extract useful insights for extrapolation to other African countries.

The common factors that form the foundation for an effective green growth transition can be summarised under the broad appellation of soft economic infrastructure or simply soft infrastructure. It is a combination of strong leadership, good governance, established institutions, adequate human capacity, and a commitment to achieving results.

Three broad categories of green growth models have emerged from this analysis.

A. Model for countries with advanced soft infrastructure (Morocco, Rwanda, Tunisia)

These three countries have made significant progress towards green growth by employing their soft infrastructure to address key challenges and tap into key opportunities. Morocco and Tunisia have each benefited from a relatively advanced education system and a pool of local human capacity, as well as a large diaspora.

In the case of Morocco, in addition to the long-term broad green growth agenda, the strong leadership of the King has enabled the country to tap into its exceptional solar resources and to mobilise international and climate finance to develop the world's largest concentrated solar power plant.

Tunisia also has a broad green growth agenda, but in terms of short-to medium-term focus has chosen to take a more inclusive approach to sustainable energy, by promoting decentralised household rooftop solar energy and energy efficiency technology.

Rwanda was able to compensate for its less well-developed soft infrastructure with exceptional leadership, speed of execution, and drive to achieve results. While developing a broad green growth agenda and working to develop the nine dimensions of green growth readiness, Rwanda has chosen to focus on inclusiveness and support for local entrepreneurship, leading to significant achievements in terms of green job creation.

B. Model for emerging countries with intermediate levels of soft infrastructure (Kenya, Gabon)

Gabon and Kenya have well-performing economies and similar levels of political commitment to green growth. However, recognising its relatively low levels of human capacity and institutional readiness, Gabon decided to focus on its main green growth opportunity, which is the sustainable management of forest resources. Gabon has created the enabling environment for a private sector-led forest cluster to emerge under the Special Economic Zone regime. In this way, the country has transferred to the private sector the burdens of raising finance, introducing technological innovations, and mobilising foreign specialist capacity to train locals and transfer knowhow for sustainable forest management. This approach has delivered significant socio-economic and environmental benefits.

Although Kenya has excelled in developing the public sector-dependent part of its soft infrastructure for green growth, establishing exceptional models of institutional coordination, its green growth outcomes have been essentially limited to utility-scale renewable energy projects. The two elements which could lead to more concrete green growth actions are: upfront public sector support for innovation and dedicated human capacity development, and an incentive framework with a sectoral focus to allow the private sector to benefit from the enabling environment.

C. Model for less-developed countries with low levels of soft infrastructure (Mozambique, Senegal)

Mozambique and Senegal are representative of the less-developed countries in Sub-Saharan Africa. Although Senegal has historically had a more advanced administrative and educational system than Mozambique and a higher level of political commitment, it has achieved less progress towards green growth than Mozambique.

Mozambique has chosen to focus its limited capacity and resources on its key environmental issue and source of GHG emissions, which is deforestation. The resulting innovative performance-based payment mechanism is expected to lead to large results in forest conservation.

By adopting a similar approach, focusing on a small number of key hotspots and high impact sectors such as decentralised solar PV, energy efficiency, and climate resilient agriculture, Senegal could have used its relatively well-developed soft infrastructure to achieve more green growth progress.

7.5 High-level recommendations

From the assessment outcomes and lessons learned presented above, the authors have extracted a set of recommendations to accelerate the transition to green growth in Africa. The recommendations are targeted at governments as well as technical assistance and financing agencies supporting green growth and climate action as well as the COVID-19 recovery on the continent. The eight recommendations call for enhanced support for activities and mechanisms that:

1) Generate high-level political commitment and raise awareness in the country and in the wider region, including activities to support international cooperation, national dialogue, and the development of a national vision for climate-resilient, inclusive green growth and a green COVID-19 recovery. Post-COVID-19 growth measures must directly reduce human impact on nature and enhance resilience against both climate change and future pandemics.

2) Facilitate inter-ministerial and multi-stakeholder coordination for inclusive and combined NDC, SDG and DRR policymaking and implementation, and enhance vertical coordination among the national, provincial, and local levels.

3) Mainstream climate-resilient green growth approaches into national development planning and budgeting processes as well as COVID-19 recovery plans, and prioritise key sectors and low-hanging fruit opportunities to demonstrate early benefits and gain stakeholder buy-in. Key sectors are those in which green growth action can simultaneously drive the creation of decent jobs and contribute to the achievement of key SDGs on rural development and social mobility, especially among women and youth. Key activities can include the furthering of climate-smart agriculture, off-grid renewable energy access, and sustainable public transportation.

4) Translate national green growth strategies and climate change plans (NDCs and LT-LEDS) into sectoral and local targets and investment action plans, to attract participation and investment from the private sector and development financiers. Where green growth strategies are not available, strategies should be developed for key sectors and key climate, development, disaster, and economic growth/diversification goals. These should demonstrate the benefits of green growth.

5) Promote coherent legal and regulatory reforms and the creation of market mechanisms that enable a shift of behaviours and investments (from brown) to greener modes of production and consumption.

6) Foster access to climate and green finance provided by development and private sector financiers, strengthen domestic resource mobilisation, and enable disbursements to enhance private sector participation, particularly by MSMEs that can create green jobs in the informal sector, and for women and youth.

7) Develop human capacity to support and harness the benefits of the green growth transition by mainstreaming green growth into formal education curricula, supporting TVET education in key sectors, supporting green growth education among civil servants, and raising public awareness of the declining costs and growing benefits of green growth technologies. Women's and youth empowerment should be a particular focus of these initiatives.

8) Strengthen MRV systems for environmental and climate action data and information, pursue systems that benefit multiple sectors, and promote early warning against potential losses and damages, to enable better long-term planning and to help justify the need for, and attract, climate finance.

By describing different promising green growth models and pathways, focus areas and entry points, this study provides important support to developing member countries and stakeholders of the African Development Bank and Global Green Growth Institute to accelerate their efforts towards transitioning to green growth. The information in this report is also expected to assist the development of the Africa Green Growth Index, pursued jointly by the two organisations. The Index is intended to stimulate valuable dialogue and debates to advance climate action and green growth in Africa. AfDB and GGGI will continue to strengthen their partnership in pursuit of this goal.

Much of the research and analysis of this report was conducted prior to the onset of the COVID-19 pandemic. Nevertheless, the recommendations set out are no less relevant to a post-COVID-19 world, in which strategies that lead to resilience and environmental sustainability whilst creating new employment opportunities must be pursued more urgently than ever. As governments and development partners work on COVID-19 recovery measures, priority must be given to approaches that, 'build back greener and better'. The authors put forward the following recommendations for a green recovery, based on relevant reports by OECD (2020) and GGGI (2020).

1) Screen all elements of recovery packages for their long-term implications, prioritising actions that:
   - Combine and align green recovery packages with support for digitisation.
   - Promote initiatives that will result in net job creation and inequality reduction and have long-term resilience building potential.
   - Employ cross-sectoral, cross-government approaches and take a long-term, systemic view rather than pursuing single technological outcomes.
2) Build pipelines of 'shovel-ready' sustainable infrastructure and nature-based solution projects by coordinating cross-ministry actions.
   - Support areas in locally relevant sectors, such as solar-powered irrigation to support small holder farming incomes, and upgrade health centres with clean energy to ensure a reliable power supply.
   - Promote nature-based solutions through employment-based social assistance programmes. Evaluations show that government programmes can create jobs in the construction of green urban infrastructure, reforestation, watershed management, or ecosystem rehabilitation, such as mangrove restoration.

3) Maintain (and increase) the ambition of long-term environmental objectives (including net-zero GHG emissions):

   - Align these with climate and green growth strategy and plans of the country.
   - Avoid relaxing existing environmental regulations to provide near-term relief, as the costs of longer-term vulnerability will often outweigh short-term economic relief.
   - Make energy pricing coherent as part of fiscal reorganisation post-crisis, including phasing out fossil-fuel subsidies and introducing renewable energy subsidies.

4) Actively support the development of green financing flows to improve resilience, and encourage longer time horizons for financial decisions:

   - Assess the alignment of investments and financing with climate change mitigation and resilience, building on existing private and public sector initiatives.
   - Promote robust and transparent definitions and standards for green finance in order to guide financial allocations and investment (including taxonomy approaches).
   - Increase the potential for public finance to catalyse private investment by further empowering public finance institutions, *eg* by increasing lending authority and ability to co-invest.
   - Increase and improve capacities to assess, manage, and publicly disclose climate change-related financial risks, building on existing frameworks and approaches (*eg* TCFD).

Annexes

Annex I: Green Growth Readiness Assessment categories and indicators, illustrated using the results for Tunisia

1. Political commitment

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
High-level commitment, championing, and stakeholder buy-in	Champion – highest office in the country (PM/ President).	Medium	A whole chapter on GE in National Dev. Plan, but key GG-relevant strategies yet to be officially endorsed. Clean energy is championed by the PM, as demonstrated during the international presentation of the action plans for RE and EE (after international events in Tunis). The Law on RE was recently approved by the People's Assembly.
	Parliament-approved white paper on GG/CC.	No	Green Economy Strategy (GES) study finalised in 2016 but yet to be officially endorsed. No official endorsement yet either for the Sustainable Development and Climate Change Strategies.
	INDC submitted.	Yes	Tunisia's NDC is often cited as a model to be followed by other developing countries in terms of its quality. There are mentions of the sustainable development impacts of mitigation measures but no explicit alignment to SDGs.
	NDC available.	Yes	It does not include more ambitious goals than the INDC, it is the same document. The execution of some of the goals is contingent upon external financing, technology, and capacity building support.

2. Institutional and governance readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Inter-agency/ -sectoral/ -ministry coordination mechanisms Inclusive participation mechanism for planning and implementation (involvement of the private sector, academia, civil society)	Public sector accountability.	High	Tunisia ranks 7th in Africa for public sector accountability, with a score of 74.6, lower than that in the previous report (SDGCA & SDSN, 2018).
	Dependence of NDA on external support for planning and implementing NDC.	Low	Tunisian experts/civil servants participate but donors still provide critical support (both financial and technical). For example, UNDP is currently leading the NDC Roadmap project. GIZ also provides support for NDC implementation, NAMAs and LT-LEDS.
	Existence of lead institution with a clear mandate for CC/GG.	Yes	The Ministry of the Environment is in charge of both CC and green economy activities (*eg* Green Economy Strategy, Green Helpdesk, New CC Results-based Unit).
	Existence of inter-ministerial/-agency coordination committee.	No	It existed and met every 2-3 months until the revolution of 2011. Its non-existence implies a coordination deficit among ministries and agencies for Sustainable Development/the Green Economy.
	Functionality of inter-ministerial body (at least one meeting over one year).	N/A	Not applicable since there is no such body.
	Membership of inter-ministerial/agency committee including private sector and CSO.	N/A	Not applicable since there is no such body.
	CC and GG are part of the work programme/ activities of national private sector umbrella bodies (*eg* chamber of commerce).	Medium	The Tunis Chamber of Commerce has participated in a few ad-hoc international projects dealing with solar PV but does not have a CC/GG strategy. UTICA and UTAP[6] regularly participate in government consultations (through the COPILs[7]) but are not known to have in-depth, explicit CC/GG strategies or action plans. CONECT has already developed a CSR label with the help of CITET[8] and has recently hosted the 6th international conference on CSR.
	GCF readiness financing secured.	Yes	Readiness programme already under implementation. There is a petition by the GCF focal point to extend the readiness programme financing further.

6 UTICA and UTAP are respectively the Tunisian Union of Industry, Trade and Handicrafts, and the Tunisian Union of Agriculture and Fisheries. UTICA: http://www.utica.org.tn/Fr/, UTAP: http://www.utap.org.tn/language/en/

7 COPIL stands for 'Comité de Pilotage' (steering committee).

8 The International Center for Environmental Technologies of Tunis (CITET) is a non-administrative public establishment promoting capacity building and transfer of green technologies. Confederation of Citizen Enterprises of Tunisia (CONECT) is an employers' union that brings together small, medium and large Tunisian and foreign companies in different sectors of the Tunisian economy.

3. Policy and planning readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Green growth policy development Policy alignment with NDCs/SDGs Mainstreaming frameworks for NDCs/SDGs Action plans linked to disaster risk reduction	Govt.-endorsed green growth policy or strategy is available.	No	GE Strategy study ready since 2016 but yet to be officially endorsed.
	Roadmap for integrating SDGs into national development plans available.	No	A study is underway in cooperation with UNDP that will include a draft roadmap and a data gap analysis. First voluntary reporting on SDGs to be carried out in 2019.
	National development plan mentions CC and environmental issues.	High	The current five-year Development Plan (2016-2020) includes an entire chapter dedicated to sustainable development/green economy.
	SDGs mainstreamed into the national development plan (substantial SDG indicators included in the plan).	Low	The data gap analysis carried out as part of the UNDP-backed project mentioned above found that not all of the SDGs are adequately mainstreamed into the National Development Plan.
	National green growth policies/plans take into account disaster risk reduction (esp. related to climate impacts).	No	A study on an early warning system is available, but DRR is not considered in the Green Economy Strategy. An international forum on DRR recently took place in Tunis.[9]

9 Africa-Arab Platform on Disaster Risk Reduction (https://www.unisdr.org/conference/2018/afrp-acdrr).

4. Sectoral readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Sectoral costing reports for Green Growth (BAU *vs* GG scenarios) Feasible sectoral and private sector green growth strategies, investment and action plans (incl. quick & big wins) Sectoral plans, especially related to cities, incorporate disaster risk reduction measures	GHG emission targets available for major sectors (*eg* energy, agriculture, forestry).	Yes	These targets can be found in the 3rd National Communication to the UNFCCC, the NDC and the Tunisian Solar Plan (PST).
	Implementation targets by 2020/2030 available for major sectors (even if it is beyond 2030, *eg* 2050).	Yes	Energy: 1) 30% renewable electricity by 2030; 2) reduce energy intensity by 3% annually (2016-2020); 3) power station energy consumption will reduced by 3% by 2020 and transmission losses reduced over the same period from 16% to 12%. Agriculture & Fisheries By 2020: 1) 60% reuse of treated waste water in agriculture; 2) energy savings of 30%; 3) regeneration and protection of 1.7 million ha of vulnerable lands; and 4) 1.5 million ha dedicated to organic agriculture by 2030. Transport: Increase public transit share from 30% to 40% by 2020.[10]
	Sector policies / strategies/programmes address CC/ environmental issues (energy/water/agriculture).	Low	There is no systematic effort across the board but, rather, several separate initiatives by each ministry's technical teams. The most attention to CC/ environmental issues has been paid in the energy, health, and tourism sectors, and most of all the agriculture sector. In the latter two, the focus appears to have been primarily on CC impacts and adaptation needs.
	Climate action investment plans/roadmaps available for major sectors.	Medium	Action plans for major sectors are included in the National Climate Change Strategy and the NDC. However, the urgently needed NDC implementation roadmap is still under development.
	Cost assessments for major sectors for climate action/green growth available.	Yes	A preparatory Study for the Elaboration of the Green Economy Strategy includes a costing exercise for the following sectors: tourism, buildings, transport, industry, energy, waste, forests, water, and agriculture. The NDC includes an estimate of investment needs for both mitigation and adaptation.
	Climate risk zones – at least major cities – assessed and available.	Medium	Studies have been conducted on CC impacts on and potential adaptation measures for the agricultural, tourism and health sectors. The Agency for Protection and Management of Coastal Zones (APAL) is working on this with the support of the UNDP (APAL, 2021). An international forum on DRR recently took place in Tunis.[11]

10 Mostly as referred to in the Study for the Elaboration of a Green Economy Strategy in Tunisia (2016) and the National Development Plan (2016-2020).
11 Africa-Arab Platform on Disaster Risk Reduction (https://www.unisdr.org/conference/2018/afrp-acdrr).

5. Legal and regulatory readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Green growth advancement regulations, incentives or arrangements	Incentives – Duty exemption for major RE technologies.	Yes	Tax exemptions for RE equipment imports were introduced as early as 1995 (Decree 95/744 of April 24). Decree No. 2010-1521 of June 21, 2010 modified and completed these exemptions. This decree determined lists of raw materials and products necessary for the manufacture of equipment used in energy conservation or RE, as well as of equipment used in energy conservation or RE.
	Level of subsidies for major fossil fuels (*ie* petrol, natural gas, and diesel).	High	The Government has a policy to phase these out gradually. The WB recently signed a $500 million agreement to support key reforms in Tunisia, including support for the creation of a more sustainable and greener energy sector through the shift of resources from fossil fuel subsidies to green energy (World Bank, 2018b).
	Mandatory environmental and social impact assessment systems in place for medium to large projects.	Yes	SEA not yet institutionalised (no formal provisions) but starting to be used for big policies/plans/programmes. EIA is mandatory according to Law No. 88, 1991 and Decree No. 362, 1991. The Environmental Protection Agency (ANPE) is the main administrative body; it must give environmental approval before the competent authority can approve the project.
	Level of enforcement of environmental laws and regulations.	Low	Environmental policy enforcement is the mandate of municipalities/local level authorities, as part of the decentralisation process enshrined in the new constitution. However, there are still few resources available for enforcement.

6. Financing and budgeting readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Financing mechanisms for private sector participation exist and are implemented	Existence of National Implementation Agency or funding mechanism for clean technologies.	Yes	FTE (Energy Transition Fund); FODEP (Pollution Reduction Fund); FODEC (Competitiveness Development Fund), which undertakes sustainable development investments; and the PMN for Industry (National Upgrade Program), which undertakes environmental investments (supported by CITET).
	Incentives and/or financing mechanisms available for major sectors.	Yes	Some are provided through the funding mechanisms mentioned above (FTE, FODEP, FODEC and PNM) as grants/subsidies, and all are reflected in the annual budget of the state. They also contribute to the goal of encouraging project leaders to invest in green activities and create green and decent jobs. payment for ecosystem services (PES) is mentioned as a priority for the agricultural sector (in the study for the National Strategy for the GE) but has not yet been implemented.
	Flow of climate finance.	Low	GCF readiness programme under implementation. One GCF concept note under preparation for a programme with 3 projects to be implemented in 9 provinces: 1) food-water-energy nexus; 2) coastal resilience; and 3) CCA. Tunisia is part of a multi-country programme on smart cities that was approved at the GCF Board meeting in October 2018. Several NAMAs are under preparation or have recently entered the implementation phase (transport, RE, EE, waste, forests, cement sector, and buildings).
	Flow of FDI in renewable energy.	Low	Tunisia's efforts to transition to RE have only recently begun in earnest (in 2009, with the development of the first wind farm of 54 MW).[12] As of 2019, the country had 373 MW of installed, operational RE capacity (245 MW on-shore wind, 66 MW hydro and approx. 62 MW solar PV, mostly for self-consumption; IRENA, 2020), which represents a scant 3% of total electric power generation. On the other hand, and as mentioned before, Tunisia has a clear political mandate and support for the acceleration of investment in RE.
	National budget structure is modified to allocate for SDG/NDC implementation.	-	Adequate information not available at the time of writing.

12 Surface of installed SWH thanks to PROSOL programme not included as part of the comment.

7. R&D, technology, and innovation readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Mitigation and adaptation technologies, innovation and intellectual property rights	Availability of Technology Needs Assessment (TNA) reports.	Yes	Tunisia has submitted its TNAs for adaptation and mitigation. The latest versions date from 2017 (focus on water, agriculture, and coastal/marine zones) and 2016 (focus on industry and transport sectors).
	National science, technology and innovation policy – address issues of climate/environment.	Low	Not explicitly/not very detailed.
	Public R&D financing available.	Low	Tunisia currently assigns 0.6% of GDP to R&D. However, it takes a generic approach, without targeting specific clean technologies. The government is paying increasing attention to research axes related to the GE and the budget allocated to research has increased by 50% since 2018.
	Existence of national intellectual property office.	Yes	Tunisia is a member of the World Intellectual Property Organization (WIPO) and signatory to the UN Conference on Trade and Development (UNCTAD). The agency responsible for patents and trademarks is the National Institute for Standardization and Industrial Property (INNORPI), created in 1982, under the Ministry of Industry. Tunisia is party to the Madrid Protocol for the International Registration of Marks.

8. Human resources and capacity readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Institutional set-up and capacity development Availability of employment VET programmes for green sectors, such as solar PV and sustainable waste management Mainstreaming of green curriculum in major universities	Green employment (share of green jobs to total).	Low	It has recently been reported that the number of green jobs stood at almost 110,000 in 2010 (with the largest share in agriculture, followed by public administration and the water and waste sectors; ILO, 2018c). The National Agency for Employment and Independent Work (ANETI) has recently finished a study determining how different types of jobs should be recorded (toolkit and baseline that must be used).
	Proportion of graduates in STEM areas.	-	Adequate information not available at the time of writing.
	Environmental science/ climate change is part of primary and secondary education curricula.	No	A project supported by the Portuguese Institute for Development Support has recently been launched to introduce basic elements into the curriculum.
	Existence of TVET on RE technologies, climate-smart agricultural practices.	Low	Vocational training in Tunisia falls primarily under the responsibility of the Ministry of Vocational Training and Employment (MFPE) through the Tunisian Agency for Vocational Training (ATFP). While the public vocational training centres under the responsibility of the ATFP offer a wide range of programmes, there are four priority sectors (as of September 2012): building and construction, general engineering and steel construction, electricity and electronics, and tourism and the hotel business. TVET for RE is in its infancy. There have been several donor-funded initiatives, such as the project 'Capacity and human resource building for solar market development in Tunisia (RCH-DMS)' (SDGCA & SDSN, 2018).
	Availability of national environmental awareness programmes or public mobilisation activities.	Low	Some stakeholders in the public sector have recognised the need for enhanced public awareness of green growth, climate change and SDGs. According to the Environment Ministry, the government intends to undertake information and communications campaigns.
	Number of NGOs working in the area of CC and environment.	High	Rapidly increasing and with a good technical skills level. There are forums every week and weekly radio programmes. In every municipality one can find 2-3 associations that work on CC/environment.

9. Monitoring and reporting readiness

ASSESSMENT PARAMETERS/ CATEGORIES	INDICATORS	STATE/ LEVEL	DESCRIPTION
Existence of MRV systems for key sectors Climate vulnerability assessment available	Government statistical capacity – overall (global SDG indicator).	Medium	Tunisia comes in 27th place in the global ranking (with a score of 62.2) and a negative trend since the last report (SDGCA & SDSN, 2018).
	A national MRV system is operational.	No	The government is finalising an MRV system for climate change (including climate finance) as part of the GCF readiness programme. This system has been developed by the consultancy Climate Analytics.
	Early warning systems are in place or are being established to enhance preparedness for climate-related hazards.	Low	Several studies have been conducted but no systems have been developed. The government is currently trying to develop a system in the Upper Medjerda Valley. It has produced a preliminary idea note and would like to develop a concept note to access funding from the GCF. Co-financing is expected from the German development bank, KfW.
	National statistical agency is reporting on major environmental indicators.	Low	Different agencies, including the National Waste Management Agency (ANGED) and the Tunisian Observatory for Environment and Sustainable Development (OTEDD), provide data about major environmental indicators to the National Statistics Institute (INS). There many indicators with old data. OTEDD publishes a report on the State of the Environment with low frequency (not annually). The latest one dates from 2008.
	Dependence of current statistical capacity on external assistance.	Medium	Only for very large surveys. *Institut Panafricain de Statistiques à Tunis*.
	Evaluations of applicability and alignment of global SDG indicators have been conducted.	No	First voluntary evaluation is planned for 2019.

Annex II: Online survey description and questionnaire

The following was shared with respondents:

This survey is part of a joint study of the African Development Bank (AfDB) and the Global Green Growth Institute (GGGI) to assess Green Growth Readiness in Africa to achieve each country's Nationally Determined Contributions (NDC) under the Paris Agreement and Sustainable Development Goals (SDGs) under UN's Agenda 2030. The survey should take approximately 10 minutes to complete and is designed to capture stakeholder perceptions on green growth readiness in categories such as policy, institutional arrangement, financing. Your responses will be strictly confidential and participation is completely voluntary. Any personal and sensitive information provided will remain confidential and will be used only for the purpose of this study. For questions regarding the survey, you may contact Dr Denis Rugege (GGGI consultant) at denis.rugege@gmail.com, copy to pranab.baruah@gggi.org and G.NJUME@afdb.org .

We value the views of well-informed stakeholders like you in conducting the evaluation that would contribute towards better programme design by intergovernmental organisations such as AfDB and GGGI. Thank you very much for your time and support.

Kindly note that you may not fill in your name and email address asked in the survey. Should you decide to provide this information, we will seek your prior permission separately before including in the assessment report.

Respondent profile:

Please select the country for which you would provide your responses (drop-down list of 54 countries of Africa)

Your institutional Affiliation

Government official

International Organization

Academia

Private Sector

Civil Society Organization

Other (please specify):

Your professional function

Permanent Secretary,

Director-General

Director

Manager

Technical specialist/officer

Other (please specify)

Name of the ministry/agency/institution you are affiliated to (optional)

Your name (optional)

Your email (optional)

Political commitment:

QUESTION/SURVEY PROPOSITION	PERCEPTION/COMMENTS
Political commitment: Government at executive level has committed itself to the green growth agenda including implementation of NDCs and SDGs (*eg* pronouncements of Head of State, Head of Government or member of Cabinet)	Strongly Agree Agree Not sure Disagree Strongly Disagree
If you answered 'agree' or 'strongly agree', please provide links to speeches, pronouncements/statements eg by President, Prime Minister, Member of Cabinet etc.	*Respond here*
Champions are actively pushing the implementation of NDC of the country (*eg* convening high-level awareness-raising and debate at summit level and national platforms)	Strongly Agree Agree Not sure Disagree Strongly Disagree
If you answered 'agree' or 'strongly agree', please provide examples of institutions, agencies or individuals championing NDC implementation	*Respond here*
If you answered 'agree' or 'strongly agree', please provide examples and dates of recent NDC related summits or national events that took place	*Respond here*
There is strong stakeholder buy-in for NDC implementation, indicated through interactions in summits or national forums	Strongly Agree Agree Not sure Disagree Strongly Disagree

Institutional and governance readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Is there an established and operational lead national institution with the mandate to lead the green growth agenda?	Yes: established and operational Yes: established but NOT fully operational No Do not know
If you answered 'Yes', please name the unit/agency/ministry with the mandate for green growth implementation	*Respond here*
Is there an established and operational lead national institution with the mandate to support the development and implementation of NDCs across ministries and agencies?	Yes: established and operational Yes: established but NOT fully operational No Do not know
If you answered 'Yes' above, please name the unit/agency/ministry with the mandate for NDC development and implementation	*Respond here*
Is there an established and operational lead national institution for supporting the implementation of SDGs across ministries and agencies?	Yes: established and operational Yes: established but NOT fully operational No Do not know
If you answered 'Yes', please name the unit/agency/ministry with the mandate for supporting SDG implementation	*Respond here*
Is there a lead national institution, such as national statistical agency/institute, mandated with SDG indicators/ data management?	Yes No Do not know
If you answered 'Yes', please name the unit/agency/ministry for SDG indicators/data management	*Respond here*
Is there an inter-ministerial coordination mechanism or taskforce to coordinate the implementation of NDCs or SDGs?	Yes: for SDGs only Yes: for NDC only Yes: for NDC and SDGs No Do not know
If you answered 'Yes', please indicate the name of the coordination mechanism, framework or structure	*Respond here*
Are there participation and feedback platforms established for multiple stakeholders (government agencies, civil society, academia, private sector *etc*) on the implementation of a strategy on green growth, NDC or the SDGs?	Yes No Do not know
If you answered 'Yes', please name of such platforms you are aware of	*Respond here*

Policy and planning readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Has the government adopted a national green growth strategy?	Yes No Do not know
Has the government adopted implementation action plans/roadmaps to implement the national green growth strategy?	Yes No Do not know
If you answered 'Yes', please provide information that you may be aware of on the national green growth action plans (eg web link, date of adoption etc)	*Respond here*
Has the government adopted an action plan to implement the country's NDC (*eg* implementation roadmap/action plan for energy sector, adaptation action plan *etc*)	Yes No Do not know
If you answered 'Yes', please provide information that you may be aware of, on the NDC implementation action plan(s) (eg web link, date of adoption etc)	*Respond here*
Do you think the country's NDC and green growth strategies/plans/programmes are aligned to the national development agenda and plans?	Strongly aligned Moderately aligned No alignment Do not know

Sectoral readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Are there sector and/or private sector green investment plans developed that are based on NDC and/or green growth action plans (*eg* project list of renewable energy etc.)?	Yes No Do not know
If you answered 'Yes', please name key sector or private sector investment plans that you may be aware of (provide web links etc)	*Provide response here*

Legal and regulatory readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Do you agree that there are key green growth regulations and/or incentive frameworks in place to promote the implementation of NDCs and SDGs (eg subsidies for sustainable transport/renewables, clear regulation for off-grid renewables, green buildings *etc*)?	Strongly Agree Agree Disagree Not sure Strongly disagree
If you answered 'agree' or 'strongly agree', please provide information on key green growth regulations/ incentives you may be aware of (eg subsidies such as feed-in-tariff and reduced VAT for renewable energy technologies, set-up of eco-industrial zones, operational REDD+ schemes, regulations for green mini-grids etc)	*Provide response here*

Financing and budgeting readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Does the government have means or a strategy for financing climate action (NDC) and the SDGs?	Yes No Do not know
If you answered 'Yes', please provide information on source/means or strategy for financing the NDC/SDGs	*Provide response here*
Is there a national mechanism (*eg* national green/sustainability fund) for mobilising and disbursing national and multilateral climate finance across sectors and local administrative levels?	Yes, there is a fund/mechanism that successfully mobilised and disbursed external funds Yes, there is a fund/mechanism but not yet operational No fund/mechanism, but it is planned No fund/mechanism and it is not planned Do not know
If you answered 'Yes', please provide the name of the mechanism/institution/entity	*Provide response here*
Is private sector participation clearly pursued in the funding mechanisms/frameworks (indicated above in question 6.2)?	Yes, the fund/mechanism has successfully engaged private sector entities Yes, but private sector participation/ projects are not adequate through the fund/mechanism No Do not know
If you answered 'Yes', please provide examples of private sector financing/projects through the fund/mechanism	*Provide response here*
Are there national implementation agencies/entities/banks that have been accredited by the Green Climate Fund (GCF) or similar financing entities for direct access of climate finance for the country?	Yes No, but in process No and not in process Do not know
If you answered 'Yes', please provide names the agencies/entities/banks	*Provide response here*

Research and development, technology, and innovation readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Are priority climate change mitigation, adaptation and resource efficient technologies for key sectors (*eg* energy, agriculture *etc*) identified and documented at national level?	Yes No Do not know
If you answered 'Yes', please indicate such efforts (eg name of project, web-link)	*Provide response here*

Human resources and capacity readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Do you think that green growth curricula, for example for renewable energy technology and sustainable waste management *etc*, are included in major universities and TVET (vocational training) institutions?	Strongly Agree Agree Not Sure Disagree Strongly Disagree

Monitoring and reporting readiness:

QUESTION/SURVEY STATEMENT	PERCEPTION
Do you think that monitoring and evaluation systems for NDCs SDGs are (or will be) integrated within the implementation plan for respective project or programme?	Strongly Agree Agree Not Sure Disagree Strongly Disagree
Please indicate major monitoring, reporting, and/or communication issue challenges for NDC and SDG implementation? How, in your opinion, could these be addressed?	*Provide response here*
What are primary reporting and communication mechanisms for NDCs and SDGs?	*Provide response here*

Annex III: List of participants

African Green Growth Readiness Assessment Stakeholder Consultation Workshop (Kigali Convention Centre, Kigali, Rwanda)

* Affiliation and title listed are at the time of the workshop

S/N	Institution/Affiliation*	Name of Official	Title*
GABON			
1	Conseil National Climat	Mme. Anaëlle F. Raoumbé Djendja	Conseiller du Président de la République Gabonaise
2	Stratégie Nationale de Développement Durable	Gislin MBYE NTOMA	Economiste du Développement Durable
KENYA			
3	Ministry of Energy	Benson M. Mwakina	Director, Renewable Energy
4	Climate Care	Joash Obare	Project Manger
5	Ministry of Environment and Forestry	Augustine Kenduiwo	Deputy Director - Climate Change and Green Growth
TUNISIA			
6	Ministry of Agriculture	M. Chokri Zairi	Coordinator of the MARHP Climate Change Committee
7	Ministry of Environment and Local Affairs	M. Mohamed Zmerli	Environment Program Coordinator; Agronomy & remote sensing
SENEGAL			
8	PACEV	Baba Dramé,	PACEV Coordinator
9	National Agency of Statistics and Demography	Mbaye FAYE	Director of Statistical Information Management
MOROCCO			
	Institution/Affiliation	**Name of Official**	**Title***
10	Secretary of State in Charge of Environment	Slimane Maliki	Chef de Service de la prospective, Direction de l'Observation, des Études et de la Planification
11	CGEM - General Confederation of Moroccan Enterprises	Rajaa Rochd	Responsable Développement de l'Initiative Entreprises Climat Maroc de la CGEM
12	Commission de régionalisation avancée du conseil économique, social et environnemental (CESE) – Coordinateur de l'alliance marocaine pour le climat et le développement durable (AMCDD)	Abderrahim Ksiri	Président

RWANDA			
	Ministry of Environment	Juliet Kabera	Director General-Environment and Climate Change
	Rwanda Environment Management Authority (REMA)	Coletha Ruhamya	Director General (NDA for GCF and UNFCCC DNA)
	Rwanda Green Fund (FONERWA)	Hebert Ruzibiza	CEO – FONERWA
	National Industrial Research and Development Agency (NIRDA)	Steven Niyonzima	National Coordinator – Rwanda Resource Efficient and Cleaner Production Centre
AFRICAN DEVELOPMENT BANK			
	Climate Change and Green Growth Department	Anthony Nyong	Director
	Climate Change and Green Growth Division	Al Hamndou Dorsouma	Manager
	Africa NDC Hub	Davinah Milenge	Principal Coordinator
	Climate Change and Green Growth Division	Gerald Esambe Njume	Climate Change Specialist
	Climate Change and Green Growth Division	Diego Fernandez	Climate Change Specialist
GGGI			
	Africa Regional Office	Dexippos Agourides	Africa Regional Director
	Office of Thought Leadership	Pranab Baruah	Principal Specialist – green growth
	Office of Thought Leadership	Denis Rugege	Consultant
	Rwanda Country Program	Okechukwu Daniel Ogbonnaya	Lead – Green Growth
	Rwanda Country Program	Brigitte Nyirambangutse	Senior Officer
	Rwanda Country Program	Michelle DeFreese	Senior Officer
	Rwanda Country Program	Arrabothu Dheeraj	Senior Green Building Officer
	Rwanda Country Program	Pamela Birungi	Senior Officer, Communications

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